PDABL 08

REPUBLIC OF INDONESIA
MINISTRY OF PUBLIC WORKS
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT

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Irrigation Sub Sector Project (ISSP)
Project Preparation ISSP-2

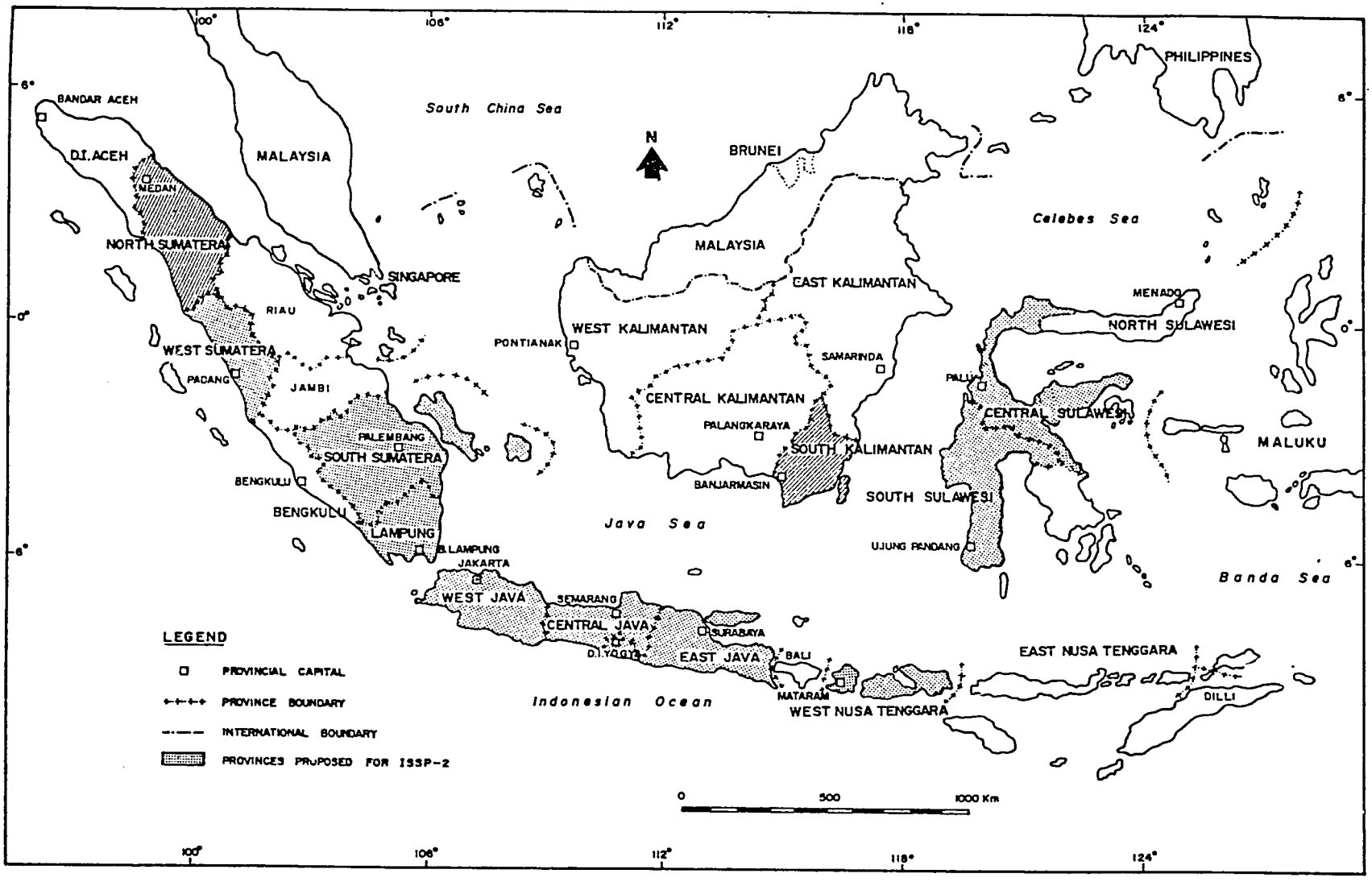
FINAL REPORT

AUGUST 1990

Lavalin International Inc.
in association with
Euroconsult
Sir M MacDonald & Partners
Indec & Associates Ltd.

'REFACE

The preparation team would like to thank the many officials and consultants in the provinces and at the centre in the Ministry of Public Works, the Ministry of Home Affairs, the Ministry of Finance and the Ministry of Agriculture for their support and advice. Without this invaluable assistance, it would have been impossible to complete this report in the time available.


PROJECT LOCATION
South China Sea
Celebes Sea
Java Sea
Banda Sea
Indonesian Ocean
N
PHILIPPINES
BRUNEI
MALAYSIA
SINGAPORE
BANDAR ACEH
D.I.ACEH
MEDAN
NORTH SUMATERA
RIAU
WEST SUMATERA
PADANG
JAMBI
PALEMBANG
SOUTH SUMATERA
BENGKULU
BENGKULU
LAMPUNG
B.LAMPUNG
JAKARTA
WEST JAVA
SEMARANG
CENTRAL JAVA
D.I.YOGYA
SURABAYA
EAST JAVA
BALI
MATARAM
WEST NUSA TENGGARA
EAST NUSA TENGGARA
DILLI
PONTIANAK
WEST KALIMANTAN
CENTRAL KALIMANTAN
PALANGKARAYA
SAMARINDA
EAST KALIMANTAN
SOUTH KALIMANTAN
BANJARMASIN
MENADO
NORTH SULAWESI
PALU
CENTRAL SULAWESI
SOUTH SULAWESI
UJUNG PENDANG
MALUKU
LEGEND
PROVINCIAL CAPITAL
PROVINCE BOUNDARY
INTERNATIONAL BOUNDARY
PROVINCES PROPOSED FOR ISSP-2
0
500
1000 Km
100°
106°
112°
118°
124°
6°
0°
6°

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IRRIGATION SYSTEM DATA VOLUME

CHAPTER 1

PROJECT AND SECTOR BACKGROUND

1.1 Agriculture and Food Crop Sector

The agriculture sector accounted for 24% of GDP, 55% of employment and 39% of non-oil exports in 1988. It is the largest sector of the economy and some 60% of rural households depend on agriculture for their livelihood. In Indonesia about 23.5 million ha is under cultivation of which about 5.3 million ha is irrigated. Rice is the dominant food crop in Indonesia and accounts for some 62% of the annually harvested area. Maize (17%), cassava (8%) and soya beans (6%) are also important subsidiary food crops.

An average annual food crop sector growth rate of about 5% per year has been achieved since 1978, although in recent years the actual annual rate has been reduced to between 2% and 4%. Growth in polowijo crops (maize, soya and groundnuts) has also been impressive.

Annual paddy production has risen from about 18 million tonnes in 1969 to 41 million tonnes in 1988. Despite a high population growth rate and increasing per capita consumption of rice from about 100 kg/year in 1976 to 140 kg/year in 1988, rice self sufficiency was achieved in 1985/86 and has been maintained thereafter to date. It is estimated by IFPRI and others that an average annual growth rate of 2.2% will be needed in the future to maintain rice self sufficiency. The Government plans to achieve this by improving the operation and maintenance of existing irrigation systems; by prudent expansion of irrigated areas, where there are suitable under-utilised land and water resources which can be developed economically; and by improving the effectiveness of the various programmes for agricultural support.

1.2 Project Background

During Repelita IV, it became apparent that the major contribution to increases in rice and other food crop production resulting from investment in the rehabilitation and expansion of irrigation infrastructure would not be sustained unless there was a greater commitment to the efficient operation and maintenance of existing infrastructure. This increased awareness of the importance of proper operation and maintenance (O&M) has resulted in a shift of emphasis in the Government of Indonesia's development programme for Repelita V towards the improvement of O&M in all sectors and particularly in the irrigation sub-sector.

The total expenditure on irrigation development during the 15 year period of Repelita I-III (1969-1984) was about Rp. 3,020 billion, with 23% provided by foreign assistance. In Repelita IV (1984/85 - 1988/89) development expenditure in the irrigation sub-sector was Rp 3,800 billion with some 70% provided by foreign assistance. This represented a reduction in capital investment in real terms as a result of the severe reduction in oil revenues, although O&M expenditure was maintained in real terms. In Repelita V the target expenditure for the irrigation subsector is about Rp 8,500 billion with 47% provided by foreign assistance. Priority has been given to improving O&M for existing irrigation and drainage systems. Emphasis is also given to the expansion of irrigation areas (especially in areas targeted for transmigration), and to river and flood control. The objective of this programme is to ensure production of adequate food crops as population continues to expand.

In October 1987 the Government of Indonesia issued a new set of policies on O&M and cost recovery. This Policy Statement stipulates that within a period of 15 years, efficient O&M will be introduced in irrigation systems throughout Indonesia and that the cost of O&M will be recovered directly from the beneficiaries. More effective funding O&M mechanisms will be developed through:

- the transfer of responsibility for funding O&M expenditures to local governments;
- the introduction of a nationwide irrigation service fee which eventually will finance all O&M costs of the main irrigation system through direct contributions from the water users;
- improved indirect cost recovery through introduction of the PBB tax and phasing out of the former IPEDA system;
- turnover of Government controlled irrigation systems of less than 500 ha to water user associations.

The implementation of these policies has been maintained through IBRD and ADB funded projects. The programme for improvement of O&M in the irrigation sub-sector was spear-headed by the first time slice of the IBRD supported Irrigation Sub-Sector Project (ISSP-1) which commenced in 1987/88 financial year and was due to end in 1989/90. This project was focused on the irrigation sub-sector (both surface water and groundwater) but also included smaller components concerned with swamps and rivers. The project was aimed at improving and maintaining physical infrastructure, supporting policy and institutional reforms for the promotion of improved O&M and the raising of additional O&M funding through the introduction of PBB tax and irrigation service fees (ISF).

As part of the improvement and maintenance of physical infrastructure, financial support and technical assistance was provided for:

- the completion of on-going projects for irrigation, swamps and rivers;

- the improvement of existing irrigation and swamp systems and river mouths through special maintenance in order to get them into a suitable condition for improved operation and maintenance;

- the introduction of efficient operation and maintenance for irrigation and swamp systems;

- groundwater irrigation development.

In support of institutional and policy reforms, financial support and technical assistance was provided for:

- introduction of the irrigation service fee in pilot areas;

- turnover of small irrigation systems to the farmers;

- water users association strengthening and training;

- on the job and formal training of government staff;

- Institutional Strengthening Study;

- Environmental Impact Study;

- Investment Strategy Study;

- Project implementation monitoring MIS;

- Project benefit monitoring and evaluation.

ISSP-1 components were distributed over 17 provinces and Jatiluhur. A matrix of provinces and components is shown in Figure 1.2.1.

The second time slice of the Irrigation Subsector Project (ISSP-2) is planned to continue development of improved operation and maintenance, based on the work programme started under ISSP-1.

DISTRIBUTION OF ISSP-1 PROJECT COMPONENTS AMONG PROVINCES

Figure 1.2.1

Province / Project Components	W JAVA 1	JATILUHUR 2	YOGYAKARTA 3	C JAVA 4	E JAVA 5	NTB 6	N SULAWESI 7	C SULAWESI 8	S SULAWESI 9	ACEH 10	BENGKULU 11	W KALIMANTAN 12	C KALIMANTAN 13	N SUMATERA 14	W SUMATERA 15	S SUMATERA 16	LAMPUNG 17	S KALIMANTAN 18
1. IRRIGATION																		
a. On-going Projects							■	■	■	■	■	■	■		■	■	■	■
b. Special Maintenance	■	■	■	■	■	■			■						■	■	■	
c. Efficient O&M	■	■	■	■	■	■			■						■	■	■	
d. I.S.F.		■		■	■				■									
e. Turn over of Small Schemes to WUAs	■		■	■	■	■			■						■			
f. O&M Staff Training	■	■	■	■		■			■						■	■	■	
2. SWAMPS																		
a. On-going Projects											■			■			■	
b. Special Maintenance														■	■	■	■	■
c. Efficient O&M														■	■	■	■	■
d. O&M Staff Training														■	■	■	■	■
3. RIVERS																		
a. On-going Projects	■			■	■	■												
b. River Mouths	■			■	■									■	■			
4. GROUNDWATER DEVELOPMENT					■	■		■	■									
5. TRAINING PROGRAMME	■	■	■	■	■	■			■					■	■	■	■	■
6. PROVINCIAL DESIGN UNIT									■								■	
7. LAND RECLASSIFICATION PROGRAMME				■	■	■			■					■	■	■		
8. ENVIRONMENTAL STUDIES	■				■				■									
9. PME	E		■	E	E	■			■					E	■	■	■	■
MIS				■													■	
10. INVESTMENT STUDY	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
11. INSTITUTIONAL STRENGTHENING STUDY	■		■	■	■	■			■					■	■	■	■	■

■ Projects Approved by World Bank

E Existing PME

4

1.3 Irrigation Sub-Sector

1.3.1 Surface Irrigation

The total potential area of irrigated sawah in Indonesia as listed in the 1988 Buku Pintar Daerah Irigasi P.U. is 4.4 million ha. of which some 3.8 million ha. is denoted as irrigated sawah at present. Of this area 2.3 million ha. (60%) is classified as technical irrigation. The irrigated areas in W Java (21.4% of the total area), C Java (20.5%) and E Java (24.2%) together total 2.5 million ha. The next most important provinces for irrigated agriculture are S Sulawesi (5.5%), W Sumatera (4.2%), N Sumatera (4.2%) and West Nusa Tenggara (3.9%). The remaining 20 provinces contribute only 0.6 million ha, 16.1% of the total irrigated area. Details of the irrigated sawah in each province are listed in Table 1.3.1. There are reported to be 6,731 irrigation systems (DIs) in Indonesia of which 86% are less than 1,000 ha in area and only 2% are greater than 5,000 ha. In reality a significant number of DIs are combinations of hydrologically separate systems and so the total number of small schemes is probably understated.

In addition to these areas there are more than 0.5 million ha of village irrigation schemes (mainly in Java and Sumatera) which are not listed in the Buku Pintar Daerah Irigasi P.U. and whose extent and location are not precisely known.

In the Repelita V programme for irrigation (excluding swamp development), it is planned to complete 876,700 ha of special maintenance and introduce efficient operation and maintenance to 2,157,000 ha. Details of the programme for each province are given in Tables 1.3.2 and 1.3.3.

There are also some 1 million ha of swamp reclamation and tidal irrigation schemes. These are described in Section 1.3.2.

Development and improvement of irrigation has been supported by IBRD, ADB and various bilateral aid agencies of which the most significant is OECF.

The most significant IBRD supported projects which directly affect the formulation of ISSP-2 are the first time slice of Irrigation Sub Sector Project (ISSP-1), West Java Irrigation Project (WJIP), Central Java Irrigation Project (CJIP), East Java Irrigation Project (EJIP) and the Second Provincial Irrigation Development Project (SPIDP). EJIP was the first provincially based irrigation project with the objectives of rehabilitating existing irrigation schemes, developing and introducing improved operation and maintenance procedures and strengthening the capability of the provincial irrigation service (PRIS). This project is now substantially complete but has laid the foundations for improved O&M and prepared many DIs in E Java for the introduction of direct efficient O&M (DEOM) under ISSP-1 and now ISSP-2. WJIP and CJIP are similar province based projects to EJIP but started in October 1986 and planned to continue until September 1991. ISSP-1, which is briefly described in Section 1.2, developed out of these three projects, started in April 1987 and was planned to continue for three years but some activities have been extended until the end of March 1991 when ISSP-2 is planned to begin. In addition the proposed Provincial Integrated Agricultural Development Project (PIADP) also affects the formulation of ISSP-2 because on-going projects originally in ISSP-1 will be transferred to PIADP together with other on-going projects from SPIDP and other irrigation development programmes. As these PIADP schemes are completed and handed over to PRIS for O&M they will become available for inclusion in the ISSP-2 DEOM programme.

Recent ADB supported projects which affect ISSP-2 include the Third Irrigation Sector Project (TISP), Nusa Tenggara Agricultural Development Project (NTADP) and the Integrated Irrigation Sub Sector Project (IISP). TISP is concentrated on selected districts within the provinces of Aceh, N Sumatera and Maluku. It began in 1988 and will continue for five years. Its objectives and scope are similar to those of ISSP-1 although implementation details are

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Table 1.3.1 Distribution of Irrigated Areas in Indonesia

Province	No of DIs	Total Pot. Area (ha)	Irrigated Sawah (ha)	Proportion of Total (%)
Aceh	267	128,706	107,280	2.8
N Sumatera	542	200,494	159,994	4.2
W Sumatera	937	203,659	161,319	4.2
Riau	66	24,424	8,828	0.2
Jambi	97	26,190	13,886	0.4
S Sumatera	68	63,730	47,325	1.2
Bengkulu	253	53,164	36,706	1.0
Lampung	108	169,002	86,253	2.3
DKI Jaya	28	15,053	8,945	0.2
W Java	1,241	898,187	817,969	21.4
C Java	737	808,304	781,900	20.5
Yogyakarta	336	57,746	52,550	1.4
E Java	781	946,962	925,418	24.2
Bali	185	86,867	79,319	2.1
West Nusa Tenggara	284	174,212	148,403	3.9
East Nusa Tenggara	74	39,927	21,415	0.6
Timor Timur	9	7,313	6,042	0.2
W Kalimantan	85	12,148	9,104	0.2
Central Kalimantan	7	4,096	2,139	0.1
S Kalimantan	47	21,873	10,729	0.3
E Kalimantan	75	19,590	5,619	0.1
N Sulawesi	134	64,490	48,149	1.3
Central Sulawesi	102	67,931	40,884	1.1
S Sulawesi	189	239,308	210,244	5.5
S.E. Sulawesi	56	31,818	16,098	0.4
Maluku	15	15,683	9,848	0.3
Irian Jaya	8	6,884	2,291	0.1
Total	6,731	4,387,761	3,818,657	100

Table 1.3.2 Repelita V Special Maintenance Program

No.	Province	Area (ha) 89/90	90/91	91/92	92/93	93/94	Total
1	Aceh	2,512	6,200	7,000	7,500	8,000	31,212
2	North Sumatera	7,559	10,000	8,000	13,500	14,000	53,059
3	West Sumatera	1,822	18,100	16,000	17,000	21,000	73,922
4	Riau	0	5,400	4,000	4,900	6,000	20,300
5	Jambi	0	0	0	0	0	0
6	South Sumatera	1,363	5,600	7,500	8,000	10,000	32,463
7	Bengkulu	0	6,000	4,500	5,000	5,000	20,500
8	Lampung	2,130	6,000	5,000	6,000	8,000	27,130
9	DKI Jaya	0	0	0	0	0	0
10	West Java	4,663	26,099	27,000	26,000	28,000	111,762
11	Central Java	3,839	36,509	25,000	18,000	20,000	103,348
12	Yogyakarta	1,250	8,186	5,000	5,000	6,000	25,436
13	East Java	3,950	59,271	25,300	22,000	24,000	134,521
14	West Kalimantan	0	0	0	0	0	0
15	Central Kalimantan	0	0	0	0	0	0
16	South Kalimantan	0	0	0	0	0	0
17	East Kalimantan	0	0	0	0	0	0
18	North Sulawesi	0	7,500	3,500	4,500	5,600	21,100
19	Central Sulawesi	0	7,500	2,500	2,500	3,500	16,000
20	South Sulawesi	15,896	6,301	8,750	11,000	11,000	52,947
21	South East Sulawesi	0	5,300	2,200	4,200	5,000	16,700
22	Bali	0	5,500	2,900	3,500	4,600	16,500
23	West Nusa Tenggara	1,500	6,612	4,000	4,800	7,800	24,712
24	East Nusa Tenggara	0	300	3,600	3,600	3,500	11,000
25	Maluku	0	0	1,000	2,000	2,000	5,000
26	Irian Jaya	0	0	0	0	0	0
27	East Timor	0	0	0	0	0	0
Sub Total		46,484	226,378	162,750	169,000	193,000	797,612
	Jatiluhur	6,441	30,656	16,000	12,380	13,570	79,047
Total		52,925	257,034	178,750	181,380	206,570	876,659

Table 1.3.3 Repelita V EOM Programme

No.	Province	Area (ha) 89/90	90/91	91/92	92/93	93/94	To end Repelita V
1	Aceh	3,800	6,992	22,401	53,274	83,869	83,869
2	North Sumatera	32,815	48,309	70,561	94,389	118,889	118,889
3	West Sumatera	21,085	23,875	34,375	42,885	54,675	54,675
4	Riau	0	0	5,000	8,657	13,415	13,415
5	Jambi	0	0	0	543	1,160	1,160
6	South Sumatera	15,238	20,835	28,123	35,523	55,177	55,177
7	Bengkulu	0	9,345	16,464	26,745	34,745	34,745
8	Lampung	51,030	64,827	85,306	93,873	103,173	103,173
9	DKI Jaya	0	0	0	0	0	0
10	West Java	204,131	240,295	281,394	313,121	339,132	339,132
11	Central Java	158,102	191,367	264,039	321,293	369,691	369,691
12	Yogyakarta	26,223	27,473	33,159	35,159	37,159	37,159
13	East Java	236,055	264,512	349,818	397,483	438,050	438,050
14	West Kalimantan	0	0	1,579	3,158	5,788	5,788
15	Central Kalimantan	0	0	387	1,474	2,174	2,174
16	South Kalimantan	0	0	0	1,805	7,247	7,247
17	East Kalimantan	0	0	0	4,480	8,960	8,960
18	North Sulawesi	0	0	11,491	18,291	27,241	27,241
19	Central Sulawesi	0	2,380	13,287	15,287	19,187	19,187
20	South Sulawesi	48,073	67,504	79,344	95,088	119,021	119,021
21	South East Sulawesi	0	20,717	33,075	43,873	51,815	51,815
22	Bali	0	7,672	15,467	19,511	27,576	27,576
23	West Nusa Tenggara	20,693	34,287	55,836	67,798	85,933	85,933
24	East Nusa Tenggara	0	1,464	8,731	19,342	31,804	31,804
25	Maluku	0	1,350	2,772	4,322	9,543	9,543
26	Irian Jaya	0	450	1,144	1,744	2,444	2,444
27	East Timor	0	713	1,426	2,139	2,852	2,852
Sub Total		817,245	1,034,367	1,415,179	1,721,257	2,050,720	2,050,720
	Jatiluhur	64,823	71,264	95,920	101,920	106,300	106,300
Total		882,068	1,105,631	1,511,099	1,823,177	2,157,020	2,157,020

different. In view of TISP it was decided to omit these three provinces from the ISSP-2 irrigation component. NTADP is based on the province of West Nusa Tenggara and includes the rehabilitation and development of several DIs in Lombok. IISP is due to start in mid 1990 and is again similar in objectives and scope to ISSP-1 but is restricted to specific Cabang Dinas and DIs in C Java, Yogyakarta, S E Sulawesi and W Sumatera. The areas involved in S E Sulawesi are sufficient to preclude the inclusion of this province in ISSP-2. The areas in Yogyakarta and W Sumatera are small and well defined. The areas in C Java which consist mainly of schemes developed previously with ADB support are also well defined and so it is considered that there will be no problem if these provinces are also in ISSP-2. The areas covered by IISP are summarised in Table 1.3.4.

In addition ADB are planning to follow on TISP and IISP with IISP-2 and IISP-3. It is understood that IISP-2 would commence in mid 1992 and cover part or all of Bali, West Nusa Tenggara and East Nusa Tenggara and that IISP-3 would begin in mid 1994 and cover part or all of Aceh, N Sumatera and Maluku. The objectives and scope are expected to be similar to IISP but the details have not been formulated yet. For this reason and the long involvement of ADB in irrigation in Bali through the Bali Irrigation Project from 1981 to 1989, it was decided to exclude Bali from ISSP-2.

Bilateral aid agencies have been involved in specific irrigation projects in many provinces but have not so far been concerned with the introduction of EOM or ISF. Therefore their main impact on ISSP-2 is to prepare specific projects for DEOM through rehabilitation and improvement programmes and in the strengthening of PRIS in specific provinces. For example Canadian Aid (CIDA) are planning the implementation of institutional strengthening of water resources development in N Sulawesi and there is a similar on going programme in East Nusa Tenggara supported by Australian Aid.

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Table 1.3.4 Areas included in ADB financed IISP Project

Province	Scheme	Area (ha)	Type of Work
C Java	S Kedu Irrigation Project		
	- Wadas Lintang	12,000	Rehabilitation
		31,000	EOM
	- Bogowonto	16,000	Rehabilitation
		22,000	EOM
	Serayu Barrage and Ijo-Tipar	22,800	New Works
	- Gambarsari Pesanggrahan	18,000	EOM
	Lower Citanduy Irrigation Project		
	- Sidareja - Cihaur	23,000	Rehab./Ext
	- Sidareja - Cihaur	23,000	EOM
	- Cilaca, Cileumeuh,	2,400	Rehabilitation
	Cilopang	4,000	EOM
Yogyakarta	Sermo - Opak	7,000	New Works
W Sumatera	Dataran Ani, Amu-Amu	6,000	Rehabilitation
S Sumatera	Telang and Saleh Development	60,000	Swamps Dev.
		10,000	EOM
S.E Sulawesi	Various DIs	6,000	Rehab./Ext
		30,000	EOM

Increasingly during the past decade, Indonesia faced severe budget constraints. In a search for more efficient ways to use limited development funds, the government is, particularly in the present Fifth Five Year Plan (Repelita V) emphasizing the improvement of operation and maintenance of irrigation systems. One component of the World Bank assisted Irrigation Subsector Project (ISSP) is the Small Scale Irrigation Turnover Project, based on the GOI Statement of Policies for Irrigation Operation and Maintenance of 1987. One of the objectives of policy 1 (Funding of O&M) reads 'Within about 15 years, to gradually turn over the Government irrigation systems of less than 500 ha each to the Water Users Associations. As a first step, over the period of Repelita V, most of the Government irrigation systems less than 150 ha in size would be turned over to WUAs'.

An IIMI study team based its recommendations (quoted in full in Appendix C.1) mainly on achieving officially-stated Government of Indonesia objectives of the turnover programme. The stated basic components of turnover include the following activities:

- establishing or developing viable water users associations (WUA, or P3A in Indonesia) in the systems;
- preparing the WUA to be willing and capable of accepting full responsibility for all O&M roles in the systems; and
- making needed physical improvements in the systems which are manageable by farmers and which support the long-term sustainability of their systems.

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The stated basic objectives of turnover are :

- to achieve an efficient and effective allocation of O&M resources in order to intensify water management in larger technical systems and to minimize the need for frequent rehabilitation;

- transition to a more indirect, service-oriented approach to support for small irrigation systems;

- to develop a more formal, systematic management approach at the inter-system level along watercourses; and

- to ensure long-term local sustainability of O&M in small-scale irrigation.

Assessments and recommendations have been based primarily on how the PRIS can best achieve these long term objectives. Most recommendations address how the implementation process can be improved in order to meet these objectives.

The 1985 Public Works inventory of irrigation systems shows that nation-wide there are 2,304 PU assisted schemes of 150 ha and less which jointly represent 185,300 ha or 4.3% of the total irrigated area under Public Works responsibility. 70% of all PW schemes are smaller than 500 ha. Together they serve just under 900,000 ha or 21% of the total public irrigated area in the country.

In all parts of Indonesia, farmers have mobilized resources to develop small irrigation systems. Recently, the abilities of these farmers have been increasingly recognized. In small irrigation systems where Public Works has become involved in management and improvement, farmers continue to play a major role in operation and maintenance. Turnover should enable better use of farmers' knowledge, skills and other resources to manage local irrigation systems, while government resources are used for those activities which are beyond the farmers' capacity. The Turnover Project should improve cooperation between farmers and government and create a better mix of government and farmer participation in small scale irrigation.

1.3.2 Swamps

An estimated 3,500,000 ha of coastal and inland swamps have been developed during the last decades. Some 1,200,000 ha have been reclaimed through Government sponsored schemes.

A nationwide inventory of coastal and near coastal swamps (1985) revealed that another 5,250,000 ha in Sumatera, Kalimantan and Irian Jaya could be developed via the low-cost low-technology approach. However larger areas could be developed for agricultural purposes if more costly development measures were used.

The development model for the reclaimed areas comprised a cropping pattern of wetland rice during the wet season followed by a polowijo crop in the dry season. The land development of the areas was carried out to conform with the Transmigration model being a cleared homestead and first holding and 1 ha of uncleared land. The total holding amounts to 2 to 2.5 ha.

Government intervention during the first stage of development was mainly confined to flood protection, simple house construction, farm roads and bridges and the provision of the most essential agricultural and social infrastructure.

During this stage of development it was assumed that the farmers could obtain a subsistence level of income and sufficient additional income to generate funds for further farm development.

Agricultural development however stagnated in most of the areas due to several constraints of which the most important are :

- inadequate planning; schemes included areas with very low agricultural potential (e.g. deep peats),
- insufficient knowledge of the reclamation of unconsolidated potential acid clays,
- lack of inter-agency coordination resulting in delayed provision of agricultural support programmes, organisation and management capacity,
- lack of an O&M organisation

As a result of the general low level of agricultural production in swamp areas, several programmes were developed to avoid further development stagnation. These programmes included upgrading measures, rehabilitation works and the like. Presently a comprehensive Integrated Swamp Development Project is under preparation, assisted by the Bank.

1.3.3 Rivers

River Basins

The rivers in Indonesia are grouped into 90 River Territories. The river territories were established through a Ministerial Decree in April 1989, with an objective to reinforce the planning, development and management of water resources through the concept of a river basin approach. These river territories are not necessarily contiguous and often contain a number of independent small river basins. A total of 15 river territories cover more than a single province. There are a total of 5,886 small and large rivers in these river territories, much of them under 50 km in length.

The bulk of supplemental irrigation water is obtained from surface water through run-of-river structures. Use of groundwater resources for irrigation is limited. In Java, irrigation water use from surface water represents about 47% of the available surface water resources or 76% of the available dry year flow [World Bank, Nov. 1988]. It is estimated that 11.5% of the irrigation water used in Java is provided by storage reservoirs. The use of surface water for domestic, municipal and industrial use is minor compared to agricultural use. For example, in Java, water use for municipal and industrial use is estimated to be 2% of the water used for agriculture and of this 66% is from rivers. Although the quantity of municipal and industrial use from surface water is small, it represents an important demand, and in many river basins has to compete with agricultural use. In a number of river basins in Java and Sumatera water availability is becoming a major constraint for development.

River Basin Planning and Development

River basin planning and development has been the responsibility of DGWRD in the Ministry of Public Works. Much of this work is for planning and development of irrigation systems. Only in 6 or 7 major river basins has the work of water resource planning and development followed the concept of a river basin approach, in which development of irrigation is accompanied by flood control, river improvement, upper watershed erosion control, sediment control and river training. In other cases irrigation system development has taken place in isolation without adequate consideration being given to aspects of low flow and high flow management, river channel improvement and maintenance, water and soil conservation. Where these programs exist in a river basin, they are either inadequate or not well integrated.

Water resource planning for different uses from a single river basin is undertaken by different agencies and lacks coordination. In the absence of an accepted river basin plan for water use, the plans developed by each agency or sector not only lead to inefficient use of the river basin water resources but set up contention among users, specially during low flow periods. The possibility of future conversion of currently used agricultural water to urban use exists in some of the river basins as urbanization increases. Irrigation system development and operation in a river basin is affected by this.

River Management

Management of the river systems to ensure their functioning both during low and flood flows is important for efficient operation of the irrigation infrastructure and protection of the service area. River management is in its infancy in Indonesia. The attention currently is centered on providing urgently needed flood protection to human settlements with limited attention given to river improvement and its management. Lack of resources and clearly identifiable benefits coupled with the high cost of river management has prevented much of the needed development for the rivers program. What little investment has been, or is being made, does not receive adequate attention. An O&M program just does not exist. The river management is identified as a support activity but has not been able to attract resources from the related development sectors for various reasons. A comprehensive river management plan and program with the extent of support to each service sector (agriculture, energy, water supply, recreation, flood protection, etc) is required to develop suitable programs and projects as well as identify the beneficiaries for cost recovery purposes.

River management is currently a central activity managed by DGWRD through Directorate of Rivers (DOR). In Repelita V Indonesia plans to spend Rp. 956 billion for river basin activities such as rural and urban flood control, river improvement, volcanic debris control, coastal erosion control and erosion control in watersheds. Much of this resource (57%) will be for urban flood control projects. A provision of Rp. 144 billion (15%) has been made for river maintenance in Repelita V. The operation of river systems and maintenance of river infrastructure receives very little attention. There is neither a well established O&M program nor an appropriate institutional arrangement for undertaking this activity. Very little budget is provided for O&M of rivers. Much of the deferred maintenance is implemented as projects in a piecemeal fashion when emergencies arise.

At present river related activities are undertaken as projects through six Proyek Pengembangan Wilayah Sungai (PPWS) projects directly under DGWRD, seven special Perbaikan dan Pemeliharaan Sungai (PPS) projects (Krueng Aceh, Ara Kundo, Ular, Bah Bolon, Banjir Jaya, Jene Berang and Citarum Hulu) all under DOR and twenty seven provincial PPS Projects. The provincial PPS projects are administered by Provincial Public Works (DPUP), Sub-Dinas Pengairan (PRIS) and technically supervised by DOR. Nearly all of the budget for river works is provided by Central Government through APBN. Of this, very little budget is earmarked for O&M of rivers or river management.

The Provincial Public Works also undertakes often minor river works through PRIS and Cabang Dinas but these are mostly limited to small rivers functioning as major drainage in the irrigation service area. The provincial budget (APBD) given to DPUP for river works through provincial PPS is very small. For example, the APBD budget for East Java for river works in 1989/90 was about Rp. 625 million.

River Basin Water Management

Water management activities are at present confined to the individual irrigation systems. The program of special maintenance (SM) and efficient operation and maintenance (EOM) promote improvement of the systems internal water management. Much of this focuses on improving water use efficiency. In contrast, the management of the water resources in the river basin, for different uses at different locations in the basin, has remained a planning concept. Appropriate management activities in the field based on water resource approach (conservation and water allocation between users) has not taken root. The PRIS and the Kabupaten Irrigation Committees do undertake a form of river basin water management by fixing areas and cropping systems for different irrigation systems in a basin at the beginning of a crop season, based on historical availability of flows at the diversions. However, in many instances where the river basin is spread over a number of kabupaten, this method of allocation fails to accomplish the desired results with the consequence that the tailend systems bear the brunt of water shortages. Where multiple types of uses and users are present in a river basin, the problem of water management is still more acute.

The major issues in river basin water management are ;

(i) lack of detailed water availability, water balance and water allocation plans based on the water resource approach for the river basin;

(ii) a mechanism to update periodically these plans on a continuous basis to account for changes in water availability and demand;

(iii) from these plans to formulate a basin wide water management program;

(iv) lack of adequate and functioning hydromet and flow data gathering network, data management and analysis for use in periodic updating of the water management plans;

(v) lack of a basin wide institutional approach in water management; and

(vi) inadequate monitoring and enforcement of water allocation decisions.

Since basin water management includes non-irrigation uses and water quality aspects, the present public works institutions in the provinces find it difficult to undertake comprehensive basin wide water management. Much of the river basin water management work (for irrigation system water allocation only) has remained in the planning stages as studies. Efforts are currently underway in a few basins to develop the institutional tools to make these plans operational. However, the biggest hurdle remains the institutional arrangement in a river basin to undertake the required river basin water management.

The flood water management in a basin has primarily remained a Central Government responsibility. Because of resource constraints these programs only exist in the more important river basins with high economic activity and large population densities. Activities in this area tend to be based on a project approach and lack a well defined operational and maintenance program. Non-structural programs are not well developed. Provincial Government involvement is limited to reacting to emergency situations when damage due to floods occurs.

In the long term, river basin water management (RBWM) must be based on a water resource approach covering the complete river basin and managed by a single Central Government institution (for each class A river basin) and by a single Provincial Government institution (for each class B river basin). Although the responsibility for managing should lie with these

institutions, the activities involved in RBWM can be decentralised through the co-management concept as stated in the Draft River Basin Decree.

River Basin Pilot Projects

River management (O&M of the river infrastructure) and river basin water management (low flow and high flow management) are important to the sustainable growth of the irrigation sector but many of the required activities in these areas have remained theoretical. It is therefore proposed to undertake a limited number of River Basin Pilot Projects as part of the ISSP-2 program. The primary aim of the pilot projects is to transform the concept of river basin management as it relates to river system operation and maintenance into an implementable program and to develop and implement a basin wide water management system. Although the focus will be primarily to support the irrigation activities in the river basin, aspects such as water management for municipal and industrial water supply, water quality, flood protection, flood operation, erosion and sedimentation, use of river for rural and urban needs and water conservation should be considered. It is not proposed to invest in large river infrastructural development in these pilot projects for river management but to direct attention to developing programs related to O&M and implement them. Much of the activities will be related to field application of O&M and basin water management.

An important element of the pilot project study will be to understand the institutional needs and identify the appropriate institutional arrangement to undertake river basin management. The role and responsibility of the institutions are to be defined. The cost and financing of the activities have to be studied as well as staffing requirements. Since the cost of river basin water management must ultimately be borne by the water users or beneficiaries it will be necessary to study introduction of a water service fee (WSF).

With the understanding gained in the pilot projects it should then be possible to develop a nationwide rivers O&M and basin water management field program which will provide the desired support for the various user sectors. Through the introduction of a WSF adequate resources could be generated to support the program.

1.3.4 Groundwater Irrigation

Groundwater development is an important activity within DGWRD's water resources development programme. Groundwater development has focused on areas of very low per capita income and non-availability of surface water supply for agricultural development. Increasingly, conjunctive use of surface and groundwater supply is also being considered in areas where there is severe water shortage in the dry season.

The first time slice of ISSP included a groundwater development component which achieved the implementation of deep tubewell systems (1,199 ha), intermediate technology shallow tubewell systems (494 ha) and low technology (hand-drilled) shallow tubewell systems (537 ha) in East Java, and intermediate technology shallow tubewell systems in Central Sulawesi (133 ha) and South Sulawesi (151 ha).

In view of the ample groundwater development potential, GOI has expressed interest in a separate, free-standing groundwater project.

The groundwater component to be included in ISSP-2, therefore, as agreed by the World Bank, will be limited to the installation of equipment procured under ISSP-1 and the procurement of equipment for the first year of this separate groundwater project.

1.4 Institutional Make-Up

1.4.1 General

The organisational setting of the ongoing irrigation subsector programme (ISSP-1, 1987-1990) has been extensively described in a number of ISSP related reports (Preparation report 1986, SAR 1987, Institutional Strengthening Study, etc.). Some of the key features are reviewed here for ready reference.

ISSP-1 is being implemented in 11 provinces and involves the Ministry of Public Works, the Ministry of Home Affairs, the Ministry of Agriculture and the Ministry of Finance. Overall policy guidance and coordination is being provided by a Project Steering Committee chaired by BAPPENAS.

Agencies at the central level

Within the Ministry of Public Works (MPW), the Directorate General of Water Resources Development (DGWRD) is in charge of the overall planning, development and management of water resources in Indonesia. Four of the six directorates in DGWRD, i.e. the Directorate of Irrigation I (DOI-1), the Directorate of Irrigation II (DOI-2), the Directorate of Rivers and the Directorate of Swamps, have involvement in the irrigation subsector. The responsibility for O&M of the irrigation network has been 'decentralised' (by PP 23/1982) to the provincial governments. The administrative and technical involvement of the central MPW offices in irrigation O&M is essentially confined to technical advice and guidance. The responsibility for O&M for rivers and swamps still rests with the central government, if delegated to the provinces by way of 'co-administration'. The central personnel divisions are engaged in movement of centre based staff, e.g. assignments to other agencies or other administrative levels, and in related personnel services for these categories.

Since 1982, in keeping with the policy of administrative 'deconcentration', regional offices (kantor wilayah) of the MPW have been established in each provincial capital. A direct (vertical) extension of the ministry, these 'Kanwil PU' are mainly engaged with MPW funded APBN projects, besides having a liaison function in technical matters between the central government and the provincial public works agencies.

A simplified organisation chart of the Ministry of Public Works is presented in Figure 1.4.1.

The Ministry of Home Affairs, through its Directorate General for Public Administration and Regional Authority (DGPUOD) and the Directorate of Regional Finance (Keuangan Daerah) is responsible for the Irrigation Service Fee component of the ISSP and thus, from a cost recovery point of view, involved in irrigation O&M. Through its DGs of Bangda (regional development), Bangdes (village development) and Agraria (land utilization, titles, registration), Home Affairs provides functional guidance and budget support to the Regional government.

The Ministry of Agriculture, particularly through its Directorate General of Food Crops Agriculture (DGFCA), BIMAS programme and regional offices (kanwil), is involved in irrigated agriculture mainly through research and development, production intensification and agricultural support services like agricultural extension, credit facilities and marketing. Besides having a vested interest in successful implementation of the ISSP, generally, the ministry is more directly connected with the ISSP-1 through the Water Users Associations Strengthening Project (WUASP) which is carried out by the Directorate of Agricultural Area Development (DAAD).

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Organisation Chart of the Ministry of Public Works

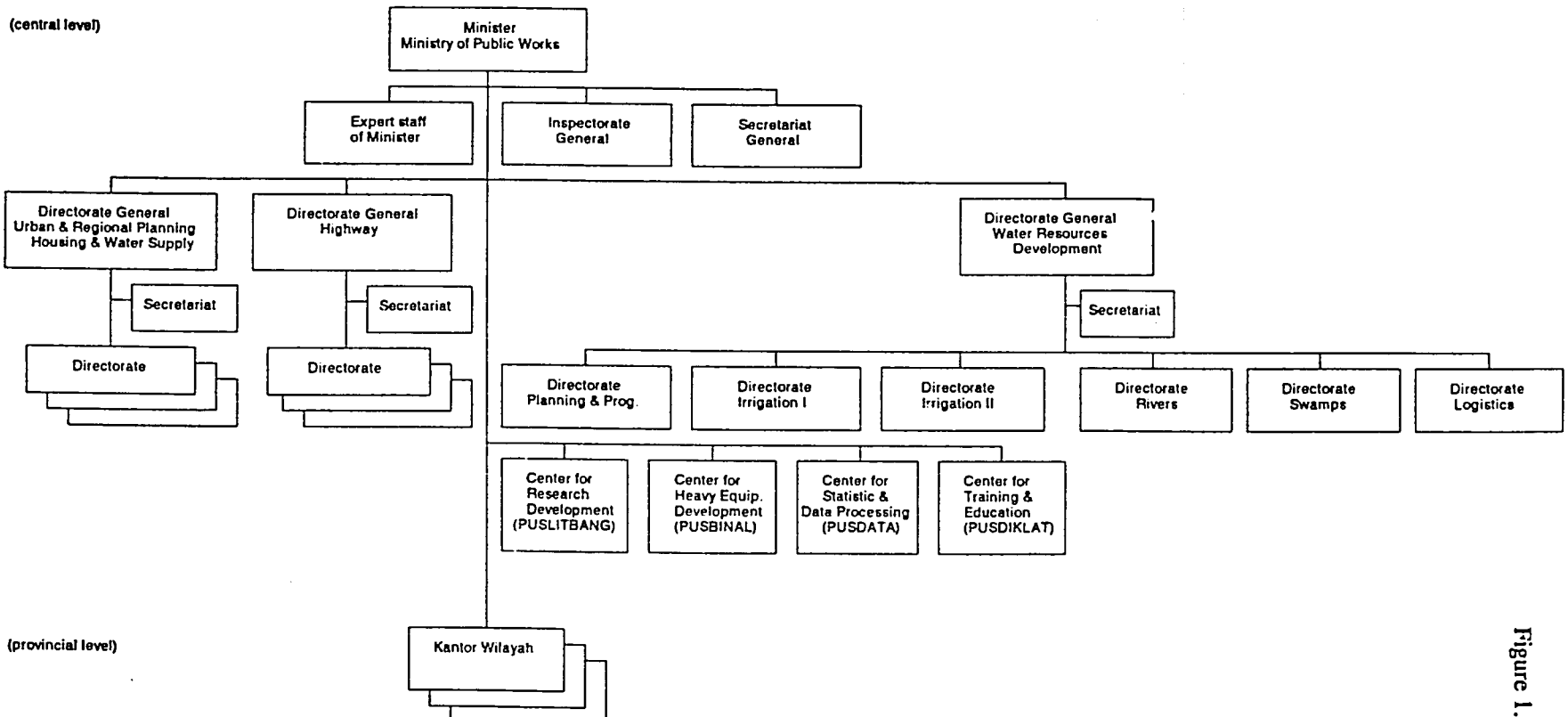
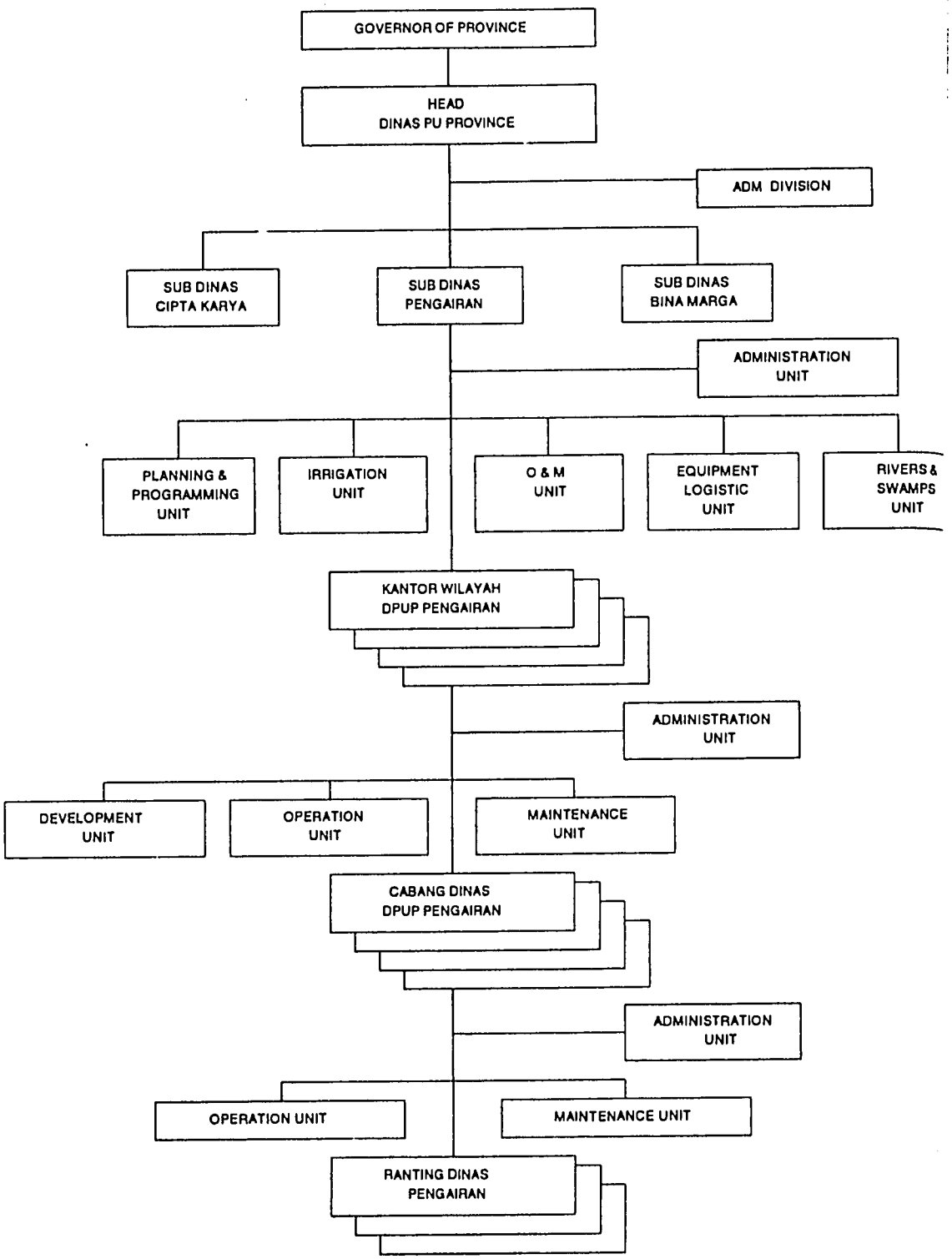


Figure 1.4.1

Typical Organisation Chart Of The Provincial Irrigation Service (PRIS) Figure 1.4.2



In the Ministry of Finance, the Directorate General for Taxation (DG Pajak) through its Directorate of Property Tax is responsible for the classification and revaluation programme in connection with PBB (land and property tax) collection, one of the sources for funding irrigation O&M.

Agencies at the regional and subregional levels

Operation and maintenance of irrigation systems are the explicit responsibilities of the provincial irrigation service (PRIS) of the provincial public works department (DPUP), administratively answerable to the Governor. Figure 1.4.2 shows the typical pattern of organisation for the PRIS, from the DPUP down to the ranting (irrigation subdistrict). It is worth noting, however, that there is a striking diversity between the various irrigation provinces in organisational make-up as well as nomenclature, as is shown in Appendix B.3.

Of particular interest to ISSP is the Sub-Dinas Pengairan, the apex provincial agency for irrigation (and other types of water resources development) and one of five DPUP divisions.

At the interim level of the provincial PW administration, the larger irrigation provinces have auxiliary offices, the KPKD (kantor pembantu kepala dinas) to assist the head of DPUP in the execution of his duties. East Java, West Java and South Sulawesi have separate KPKD (or wilayah) for Water Resources, Cipta Karya and Highways. Central Java and North Sumatera have KPKD for all PW matters combined (see Appendix B.3). One reason for the existence of KPKD is the large number of PW sections (cabang dinas), e.g. in East Java 39 for water resources (pengairan) alone. For coordination purposes cabangs are grouped in clusters of five to seven per KPKD.

Most of the 11 ISSP-1 provinces have a separate Cabang Dinas PU Pengairan (irrigation section, or district). In four provinces, a composite cabang dinas 'umum' takes care of all PW components. The cabang dinas pengairan is the second major level of the provincial PW organisation and directly involved in irrigation operation matters such as water allocation and distribution, and management and supervision of maintenance works, both force account (swakelola) and under contract. Through the medium of the Kabupaten Irrigation Committee the head of the cabang dinas liaises with other regional government departments, notably the agricultural service, that have an interest in adequate and timely supply of irrigation water.

At the field or ranting (irrigation subdistrict) level, a Pengamat (head of ranting office) is in charge of an irrigation (command) area of up to 5,000 ha. Subordinate to the head of the cabang, these heads of ranting (dinas PU pengairan, tk.I) supervise a number of inspectorates of some 1,000 ha each, headed by a juru pengairan who, in turn, supervises the actual grassroot's level irrigation operation by gate operators, and maintenance by foremen and labour gangs. The organisational pattern at these lower levels of the irrigation administrative hierarchy is also not always consistent. In addition to their regular technical tasks, juru pengairan in certain areas are being prepared for increased interaction with water users and their WUAs, like in areas with small systems selected for turnover and in systems under ISF.

The local government setting of Pengairan, and particularly irrigation services including O&M, is significant when assessing the effectiveness of the ISSP components in the light of prevailing institutional arrangements. Some basic features of the general administrative organisation need therefore to be highlighted.

The statute governing the Regional Governments is Law no.5 of 1974. On the basis of this law, the regional governments have been granted substantial autonomy and responsibility in carrying out, for or on behalf of the central government, certain tasks related to general administration and development of the region concerned. The authority for implementing these tasks rests with the Governor.

The Governor is assisted by a number of provincial support agencies (dinas), headed by kepala dinas who are fully and directly answerable to the Governor as chief of the province. One of these dinas is the DPUP. Staff bureaus within the governor's office include the provincial planning bureau, BAPPEDA I, which has an important role in inter-agency coordination in ISSP, and represents Home Affairs (PUOD) as chairman of the provincial steering committee for ISF.

At the district level (tingkat II), Bupati assist the Governor in the execution of his tasks. Whereas most decentralized and deconcentrated responsibilities concern the provincial government (tingkat I), the role of the kabupaten government is becoming increasingly more important. To a certain extent this also applies to water resources development. The already strong ties between Bupati (Home affairs, local government tk.II) and head of cabang dinas pengairan (tk.I) are getting even more impetus through the ISF project which requires close working relationships between the two sides. This dialogue continues at the field levels where camats and village heads regularly meet with pengamats and jurus on tertiary O&M and village irrigation matters.

The Bupati is responsible for the implementation of formation and strengthening of water users associations. Moreover, he is chairman of the kabupaten Irrigation Committee and, in ISF districts, of the ISF Consultative Committee (BAMUS IPAIR). It is on these inter-agency platforms that water management can be and is being effectively discussed.

The Irrigation Committee (IC) is the most prominent horizontal linkage within the irrigation O&M institutional framework. The institution was introduced into the Indonesian irrigation community some fifty years ago and a great deal of know-how and experience has been gained ever since. The IC, in particular the kabupaten IC, is now widely recognized as a valuable asset by government officials and farmers alike, though the institution is not always put to effective use.

The provincial agricultural service (PRAS) is organised according to the boundaries of the civil administration and has offices (dinas) at the provincial, sub-provincial (wilayah), kabupaten and kecamatan levels. Its responsibilities include participation in the planning of water allocation, assisting farmers to organise themselves in functional groups and cooperating with other agencies in the delivery of the Bimas package (credit, inputs, advice) to farmers.

One of the tasks of the rural extension centres and their extension field staff (PPL) is the establishment, development and activation of agriculture-oriented village institutions. In irrigation areas, the PPL closely cooperate with juru pengairan in encouraging farmers to jointly decide on a cropping pattern and planting areas matched with water availability. The PRAS is more directly linked to the ISSP-1 through its involvement in WUA strengthening and training (the WUASP component) in a limited number of kabupaten.

The presence and importance of the Ministry of Finance, in funding, financial and budgeting procedures, throughout the provinces and their subordinate levels, needs no emphasis here. In the ISSP context, the Ministry is involved in PBB, even though the collection of this tax is entrusted to the Dipenda which are local government offices for regional revenue, at provincial and district level. In ISF pilot districts, the Dipenda is currently also charged with supervising the collection of ISF, which is essentially a kabupaten affair.

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1.4.2 Water Users Organisations

Background

Many farmer groups in the country have a long standing reputation in designing, building and managing their own small-scale ('simple') irrigation schemes. Since time immemorial farmers who share the same water course have had some kind of organisation to handle their common interests in equitable distribution of the water available, in management and upkeep of their system and to solve problems as and when they arise. Such traditional and often quite informal farmer groupings are found in all irrigation provinces, and some, such as the subak of Bali/Lombok, have gained wide attention.

Over the past decade it has increasingly been recognized that more formalized organisation of the users of irrigation water is indispensable. Viable, active, and effective water users organisations (WUAs) will be the key to success in irrigation system management in the years to come. Water being a crucial production input in irrigated agriculture, the users organisations at various levels of the local community will prove to be instrumental to improving agricultural productive performance and thus to one of the prime national objectives.

Moreover, it is imperative that the increasing cost of government involvement in irrigation system upgrading and O&M is reduced and this can only be achieved by maximizing the active participation of agricultural producers/water users in cost recovery.

Irrigation efficiency depends to a great extent on the capacity to distribute water effectively, to operate and maintain the infrastructure below the tertiary outlet, to settle and resolve local disputes, to make collective decisions and enforce decisions made, to design and implement balanced cropping plans at the field level, to monitor mutually agreed farming systems, etc. These are or will have to be the tasks and responsibilities of farmer and water user organisations. In the performance of these tasks the WUAs will continue to need guidance and support from local government agencies. For their part, local governments, facing new and delicate responsibilities, accept that sustained development will remain largely ineffective unless full participation of the beneficiaries can be secured.

Legal Basis

By Government Regulation PP 23/1982, irrigation management at the tertiary and farm levels became the responsibility of farmers who, for this purpose, should be organised in water users associations. These WUAs were to be organisationally, technically and financially capable of fulfilling tasks and responsibilities in the exploitation and maintenance of the irrigation canals and all related structures in a tertiary unit or village irrigation area.

As a follow-up to PP 23/1982, the actual establishment of WUAs (or P3As in Indonesian) has been instructed by presidential decree Inpres 2/1984, and subsequently effected through decrees of the provincial governors. Nevertheless, to date a majority of WUAs throughout Indonesia have remained all but inactive. Why this is so is briefly analysed in the Institutional Strengthening Study (ISSP study, 1988).

PP 23/1982, Inpres 2/1984 and PP 14/1987 form essentially the legal basis of the WUA organisation in Indonesia. In the presidential instruction the role of the various agencies involved in the guidance of WUAs is described. This involvement can be highlighted as follows :

- Department of home affairs: to advise the local governments at the provincial level on how to encourage and establish WUAs;

- Department of public works: to advise the provincial irrigation offices on system O&M and effective water management at tertiary level;

- Department of agriculture: to give guidance to their field offices on efficient water use at the farm level;

- Local government at the provincial level: to give operational guidelines on the establishment and development of WUAs;

- Local government at the kabupaten level: responsibility for implementation of WUA strengthening and registration;

- Camats : to coordinate and control implementation;

- Village heads: to assist the camats in their tasks.

PP 14/1987 is important, as it substantiates the prime role and responsibility of Home Affairs, c.q. the second level Local Government (Pemda II) for WUA formation and development.

The contents of the respective enactments describing the basic characteristics of the WUAs as they function, or should function, are highlighted in Annex 6 of the Institutional Strengthening Study prepared under ISSP in 1988.

WUAs in ISSP-2

Setting up and strengthening of water users associations will have the focus of attention in ISSP-2 . Specifically, three programme components will be more or less directly involved. First, the WUTP will have tertiary level O&M training of WUAs in larger schemes as an important component of their overall training package.

Secondly, as at present, WUAs will be in a pivotal position in the Small Scheme Turnover extension programme. They will be trained and prepared for registration so as to be ready when the management of the scheme will be handed over to them. They participate fully in the design of the physical improvements needed and in the subsequent construction works.

Thirdly, for successful introduction and implementation of the Irrigation Service Fee it has proven to be vitally important that strong WUAs exist and actively participate in the process. Formation and strengthening of these system-level institutions has therefore become a key activity of ISF and this will continue under ISSP-2.

Some selected issues which are particularly relevant to WUA development and strengthening in ISSP-2, are highlighted here.

Legal status of WUAs

One of the focal points in the GOI policy with regard to the irrigation subsector is on the increased transfer to the WUAs of responsibilities for system operation and maintenance. Paramount in this approach is the awareness that the prevailing situation is one of inter-dependence between water users on the one hand and government irrigation services on the other.

Whereas the WUAs are duly recognized by law (already implicitly in Law no.11/1974), there is no formal registration process by which such organisations can obtain legally enforceable

recognition of their identity and rights within society. This lack of legitimate, rather than legal, existence is considered a shortcoming to be addressed.

It is recognized that the WUA in Indonesia should be granted the status of **legal body** as soon as possible. This would enable them to open bank accounts (an ISF requirement), receive government assets (as under the Turnover programme), make contracts, enforce agreements in court, have access to commercial bank credit, have legitimate control over members, etc.

Legal status and legitimacy are logical extensions of the process of decentralization and privatization, and of the high expectations of the WUAs as partners in water management and cost sharing.

The GOI is very much aware of this and will undertake to try and speed up the legalization process and procedures. For example, higher level laws and presidential instructions would have to be reinforced by implementing legislation at the central level (ministerial decrees, instructions and implementation guidelines) and subsequently at the provincial level (SK and instructions by the Governor), the latter allowing for local variations that may exist in the province and reflecting the real needs of the WUAs concerned.

Only then could WUA formation and strengthening cease to be a project and become part of the routine tasks of the district level administration including the cabang dinas level (tk.I) irrigation service, eventually evolving in what may be termed user oriented irrigation extension service. Routinization of WUA registration, now already gaining momentum (in Turnover and ISF areas) is a first step in this direction.

System Based WUAs

WUAs should be based on **hydrological** boundaries, not on administrative (mainly village) boundaries. There is at present hardly any difference of opinion about that. WUAs need to have managerial control over the hydraulic network of their system. This will be the case in small schemes after turnover, and it will also apply in larger schemes under EOM/ISF which are both explicitly system-based programmes.

Where exclusively village-based WUAs persist (as the HIPPA in East Java) efforts will be made to gradually adjust the situation to the general principle of tertiary unit based organisation which is considered a better workable basis for O&M and cost recovery activities. WUAs would then also be independent from and not under the aegis of village administration, yet maintaining strong working relationships with desa and kecamatan based agencies.

WUA Representation

Legal arrangements, policy and practice should increasingly reflect that WUAs not only have responsibilities (for tertiary O&M, discipline in water distribution and rotation, paying service fees, etc.) but also need the right to representation in decision-making. In large systems, **WUA federations** will be needed to effectively represent the water users above the tertiary level.

Under the ISF pilot schemes (ISSP-1) such federations were indeed established and found to satisfy a long-felt need, i.e. having a voice in main system O&M, which may be seen as an initial step towards user participation in main system and inter-system management. The BAMUS (a consultative body created for ISF purposes) allows for farmer water user representation through their federation.

Formal farmer water user representation should also be considered on the irrigation committees. This idea which is in line with present government irrigation policy, will be given more attention during ISSP-2.

Catalysts for WUA Development

Experiences with the ongoing Small Systems Turnover programme show that user involvement in planning, design and construction activities aimed at system improvement is a strong motivating factor in WUA development and strengthening. It appeals to farmers' sense of ownership and satisfaction of being consulted on matters that used to be decided for them.

A similarly effective catalyst in getting WUAs and even WUA federations started and functioning, is being provided by the service oriented ISF concept. Rather than involvement in physical upgrading works, the impetus in ISF is the awareness of users that by organising themselves they gain access to better and reliable irrigation services, which serves their interest.

The common denominator of these examples would be the participatory approach to system oriented development. This approach will be continued during the second time slice of ISSP. To this effect, efforts will be made to optimize beneficiary participation in and commitment to both main and tertiary system development and, particularly, ensure that contractor involvement in design and construction will be kept to reasonable proportions.

Moreover, in keeping with the ISSP-2 equity participation principle, the DOI-1 will determine to what extent the beneficiaries in turnover areas can be encouraged to contribute more to the cost of the physical improvements, commensurate with the practice followed in ISF areas. Given the cost consciousness of farmers, such an approach will be conducive to implementation cost effectiveness.

1.4.3 Staffing and staff development

In the Institutional Strengthening Study (ISS), carried out in 1988 under ISSP-1, a great deal of attention was paid to the manpower situation in the irrigation (O&M) subsector, and reference to the ISS final report should be made. The main findings of the study and some of the developments since, are highlighted below.

With many thousands of people being engaged in irrigation O&M alone, manpower is one of the vital elements in the irrigation subsector. The quality of any organisation's performance depends to a large extent on the number and quality of the people in that organisation. Comprehensive and up-to-date staffing data is, according to the Study, not very accessible, and this situation has not changed to date. This is said to be partly due to the lack of uniformity in provincial organisations, and partly due to the system of secondment of MPW personnel throughout the country. Moreover, in the absence of a clearly defined management information system no nation-wide overview of staff strength and requirements could be obtained.

Realistic needs-based staffing requirements of the MPW organisation can only be formulated when the tasks and responsibilities, at the various levels, have been considered. Whereas the number of people needed can be defined on basis of the volume of work to be carried out, the content of the individual jobs within the organisation mainly depends on the structure of the organisation and on the number of staff defined to be necessary at each level.

The tasks and responsibilities of the organisation as well as the number of staff at each level of the line organisation should be reflected in job descriptions. The people performing key functions are the basic assets of the MPW organisation. All line positions are key positions. ISS

has identified eight such key positions in the provincial O&M organisation, not including key personnel in support divisions (administration, finance, personnel, planning, design). Provisional task descriptions for these key positions are presented in Appendix B 4.

The Institutional Strengthening Study has resulted in a large number of recommendations in respect of the personnel function. They aim at improving:

- job evaluation, staff performance appraisal and career planning and development
- manpower planning based on work plans
- employment status of temporary staff
- salary grading of key field staff
- training of senior O&M staff
- assessment of staff training needs (to be made by Head of cabang) and corresponding allocation for training in provincial budget
- consistent personnel information systems at all levels and covering the entire work force
- differentiation of provincial PW departments by size (in terms of workload and responsibilities as part of career path planning for provincial personnel)
- placement policy for centre based staff enhancing career prospects for provincial staff
- placement and transfer policies for provincial and Cabang Dinas staff
- senior staff mobility between provinces and centre for career purposes
- differentiation and ranking of functional positions
- reformulation of roles of certain existing agency personnel (e.g. KPKD/Wilayah, Regional Offices/Kanwil PU).

It should be noted that implementation of this comprehensive and ambitious package of measures would require considerable time and may not be realized, for all its components, during the present five-year plan.

The proposed action plan has been well received by the GOI and it is widely recognized that its implementation would enhance the service performance in the subsector and is worth considering. In fact, discussions on this basis with the World Bank have already led to certain commitments to this effect on the part of the Government. With regard to manpower it was agreed that the government would undertake shortly :

- to carry out a complete inventory of existing O&M training programmes and data
- to prepare an action plan for increased transfer of staff between centre and provinces.

In line with and as a follow-up to these proposals an important project is about to start which is expected to provide new impetus to manpower planning and development through MPW

including the irrigation sub-sector. This project, supported by IBRD is called : the Public Works Institutional Development and Training Project (IDTP).

The objective of IDTP is to improve the coordination of planning and to contribute to the improvement of the efficiency of implementation of public works activities, by staff development, improved management and procedures and assisting the implementation of government policies for deconcentration and decentralization of responsibilities for public works to provincial and local government levels.

Project components include :

(a) staff and institutional development; improved management and coordination of training; strengthening of provincial public works offices through relocating experienced staff to key technical and administrative posts; and public works staff training with emphasis on provincial and local government staff;

(b) improved management information systems (MIS) and other systems and procedures.

1.4.4 Training

Introduction

The ISSP-1 training component can be divided into three main components :

i) Training of DGWRD employees involved with operation and maintenance.

ii) Training of farmers and local government staff

iii) Training Coordination Project.

Further information about the training and of the principal individual courses is contained in Appendix B.1 and B.2. The number of participants trained under ISSP-1 is given in Table 1.4.1.

Training of DGWRD employees involved with Operation and Maintenance

i) Classical Training

The classical training aims to give senior staff a one month general course in operation and maintenance. Separate courses were arranged for Cabang level and Pengamat staff in irrigation O&M and swamps O&M. The courses are held in the Diklat regional training centres, are fairly theoretical and provide an overall introduction to the many aspects of operation and maintenance. The courses mainly comprise formal classroom lectures with exercises. The trainees need additional more practical training on return to their work place to be able to implement the O&M procedures (on-the-job training).

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Table 1.4.1

Training carried out in ISSP–1
(Number of participants)

Training Course	West Sumatera	South Sumatera	Lampung	West Java	Jatiluhur	Central Java	Yogyakarta	East Java	N.T.B	South Sulawesi	Total
1 Training of DGWRD employees											
A. Classical (BDP) courses											
O&M Irrigation (Cabang level) = 231											
O&M Irrigation (Pengamat) = 340											
O&M Swamps (Cabang level) = 50											
	PROVINCE										
B. On-the-job											
B1 Irrigation											
Planning and Programming											
PD-1	35	22	18	–	19	–	22	–	25	33	174
Construction Supervision											
CS-1	8	6	6	–	8	–	8	–	8	6	50
CS-2	31	14	25	–	33	–	28	–	24	37	192
CS-3	10	8	14	–	13	30	8	–	8	17	108
Operation and Maintenance											
OP-1	8	6	8	20	12	37	8	20	8	9	138
OP-2	42	23	40		38	129	44	–	27	66	409
OP-3a	28	28	87	696	51	474	106	–	53	105	1628
OP-3b	30	26	61	98	44	345	284	512	35	72	1507
Workshops	130	54	38	34	–	198	–	–	–	221	675
Total	322	187	297	848	218	1213	508	532	188	566	4879
				N. Sum	S. Kal						
B2 Swamps											
Training Instructors	2	6	2	2	2	–	–	–	–	–	14
Kep. Ranting Dinas	2	6	4	3	2	–	–	–	–	–	17
Pengamats Pengairan	4	13	15	4	6	–	–	–	–	–	42
Jurus Pengairan	11	40	36	5	17	–	–	–	–	–	109
Total	19	65	57	14	27						182
2 Training of Farmer's and Local Government's Staff											
A Water User's Training Project (WUTP)											
Instructor Tr.	–	–	–	–	–	–	–	–	–	–	354
Group A Tr.	195	140	182	200	82	440	200	309	102	123	1971
Group B Tr.	319	360	367	1205	160	670	401	960	369	442	5253
Group C Tr.	720	520	482	1726	120	1086	524	2280	179	1040	8677
Follow-up Activities						418					4140
Total											20395
B. Water User's Association Strengthening Project (WUASP)											
Action Groups	20	20	20	20	20	20	20	20	20	20	200
KPL Training	102	102	102	102	102	102	102	102	102	102	1020
PPL Training	22	22	22	22	22	22	22	22	22	22	220
Training of Trainers	10	10	10	10	10	10	10	10	10	10	100
Total	154	154	154	154	154	154	154	154	154	154	1540
		D.I. Aceh	N. Sum								
C. Turnover Project (PIK) Instructor Training	3	3	3	3	–	3	3	3	3	3	27
TP4 Training (in 4 parts)	122	–	–	99	–	44	51	–	–	–	316

ii) On-the-job training for irrigation O&M

The on-the-job training for irrigation O&M staff provides practical in-service training courses for PRIS staff at all levels involved with operation and maintenance. On-the-job training courses in operation and maintenance started with the East Java Irrigation Project. From 1984-1987, Cabang Dinas O&M staff, Pengamat and Juru were trained in basic O&M procedures throughout the Province. The training compri ed a mix of theoretical and practical training with talks, exercises and field work. The West and Central Java irrigation projects expanded the on-the-job training courses to cover planning and design, and construction supervision, as well as Operation and Maintenance. The courses were given by PRIS trainers, with central and wilayah level training teams, the aim being to establish a long term training capability in each Province. For most courses, modules, trainee and trainer notes and visual aids were prepared. Eight 20 minute videos were prepared, four for Operation and Maintenance and four for Construction Supervision. This training has been further developed during ISSP-1.

The overall objectives of the ISSP training were to evaluate and strengthen the on-the-job capabilities and to develop the self reliance of the PRIS staff at various levels in the project areas for :

- continuously and effectively carrying out efficient Operation and Maintenance on irrigation schemes (DIs).
- smoothly and satisfactorily implementing the ISSP-EOM packages in the Provinces, including special maintenance construction, and EOM on DIs and AOU's.

Bearing in mind the training carried out previously, the ten ISSP Provinces can be divided into three groups :

East Java; Central Java and West Java; and the other seven Provinces.

The training provided under ISSP-1 and East, Central, West Java Irrigation Projects is shown in Table 1.4.2.

For the seven Provinces, the training provided can be summarised as :

Course PD-1 Planning and Design course for PRIS and senior Wilayah staff

Course CS-1 Training of Construction Supervision wilayah trainers

Course CS-2 Construction Supervision training for staff (pengawas lapangan, pekerjaan, staf pemeliharaan) at Wilayah/Cabang and Ranting levels.

Course CS-3 Construction Supervision training for resident engineers (pengawas daerah) at provincial, wilayah and cabang offices.

Course OP-1 Training of Operation and Maintenance Wilayah trainers

Course OP-2 Operation and Maintenance training for O&M staff at Cabang level and Pengamat

Course OP-3a Operation and Maintenance training for O&M staff for Jurus and Ranting office staff

Table 1.4.2 ISSP – 1 Staff Training, Irrigation Operation and Maintenance

Level	Training Needs	TRAINING PROVISION							ISSP-1 Training Details			
		EAST JAVA		CENTRAL JAVA		WEST JAVA		Other				
		EJIP	ISSP-1	CJIP	ISSP-1	WJIP	ISSP-1	Provinces	Course Nr	Days	Location	Trainer
PRIS/Wilayah												
	Planning and Design (SM)	•		•		•		•	PD-1	10 – 14	PRIS	B
	Construction Supervision, PD			•		•		•	CS-3	12	PRIS	A
	Operation and Maintenance	•		•	•	•		•	OP-2	6	Wil/Cabang	A
	Data Management											
Cabang Dinas												
Kep. Cabang	Management											
Cabang Staff	Management (Supervisory level)											
	Planning + Design EOM							•	PD-1	10 – 14	PRIS	B
	Construction Supervision											
	SM – PL + PP			•		•		•	CS-2	12	Wil/Cabang	A
	EOM – Maintenance Staff							•	CS-2	12	Wil/Cabang	A
	Refreshers			•		•						
	Operation and Maintenance											
	Principles & Practise	•		•		•		•	OP-2	3 + 3	Wil/Cabang	A
	Practical (Routine Management)				* Note 2				OP-2a/b (CJ)	3	Cabang	A
	Follow-up, Refresher/Superv.											
	Data Management/Computers											
Ranting Dinas	Management (Supervisory level)											
Pengamat												
(Note 1.)	Operation and Maintenance											
	Principles & Practise	•		•		•		•	OP-2	3 + 3	Wil/Cabang	A
	Practical/Routine Management				* Note 2				OP-2a/b (CJ)	3	Cabang	A
	Follow-up, Refresher/Superv.											
Juru/Mantri	Operation and Maintenance											
RD Staff	Principles & Practise	•		•		•		•	OP-3a	3 + 3	Ranting	A
	Practical 2nd Course				•	•	•		OP-3a (CJ/WJ)	5/8	Ranting	A
	Follow-up, Refresher/Superv.											
	Construction Supervision							•	CS-2	12	Cabang	A
PPA	O&M		•		•		•		OP-3b	2	Ranting	A
All Levels	Education tours			•		•		•		various	various	
Senior Staff	Workshops			•	•	•	•	•		various	various	
Training of	Operation and Maintenance	•		•		•		•	OP-1	12	PRIS	B
Trainers	Refresher		•	•	•	•	•	•	OP-1	+12	PRIS	B,C
	Construction Supervision			•		•			CS-1	12	PRIS	B
	Refresher			•		•						
	Planning and Design			•		•						
	Refresher											
	Management											

Notes : 1. Pengamat attends Cabang Dinas level course, as well as often attending Juru course as observer/ trainer.

2. Course partially given in ISSP-1, continue in ISSP-2.

3. Types of trainer

A – PRIS – Cabang

B – Central team (Jakarta) + Provincial consultant + senior PRIS staff

C – PRIS Central training team + Provincial consultant (C. and W. Java only)

Course OP-3b Operation and Maintenance training for gatekeepers (PPA) in Advanced Operation Units (AOU's).

The details of these courses are given in Appendix B 2.

For East Java, the main training given was for the PPA's (course OP-3b), only.
For Central Java and West Java, all the Operation and Maintenance staff had received "first" O&M course OP-2, and OP-3a. For the Jurus and Ranting office staff, a second course, for EOM areas, was given. The first O&M course mainly describes the principles and practise of O&M (i.e. what O&M comprises) and the second O&M course is very practical (i.e. to reinforce the implementation of the procedures) with operation simulations (using whiteboards) and maintenance exercises which go through the staff's daily work. In Central Java, a shortened version of this course was also given to Cabang level staff in EOM areas. The OP-3b course was given to PPA's in AOU areas. For most Provinces, in addition to these courses, there were workshops on a range of subjects and education tours.

The training organisation comprised :

- A central team in Jakarta, which prepared training materials (largely based on Central Java and West Java Irrigation Project work), coordinated the training, assisted with giving the training of trainers courses (courses OP-1 and CS-1) and the planning and design course (course PD-1) in the Provinces.

- A consultant training engineer in each province who with Provincial staff coordinated the training in the Province, modified materials to make them province specific and assisted with giving training courses.

- Wilayah Operation and Maintenance and Construction Supervision trainers who gave the training in the Provinces (courses OP-2,OP-3,CS-2, CS-3).

For West Java and Central Java, there was already a stronger training base through the respective irrigation projects and their facilities, trainers and experience were widely used during the ISSP training. Most of the material for the second O&M course was developed jointly in the two Provinces.

At present long term training evaluations are being carried out in each of the Provinces and a training report is being prepared. Generally the training has been successful, particularly in West Java and Central Java where there was already a training resource. The following comments however can already be made :

- The training must tie in with the sequencing of the SM-EOM works. Staff should attend the right courses at the right time.

- The training must be given only in SM/EOM areas.

- The training should be more participative and less formal, with more exercises, field work and use of videos.

- The first O&M courses give a good introduction to O&M procedures, but a second very practical course is required.

- Courses for various staff levels should reflect more the different job descriptions.

- More time should be given for making centrally prepared training material province specific.

- Centrally prepared material should include trainee notes (modules), trainer notes and training aids.

- Follow-up to the training is required.

- More time should be allowed for carrying out the Provincial courses.

iii) On-the-job training for Swamps O&M

On-the-job training for Operation and Maintenance for swamp schemes was a new concept for ISSP, although there had been limited training previously. The objectives of the training were similar to those for irrigation.

The training was much more limited in scale than that for irrigation concentrating on O&M and covering five Provinces only. The training was given in three blocks, each block covering two or three Provinces. Each training block comprised :

a) Training of instructors

b) Workshop for KUPT or Kepala Ranting Dinas on the contents of the O&M courses given to Pengamats and Jurus

c) Training for Pengamats Pengairan

d) Training for Jurus Pengairan

Most of the staff to be trained under c) and d) had not had previous experience in swamp areas, so the training was divided into three sections :

- classroom training on communication techniques and technical aspects of swamp operation and maintenance

- field visits to swamp areas

- on-the-job training (in two parts) to practise the techniques learnt in the classroom.

The courses were generally attended by small numbers of trainees and were very participative with many exercises both in the classroom and field, and discussions. The trainers provided follow up training to the trainees during the next 12 months.

The central consultant team through its involvement in giving the training was able to monitor the training and the training material was reviewed and modified.
The following comments can be made on the training :

- O&M training should only start after the completion of Special Maintenance and on-going works when all hydraulic infrastructure is operational.

- Training of field staff should only start if EOM funds are readily available for the swamp schemes concerned.

- Training of field staff should only start when the staff have been selected and appointed and are living in the job area. Offices and houses, as well as transport facilities should also have been provided.

- Trainers should be of a suitable education level (preferably BE), should have O&M experience in Swamp schemes and have attended the Diklat O&M swamps course, so they have adequate background technical information.

Training of Farmers and Local Government Staff

Complementary to the training of DGWRD Staff is the training of Water User's Associations (WUA or P3A), as well as training of local government staff involved in the strengthening of WUA and giving technical support (both irrigation and agricultural) to the WUA.

Water user training must be considered bearing in mind Presidential Instruction Nr 2/1984 which gives instructions for water user activities.

As part of ISSP, three projects were involved in giving training to water users :

i) Water Users Training Project (WUTP or PTGA) through DOI-II (to be transferred to DOI-I)

ii) Water Users Association Strengthening Project (WUASP) through Directorate of Agriculture Area Development

iii) Turnover Project (PIK) through DOI-I.

WUTP and WUASP mainly concentrate on WUA in larger irrigation schemes (>500 ha) and the PIK on smaller irrigation schemes (mainly <150 ha). Both areas are covered by agricultural extension programmes (BPP). Figure 1.4.3 compares the WUTP and WUASP approaches as well as the agricultural extension approach.

In ISSP-1, WUTP will have trained approximately 2,200 WUA and WUASP approximately 400 WUA (original target 220 WUA). Although both projects are active in some Kabupatens, no WUA appeared to have received training from both projects.

Water Users Training Project

The Water Users Training Project (WUTP) started in 1983 in three Provinces (East Java, West Java and South Sulawesi). During ISSP-1, it has consolidated its training in these Provinces and expanded into the seven other Provinces which were covered by ISSP-1.

The objectives of the project are :

- to achieve a unified understanding of the operation and maintenance of interfarm water distribution systems among the personnel of the Irrigation Services, Agricultural Services and Local Government as well as Water Users Associations and Key Farmers;

- to strengthen the Water Users Association;

- to strengthen the Irrigation Committees; and

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Comparison of WUA Approaches – ISSP – 1

Figure 1.4.3

	WUTP APPROACH			WUASP APPROACH			BPP APPROACH
1. Work Area Type of land Area of work area Work Area	. Wetland only. . 100 – 150 ha. . Same as WUA Area. . Tertiary Block (Hydraulic boundary). . Village (Adm. boundary). . Village Irrigation. . Command Area (Ground water).			. Wetland only. . 100 – 150 ha. . Same as WUA Area. . Tertiary Block (Hydraulic boundary). . Village (Adm. boundary). . Command Area (Ground water).			. Wetland and dryland. . 20 – 50 ha. . Village Areas.
2 Organization	Project			Project			Routine Functional
3 Farmer Group	WUA			WUA			Farmer Group (Kelompok Tani)
4 Activities Covered	1. Water distribution within tertiary unit. 2. O&M Tertiary Unit. 3. Implementation of Organisational activities. 4. Contact with other organisation. 5. Communication and coordination with other guidance organisations at the village level. 6. Assist members to increase production.			1. Strengthening development of WUA 2. Increasing role of woman. 3. Problem solving. 4. Locating problems of WUA through AG. 5. Implementing strengthening WUA.			10 technology packets 1. Cropping pattern (IP > 200%) 2. Land Management 3. Annual crop rotation 4. Seed of high quality 5. Concentration pf Planning 6. Pesticides 7. Base exchange 8. Use of fertilizers 9. Water User Training – water managemnet 10. Harvest and post harvest
5 Target Group and Methodology	Trainees	Training Type	Trainer	Trainees	Training Type	Trainer	
	A1: Provincial level officials A2: Kabupaten level officials	workshop expose workshop expose	- -	Action Group (AG) Kabupaten Level Staff	Classical	Trainer WUASP	
	B1: Camat level officials	Classical	Trainer WUTP	KPL Camat Camat level officials			
	B2: Village level officials - Village head - PPL - Juru	Classical + pre-service training (KPL)	Trainer WUTP	KPL Village level officials - Village head - PPL - Juru - Women Farms	Classical	Trainer AG + Trainer WUASP	
				- CO/PPL	Classical	Trainer AG + Trainer WUASP	
	C : - WUAS Org - Key Farmers - Informal Leaders	Classical	Trainer WUTP	- WUAs Org - Key Farmers - Informal Leaders	Workshop	CO/PPL (Trainer AG)	
6 Follow-up Activities	WUA boa d Key farmers	Practical Field	- village head - PPL > KPL - Juru >	LAKU : Farmers	Field meeting	PPL/CO	Field meeting
Frequency	5 times/year ——> every 2 months			ROUTINE			ROUTINE
7 Other Supportive Org.	KUD, LKMD, KPD, LMD			KUD, LKMD, KPD, LMD			KUD, LKMD, KPD, LMD

Note : Officials from : Ministry of Home Affairs
Ministry of Agriculture
Ministry of Public Works (DGWRD)
Tertiary demonstration units are used for WUTP training

to further stimulate the development of legal framework on irrigation management in order to achieve better conditions to increase the food production through irrigation.

The training is carried out in a series of groups in a top-down approach in the following sequence :

Group A : Two exposes to introduce the project to :

- Senior Officials of Public Works
- Senior Officials of agencies involved in irrigation management

Two workshops to acquaint the participants with the project, secure their participation and suggestions and to enlist their support and commitment for the training programme for groups B and C, for :

- Senior Officials involved in irrigation management at provincial and sub-provincial levels (Group A1)
- Senior/Middle-level Officials involved in irrigation management at Kabupaten (district) level (Group A2)

Group I : Training for instructors for groups B1, B2 and C. Trainers chosen from Group A1, A2 participants.

Group B : Two levels of training programmes to increase the participants technical knowledge of tertiary level irrigation Operation and Maintenance, to agree common goals and actions and to develop their abilities to give guidance to the WUA (Target Group C), for camats (Group B1) and village officials (Group B2).

Group C : Training programme for Board members of Water Users Associations, key farmers and informal leaders.
The programme aims to teach the participants the principles and application of O&M and irrigation management at the tertiary level as well as communication skills. The training uses a four phase approach, classroom training followed by field problem identification, finding solutions and field implementation.

Following the formal training, there is a one year period of follow-up activities, when a follow-up team (Village Heads, PPL and Juru) pay approximately five visits to the WUA to help solve the problems identified in the Group C training, as well as other technical and organisational problems.

Most of the training is held in the fully equipped training centres (27 Nr) which have been established in each Province. There are now a total of 450 instructors. To assist with the WUTP training programme, demonstration plots have recently been established where tertiary level water management and operation and maintenance can be shown.

Since 1983, as experience has been gained with the project, continual improvements have been made to the training programme, the most recent having been the introduction of follow-up activities and the provision of demonstration plots. It is important that the projects activities are concentrated in SM/EOM areas and sequenced with the implementation of SM/EOM, ISF and the activities of the WUASP. For the training to be successful, EOM must be fully implemented. Demonstration plots have generally been established near the training centres, and these should

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if possible be within the Advanced Operation Units. The low education level of the participants often causes a problem with the training.

Water Users Association Strengthening Project

WUASP is a new project established in 1987. During ISSP-1 it was in the formulation stage and recently major changes in training approach have been made to speed up implementation and reduce costs. During ISSP-1 it was only active in two Kabupatens in each of the ten provinces. In contrast to WUTP which concentrates on more technical aspects, WUASP is primarily concerned with :

- strengthening of the organisation and development of WUAs;
- strengthening the relation between WUAs and other farm organisations at Village level;
- increasing awareness among actively involved officials at Village, Kecamatan (sub-District) and Kabupaten (District) levels in identifying the constraints regarding the strengthening of WUAs and recommending solutions and measures needed to overcome these constraints;
- improving coordination and cooperation with the Ministries of Public Works, Home Affairs and Agriculture in making an inventory of the functioning of WUAs and guiding these in line with INPRES 2/1984.

The training is at two levels :

i) Kabupaten or District level, where Action Groups comprising senior officials (typically one level below the heads) from local government, agricultural and irrigation services (typically several members from each service) serve as a catalyst in the development process of WUA's.

ii) Village level, where community organisers (CO) (typically agricultural extension workers, PPL) work directly with the WUA through mini workshops followed by routine guidance. To give guidance at the lower levels (Kecamatan and Village), field teams (KPL) from local government, agriculture and irrigation are established.

The training is mainly carried out at the Agriculture Department training centres (BLPP), with training staff from the Agriculture Department. Much of the training is given using facilitators rather than using formal modules. Broad curricula have been developed centrally and these are expanded at Provincial level.

As a result of experience with the first stage training, a major change in approach has been proposed, from a top-down approach with the Action Groups in a central role to approach with initially the CO/PPL in a central role. This new approach should be much cheaper.

Turnover Project (PIK)

The Turnover Project aims to hand over small irrigation projects to Water User Associations (presently mostly < 150 ha, in future < 500 ha).

Three groups of existing schemes are identified :

A. Schemes in good physical condition owned by farmers.

B. Schemes in good physical condition owned by Public Works and/or receiving O&M from Public Works.

C. Schemes requiring improvement (perbaikan).

The majority of schemes fall in Group C.

The project started with pilot activities in 1987 in West Java and West Sumatera and has now been expanded into Central Java, Yogyakarta, East Java, N.T.B and South Sulawesi. The first schemes were formally turned over in May 1990.

The training programme concentrates on schemes in Group C and uses a four stage training approach with the motivators/community organisers (TP4) receiving training on a specific subject and then implementing it before receiving further training. Most of the TP4 are juru pengairan for the respective schemes.

The training subject matter comprises :

Part 1. Carrying out farmer organisation inventories and working with farmers.

Part 2. Carrying out socio-economic profiles.

Part 3. Carrying out designs and construction with farmers participation.

Part 4. Preparation for turnover of schemes to farmers and operation & maintenance.

All the training is very participative. All the training material (manuals, notes etc.) have been prepared centrally. The project uses existing PRIS facilities and equipment.

Considerable short term evaluation of training has been carried out as part of the project, but as yet no long term evaluation has been undertaken.

Training Coordination Project

As part of ISSP-1, there was a separate consultancy to provide Training Coordination assistance to Bidang Diklat Pengairan. All training activities were to be coordinated, in close cooperation with the individual Directorates, their Consultants and PRIS, to ensure that courses were sequenced correctly and course content was consistent with actual needs; that training concentrated on ISSP-areas and that results of the training were assessed.

Data has been collected from PRIS and other agencies on courses held with subjects and participants and training material available.

It has been noted that sometimes the training material developed and presented has not been based on systematic training needs surveys. Also the material often concentrates on technical aspects rather than the wider scope of the job requirements. Some training evaluation has been carried out for courses at the Diklat Regional Training Centres and PRIS.

A master plan for all water resources development training has been developed.One of the new initiatives within the plan is the introduction of an interim system for training needs

identification, which has been implemented to assist with the planning of O&M irrigation training in ISSP-2 areas. The Master Plan has also prepared guidelines for the content of training modules and future curriculum development, and training management sub-systems.

1.5 O&M Funding

1.5.1 Surface Irrigation

Present Arrangements

The three main sources of funds for O&M are as shown in Figure 1.5.1 and described below :

(a) **Routine Salary Payments (DIK)**

Each provincial government allocates funds from its own revenue for payment of routine salaries to province based permanent staff (Pegawai Sipil Daerah). The payments are made through DIK (Daftar Isian Kegiatan). In most provinces the money is allocated to each Dinas or Service. For this purpose all three Public Works Services fall under one Dinas and, therefore, it is difficult to obtain exact figures for the Provincial Irrigation Service (PRIS).

(b) **APBD - Inpres Dati I**

This is a subsidy from the Central Government, made available under the development budget and channelled through the Ministry of Home Affairs via the Provincial Government (DIPDA) to the PRIS, to meet incentive payments, overtime, transport, subsistence, materials and construction expenditures.

(c) **APBN - DGWRD**

This is a development budget allocated through the Ministry of Public Works, via DGWRD to the PRIS, and is used for the same purpose as the APBD funds.

The APBD funds are further augmented by (small) contributions from PBB (Ministry of Finance) land and property tax collections (see Section 1.5.3 below) and from PAD, miscellaneous local taxes to meet local needs.

During the period 1984/85 to 1988/89 Central Government allocation for O&M was only made to specific areas, which had been rehabilitated, in West, Central and East Java, Lampung and South Sulawesi. These areas did not receive APBD funds.

Prior to ISSP-1, GOI allocations for O&M were at a level of about 7,700 Rp/ha, excluding routine salaries (DIK). This was insufficient to maintain the irrigation systems in good condition.

The structure for EOM funding under ISSP-1 for irrigation areas was based on an estimated average cost figure of 25,000 Rp/ha at 1987 prices, excluding DIK. The budget allocation for FY 1987/88 for recurrent O&M (excluding DIK) was set at 8,385 Rp/ha and the incremental expenditures for Efficient O&M at 13,200 Rp/ha, including 10% tax.

The agreement for Loan 2880-IND which supported ISSP stipulates that GOI would maintain the allocations for recurrent O&M at the above level in real terms. The Bank contribution to the incremental expenditures of each DI would decline from 100% in the first year of admission to EOM, reducing by 20% each year thereafter. The actual percentage funded by the Bank is calculated as a uniform rate for all EOM areas in any one fiscal year. This simplifies DIP calculations which would otherwise become very complex.

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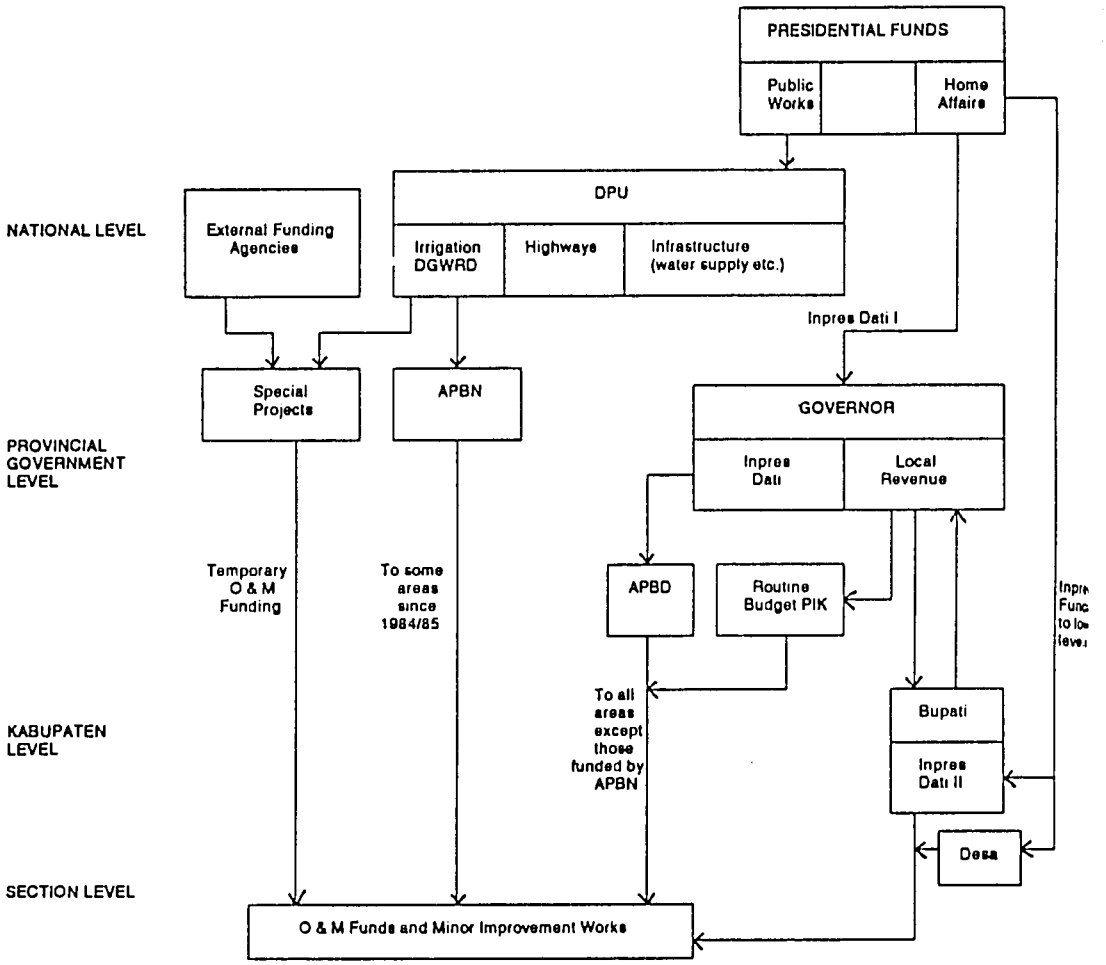
Sources of O & M Funding

Figure 1.5



Note : 1. Village, through the Kecamatan request works related to irrigation. Kabupaten then discuss these proposals with the Irrigation Service Section Head before finalising works to be carried out. The Section Office then carries out the design work. Tenders let through Kabupaten, construction supervision by Kabupaten with Section Office assistance.

2. The Irrigation Section Head has possible sources of funding for O & M and minor works, which he has to coordinate

Since FY 1989/90 the APBD sources fund the non-EOM areas and the EOM areas are funded by the APBN/Bank sources. The budget allocations in the period 1986/87-1990/91 are shown in Table 1.5.1.

Possible Future Arrangements

At present all non-EOM areas are funded by APBD sources while areas introduced to the EOM programme are funded by APBN/Bank sources. The Working Group on Irrigation O&M proposes that when the Bank contribution to the incremental expenditures for Efficient O&M for a particular DI expires after five years in the programme, the EOM area will be transferred back to the province (APBD). This proposal still needs to be worked out in more detail, in order to deal with the variations which will occur in practice. The best way to re-cycle irrigation service fee (ISF) revenue also needs to be explored further.

The overall strategy and a detailed plan for handing back DIs in both IBRD and ADB supported areas needs to be explored and developed. During ISSP-2 Project Preparation various ideas where explored, but it was not possible to obtain consensus on the most appropriate strategy for future funding of O&M in the time available.

Within the Urban Sector various procedures for Central-Local transfers of funds and for funding urban maintenance from locally raised revenue are being developed at present. However, as far as could be ascertained, none of the locally raised revenue is earmarked for a specific purpose as is planned for ISF. Some of these procedures may well be applicable to the funding of irrigation operation and maintenance once they have been finalised.

In view of these developments, it is proposed that the Working Group on Irrigation O&M continues to explore the various possibilities for future funding of irrigation O&M with assistance from both the General Coordination Consultants and the DOI-I Central Consultants. A discussion note has been prepared by the General Coordination Consultants. This should be discussed and developed into an agreed Technical Note describing in detail the methodology for future funding of O&M and setting out the overall strategy and detailed planning. This should be completed before the start of ISSP-2, so that arrangements can be made for the disbursement of ISF funds, already collected to support EOM. This note should take account of both experience gained from the Irrigation Service Fee programme and in the Urban Sector programme.

1.5.2 Development Tax

The property tax system IPEDA is intended as a revenue source for local governments. Its revenues are used to fund development activities at the local level. This tax is not an irrigation fee and its revenues do not cover operation and maintenance costs of irrigation systems.

In the Statement of Policies for Irrigation Operation and Maintenance the Government has formulated, inter alia, the following objectives:

- To establish an agreed mechanism for ensuring that Provincial Governments take a gradually increasing financial responsibility for the O&M budget of main irrigation systems from their own revenues,

- To implement a cost recovery system which will eventually finance all costs of efficient O&M of irrigation systems through increased contributions from irrigation beneficiaries,

Table 1.5.1 Budget Allocations for Recurrent and Incremental O&M

a) Recurrent O&M (incl. area but excl. funds for POJ)

Fiscal Year	Area (ha) 1)	Allocations (Rp/ha)	Allocations Total (Rp mln)	Indexes Allocatio	Indexes Inflation
1986/87	5,184,326	7,700	39,977.0	100.0	100.0
1987/88	5,193,743	8,385	43,546.0	108.9	108.9
1988/89	5,402,238	8,312 2)	44,903.0	107.9	117.6
1989/90	5,202,609	10,411	54,164.3 *	135.2	127.0
1990/91					

b) Incremental Expenditure for Efficient O&M on part of areas included in (a) above (incl. areas and funds for POJ)

Fiscal Year	Area wit EOM (ha) 1)	Incremental Allocation (Rp/ha)	Allocations and Tax (Rp million) Loans	GOI	Tax	Total
1987/88	213,000 (IBRD)	13,200	2,556.0		255.6	2,811.6
1988/89	608,187 (IBRD)	14,030	7,757.6		775.7	8,532.9
	19,695 (ADB)	12,427	222.5		22.3	244.8
1989/90	943,379 (IBRD)	15,400	11,622.4	1,584.9 *	1,320.7	14,528.0
	36,615 (ADB)	15,532	461.4	55.1	51.7	568.7
1990/91						

Notes:
1) Irrigation and Swamps combined
2) 9,779 Rp/ha would meet the requirement to maintain recurrent O&M expenditures in real terms for 1989/90. The extra makes good the deficit from 1988/89

(*) GOI O&M Budget Allocations for 1989/90 (Rp million)

Distribution

Recurrent O&	Rp	54,164.3
EOM (IBRD)		1,584.9
EOM (ADB)		55.1
DIK (Swamps)		395.0
Total	Rp	56,199.3

Source of Funds

APBD I PBB etc.	Rp	6,741.[illegible]
II Inpres Dati I		38,580.[illegible]
APBN (#)		10,768.[illegible]
POJ (Incr. Expenditures)		108.[illegible]
	Rp	56,199.[illegible]

(#) Includes Rp 395 mln DIK Swamps

- To improve indirect cost recovery and increase local government revenue generation and their capacity for O&M funding, through a long-term programme to raise PBB revenues on irrigated areas in all provinces,

- To expedite the conversion of Land Tax (IPEDA) to the new PBB system through reclassification and reassessment of the market value of irrigated properties, and to ensure that the system is implemented effectively and yields the expected revenues.

The Government introduced the new PBB (Pajak Bumi dan Bangunan) in 1985. Within the framework of ISSP these new taxing activities are strongly supported.

1.5.3 Irrigation Service Fee

Since, according to the Statement of Policies for Irrigation Operation and Maintenance referred to in section 1.5.2, the PBB tax system may not be a dependable source, the implementation of a direct cost recovery system - irrigation service fee - which eventually finances all costs of efficient O&M of irrigation systems should be established. These fees are expected to gradually reduce the need for Government funding subsidies and become the main source of an efficient O&M Budget for main irrigation systems.

In the Policy Statement, two objectives are formulated relating to the irrigation service fee:

- Starting from fiscal year 1988/89, to introduce an Irrigation Service Fee (ISF) related to the cropping patterns/systems in several pilot scheme areas being taken up for efficient O&M. The implementation of the pilot scheme will also enable the establishment and refinement of the necessary administrative and judicial arrangements as well as institutional aspects, collection mechanisms and level of fees to be collected.

- Based on the results of the pilot scheme, to gradually extend ISF to all provinces for irrigation systems where efficient O&M has already been introduced.

During the first time slice of ISSP, ISF was introduced in 4 pilot areas (Nganjuk in East Java, Subang in Jatiluhur, Sukoharjo in Central Java and Sidrap in South Sulawesi), covering a total area of about 50,000 ha. The intention is to extend the ISF area to about 700,000 ha during the second time slice of ISSP (see section 2.6).

1.5.4 ISF versus PBB

Irrigation Service Fee (ISF) and Land & Property Tax (PBB), both ISSP components, have in common that they are cost recovery mechanisms. They are however fundamentally different in nature and concept.

ISF is a <u>fee</u>, a payment for (irrigation) service; the service being extended by the irrigation authority and the payment made by water users as the service beneficiaries.

PBB is a public <u>tax</u> levied to owners who have, unlike the ISF payees, no control on ultimate use of the funds.

Farmers are well aware of the distinction, and both fund raising systems can exist side by side. Yet, it is in the interest of a successful ISF programme that both systems are kept strictly

separate, even if the same government agency (Dipenda II) will be responsible for collection implementation and fund administration of both.

One aspect should be given attention. The 1987 GOI policy statement on irrigation O&M refers to PBB as an 'indirect cost recovery system to increase local revenue generation (through PBB) from irrigated areas'. This could imply that if and when irrigated land values increase as a result of improved O&M services in ISF areas, the PBB would (after reclassification) be increased proportionately.

Logical as this may be, some restraint to this effect should be exercised, because a tax rise may adversely affect farmers' willingness to pay ISF. The kabupaten revenue office, being aware of this potential conflict of interest, would be the obvious agency to judge and reconcile the two types of revenue as necessary.

1.6 Issues

1.6.1 Introduction

During ISSP-1 various issues have arisen which have in some cases affected the implementation of the project. These issues are reviewed here and have been taken into account in formulating ISSP-2.

1.6.2 Physical and Financial Targets

As with all projects, various physical and financial targets were set for ISSP-1, by GOI at the Centre, for achievement annually and/or by the end of Repelita IV in March 1989. In particular, the EOM targets set resulted in some provinces being obliged to introduce EOM prematurely to some DIs before they were in a suitable condition. This contributed to the need for additional special maintenance (referred to as SM2 where applied to DIs already under EOM and SM3 for DIs under direct EOM or DEOM) in order to rectify physical defects in the infrastructure which made proper introduction of efficient operation and maintenance difficult. Increased involvement of the provinces in the setting of realistic targets, which should occur as decentralisation proceeds, will help to overcome this problem in the future. This is not likely to occur in the initial years of ISSP-2 and targets will have to continue to be set by the centre based on demonstrated provincial implementation capacities and regional development priorities.

The financial planning and budgeting procedures currently in use in Indonesia can in some cases also contribute to the setting of unsuitable targets for implementation. Efforts should be made to use these procedures in a flexible way so that budgets can be adjusted to meet the actual needs which may only become apparent as implementation proceeds.

1.6.3 The Planning and Sequencing of Activities

The correct sequencing of activities is important to the smooth build up of EOM and ISF areas. Particularly at the start of ISSP-1, when the detailed requirements for the introduction of EOM and ISF where not fully defined, some key activities were omitted or got out of phase. The planning of the selection of schemes for inclusion in the SM programme must take account of the planning for introduction of ISF and the turnover of small schemes. The selection of schemes for the SM programme in scattered locations or schemes which turn out to be inherently unsuitable for EOM without major changes makes it more difficult to manage the EOM programme and coordinate it with the ISF and Turnover programmes. On the other hand if activities are concentrated on too small an area, this may lead to human resource constraints to implementation as the Jurus are involved in many of the activities of the EOM, ISF and Turnover programmes.

A better understanding of the inter-relation of the various ISSP components has developed during ISSP-1. The lessons learnt should enable ISSP-2 to be implemented more efficiently. For example the importance of coordinating Water User Association (WUA) formation and strengthening and the training of WUAs and O&M staff with the EOM, ISF and Turnover programmes is now better appreciated.

The need to have a realistic plan of operation and maintenance (POM) and the budget, staff equipment and facilities to implement EOM before it begins is also better understood as a esult of experience gained by PRIS and DOI-1 during ISSP-1. The introduction of a test to heck whether the minimum requirements for introduction of EOM have been achieved during M will also help to prevent unsuitable DIs being admitted to the EOM programme. Similarly

the introduction of "Preparation for Operation and Maintenance" (PROM) for schemes coming directly into the EOM programme from other projects should allow their suitability for DEOM to be checked and defects to be remedied through a clean-up contract where appropriate. These measures should make the continuation of additional special maintenance unnecessary once the present backlog from ISSP-1 has been dealt with.

1.6.4 Procurement of Equipment and Consultants

The procurement of equipment and consultants for the design packages was done centrally in ISSP-1. In some cases the equipment procured was not what was needed by the provinces and arrived in the provinces after long delays. The provinces also in some instances felt that they were not in close enough contact with the consultants carrying out designs and were not aware of the status of the design contracts. The decentralisation of the letting of design contracts and of the procurement of selected items of equipment would help to resolve some of these problems.

1.6.5 Methods of Irrigation System Operation

The basic methods of operation of irrigation systems were developed under East Java Irrigation Project and its predecessors, based on simplification of the procedures in use for many years in E Java. These were disseminated to other provinces through West Java and Central Java Irrigation Projects and ISSP-1. It was assumed at first that although there would be small regional differences in operating practises, the fundamental operating system would continue to be based on the East Java model. Advanced Operation Units (AOUs) were used to develop or refine local operating procedures and train O&M staff in their use. Experience gained during ISSP-1 has shown that in some provinces, significant variations may be appropriate because of differences in irrigation infrastructure and regional methods of operation. These alternative operating systems need to be investigated further during ISSP-2 through the continued use of AOUs.

1.6.6 Inventories of Irrigation Systems

The basic inventory of the DPU irrigation systems is contained in the Buku Pintar Daerah Irigasi P.U. The database for this is held on a main-frame computer in Bekasi and the data is revised every two years. The database could be made more useful and accessible if it could be accessed by micro-computers and if some additional information such as the river basin of the DIs could be added. There are also problems with processing the data as many of the newer DIs do not have numbers and in some cases the same DI number applies to several DIs. Particularly in Java some individual DIs consist of agglomerations of physically distinct irrigation systems which also can lead to confusion, particularly when trying to identify DIs suitable for turnover. A second Buku Pintar for non-PU schemes gives details of village irrigation systems. The data in this is incomplete and unreliable in many regions.

With the introduction of ISF and the turnover of small irrigation schemes to farmers, it becomes even more important that the inventory of irrigation systems is improved. Procedures for doing this for small systems have been developed as part of the turnover programme under ISSP-1. Under ISSP-2 this process should be further developed and institutionalised and support should also be provided to PRIS staff involved in updating the Buku Pintar Daerah Irigasi P.U.

1.6.7 Coordination and Monitoring of the Overall EOM Programme

The EOM programme which originated with IBRD support, now receives incremental funds from both IBRD and ADB and may well receive support from other multilateral or bilateral aid agencies in the future. There is a need for an overview of the whole EOM programme and for strategic planning of the introduction, coordination and gradual phasing out of support for EOM from foreign assistance. The different methods of assessing the incremental O&M used by IBRD and ADB further complicates the administration and monitoring of the overall programme, particularly where both programmes are occurring in the same province. The various loans through which EOM support is provided all start and finish at different times and do not coincide with GOI's five year planning cycle. The need to coordinate the ISF programme under the Ministry of Home Affairs with the EOM programme under the Ministry of Public Works is essential and yet also made more difficult by the lack of strategic planning to date. This strategic planning and monitoring should be done by the General Coordination Consultants together with senior staff from Bina Program. However in order to be more effective, ways need to be found for the ISSP-2 General Coordinating Consultants to be combined with the TISP and IISP General Coordinating Consultants in the ADB programme. Similarly meetings of the coordination team chaired by BAPPENAS should deal with the overall EOM programme. All future irrigation development programmes, whether for rehabilitation, completion of on-going projects or development of new schemes will eventually affect the EOM programme. It would therefore also greatly assist with planning if IBRD missions involved in the irrigation sector could coordinate their schedule of visits in the same way that urban sector missions do.

CHAPTER 2

PROJECT COMPONENTS

2.1 Objectives, Scope and Components

2.1.1 Objectives

ISSP-2 will continue some of the activities initiated under ISSP-1 but will be mainly focussed on achieving the improvement of irrigation operation and maintenance through support of the goals stated in the policy statement on irrigation operation and maintenance issued in 1987. It will build on the experience gained in the implementation of ISSP-1 and will consolidate the activities commenced during ISSP-1.

2.1.2 Scope and Components

Whilst focussed primarily on irrigation system operation and maintenance, the project also covers aspects of O&M for selected rivers and swamps. In the course of Project Preparation it was decided to limit implementation of the project components to Jatiluhur and the provinces indicated on Figure 2.1.1 which shows a matrix of components and provinces. Altogether 12 provinces and Jatiluhur are included in one or more of the various project components.

The selection of provinces for the irrigation component was based on the area of irrigation systems suitable for introduction of special maintenance and EOM and the extent to which ADB was already supporting irrigation development and introduction of special maintenance and EOM in particular provinces. For this reason Aceh, N Sumatera, Maluku, Bali, NTB and S E Sulawesi were excluded from the irrigation component because of the ADB supported TISP and ISSP projects. Bengkulu, Riau, Jambi, DKI Jaya, East Nusa Tenggara, Timor Timur, W Kalimantan, C Kalimantan, E Kalimantan and Irian Jaya were also excluded because the irrigation areas are small. N Sulawesi was excluded from the irrigation component because the irrigation areas are small and there is a similar program in the province supported by Canadian aid (CIDA). The irrigation component is therefore situated in W Sumatera, S Sumatera, Lampung, W Java, Jatiluhur, C Java, Yogyakarta, E Java, C Sulawesi and S Sulawesi. In C Java where ADB is also active the cabang dinas of Luk Ulo, Serayu Hilir, Citanduy Timur and Bogowonto have been excluded from ISSP-2.

The swamps component was restricted to the provinces of N Sumatera, W Sumatera, S Sumatera, Lampung and S Kalimantan, where there is still outstanding work remaining from ISSP-1. The rivers component is in N Sumatera, W Sumatera, W Java, C Java, Yogyakarta, and E Java.

The scope of the project includes

- special maintenance on irrigation where deferred maintenance and minor system modifications are required;
- special maintenance on swamps development systems where SM construction was started under ISSP-1 and further work is required;
- completion of additional special maintenance on systems which received special maintenance or entered the ISSP-1 EOM programme either from ISSP-1 or other special projects and where then found to require additional work before they were suitable for inclusion in the EOM programme;

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DISTRIBUTION OF PROJECT COMPONENTS AMONG PROVINCES (ISSP-2) Figure 2.1.1

Project Components \ Province	1 W JAVA	2 JATILUHUR	3 YOGYAKARTA	4 C JAVA	5 E JAVA	6 NTB	7 C SULAWESI	8 S SULAWESI	9 N SUMATERA	10 W SUMATERA	11 S SUMATERA	12 LAMPUNG	13 S KALIMANTAN
1. IRRIGATION													
a. Special Maintenance	■	■	■	■	■		■	■		■	■	■	
b. Efficient O&M	■	■	■	■	■		■	■		■	■	■	
c. I.S.F.	■	■	■	■	■			■		■		■	
d. Turn over of Small Schemes to WUAs	■	■	■	■	■			■		■	■	■	
e. O&M Staff Training	■	■	■	■	■		■	■		■	■	■	
f. WUTP Water Users Training	■	■	■	■	■		■	■		■	■	■	
2. SWAMPS													
a. On-going Project Completion									■			■	
b. Special Maintenance										■	■		
c. Efficient O&M									■	■	■	■	■
3. RIVERS													
a. River Mouths Monitoring	■			■	■				■	■			
b. Pilot River Basins	■		■	■									
c. Basin Water Management				■									
4. GROUNDWATER DEVELOPMENT					■	■	■	■					
5. LAND RECLASSIFICATION PROGRAMME				■	■			■		■		■	
6. MIS	■		■	■	■		■	■		■	■	■	
7. INSTITUTIONAL STRENGTHENING	■	■	■	■	■		■	■		■	■	■	

■ Components proposed for ISSP-2

* ISF is also proposed to be introduced in Bali

- most essential land development activities for some of the swamp schemes (financed by GOI);

- introduction of O&M (EOM) on those systems where special maintenance has been completed and on those areas where new systems or rehabilitation of systems have been completed and are operational with O&M manuals and plans developed and in place;

- consolidation and expansion of the Irrigation Service Fee areas introduced under ISSP-1 in selected provinces;

- consolidation and expansion of the programme for turnover of public irrigation systems;

- consolidation of the land reclassification/valuation programme undertaken to date;

- institutional strengthening of provincial agencies in O&M and water resource management related activities;

- training PRIS staff, irrigation committee members and WUAs in activities related to the above components;

- a small groundwater component covering a period of 18 to 24 months which includes installation of the outstanding materials and equipment procured under ISSP-1 and the procurement of equipment in readiness for the first year of a proposed separate groundwater project;

- continuation of the programme for monitoring the performance of the five river mouths started under ISSP-1. No work on any additional river mouths will be included.

- completion of minimal works required to ongoing swamps projects subject to re-evaluation of technical and economic viability;

- evaluation of alternative approaches to the operation of irrigation systems in different regions including continuation of on-going AOUs where appropriate;

- selection of two pilot river basins on which river basin management, river O&M, and the coordination of the introduction of EOM, turnover and ISF activities can be implemented;

- the improvement of existing irrigation inventories;

- continued support for the introduction of the Management Information System, developed under ISSP-1, to PRIS in selected provinces.

Details of these components are described in the remaining sections of Chapter 2. The implementation planning is given in Chapter 3 and the cost estimates for each component and the project as a whole are given in Chapter 4.

In the Aide Memoire of the IBRD mission in March 1990 it was stated that :

> "The proposed ISSP-2 could also provide technical assistance to DGWRD and one or more pilot Province to : (a) improve DGWRD's and Provincial Governments' capabilities to carry out EA of water resource development projects; and (b) develop and apply environmental guidelines, and review the requisite EAs".

Environmental aspects were not in the TOR for preparation of ISSP-2 and consequently the preparation team lacked the expertise to develop this component. A request for technical assistance was received during discussions of the draft report and was included in the Appendices. This technical assistance was deemed to be inappropriate by the IBRD pre-appraisal mission. A new draft terms of reference based on the guidance provided by the mission was received during finalisation of the Final Report. The draft terms of reference are included as Appendix A3 and estimated costs are included in the summary project cost tables in Chapter 4.

PILS for the Sei Kualuh and Mesuji/Tulang Bawang swamp schemes in N. Sumatra and Lampung respectively, and for existing irrigation developments in the Citarum river basin in W. Java, are under preparation and will be available at the time of appraisal. The abovementioned terms of reference relate to these areas.

2.2 Surface Irrigation

2.2.1 Special Maintenance

Many recently rehabilitated irrigation systems which were once in good condition have deteriorated due to lack of adequate funds for O&M and other constraints. Also, systems have been built without appropriate facilities for efficient operation; these systems lack adequate measuring and control structures or other necessary facilities.

Special Maintenance (SM) is required to remedy the problems which have developed since rehabilitation was carried out. Thus, Special Maintenance would include minor works and repairs/improvements such as painting, silt removal, limited canal shaping, localised remedy of canal erosion and limited lining and structure repair. In order that operation of these systems can be properly carried out, minor modifications/additions such as the construction of a limited number of measuring devices may be included. However, construction of large structures and major new lining are not included.

There are several clearly defined basic activities to be carried out, as follows:

(a) Preparatory work

- updating of system maps
- system survey and inventory
- system planning
- review of operation and maintenance requirements
- detailed design and tender documents for SM-works.
- preparation of a Plan of Operation and Maintenance

(b) Implementation

- award and supervision of SM-works
- update of inventory and maps
- as-built drawings

System objectives and the method of operation should in principle be clearly established during preparatory work.

Upon completion of SM, all facilities and supporting equipment should be completed and in sound condition, fully meeting high standards of construction.

Special Maintenance also entails preparation of a comprehensive, system-specific Plan of Operation and Maintenance (POM), including all maps, plans, as-built drawings, O&M manuals, staffing plan, equipment, communications and other support required for efficient O&M.

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Based on the inventories received from the provinces the total area needing Special Maintenance is 824,100 ha. The following criteria have been used for selection of DIs for the ISSP-2 programme for special maintenance :

- DIs with areas greater than 500 ha should be included. However, in Yogyakarta small DIs which receive supplementary water from the Mataram canal should be included, even if their area is less than 500 ha.

- DIs which are known to consists of groups of small DIs (DI gabungan) should be excluded.

- In C Java, Cabang Dinas of Luk Ulo, Serayu Hilir, Citanduy Timur and Bogowonto should be excluded because ADB is supporting SM and EOM in these areas.

After modification as necessary to suit the overall programme of implementation and feasible implementation rates (see Section 3.2.2) the total SM construction area included in the proposed ISSP-2 programme, by province is shown in Table 2.2.1. A list of the DIs included in the programme is given in the irrigation system data volume.

SM2: Additional SM in ISSP-1 areas

In the concept of Special Maintenance for ISSP-1, it was considered that the average cost of construction, needed to bring selected areas up to a standard which would allow efficient operation and maintenance, would be about 100 US$/ha, or about 164,000 Rp/ha. However, it turned out that the actual average cost far exceeded this amount, the engineer's estimates averaging some 260,000 Rp/ha.

To accommodate these budget constraints, in a number of cases the originally selected areas were reduced and all works needed in these reduced areas were executed. In other cases, the work was spread out over the whole area but only part of the required work was carried out, often concentrated on the repair of structures. Because of this, it is not possible to accurately determine the extent of the areas actually completed.

A summary by province of the areas where SM construction has been carried out during ISSP-1 is shown in Table 2.2.1. Areas where SM still needs to be completed (designated SM2) are also given but, for the reason mentioned above, these figures are indicative only.

SM3: Special Maintenance in DEOM areas

In addition to the completion of SM construction started in ISSP-1, some deferred maintenance work is still needed in areas selected for Direct EOM in the first time slice (designated SM3). A summary by province of the areas concerned is also given in Table 2.2.1.

2.2.2 Efficient Operation and Maintenance

Efficient operation means the effective utilisation of the irrigation and drainage infrastructure to ensure an adequate and economic supply of water to farmers in all parts of the system at times of availability without deterioration of the system, and that when water is a constraint, it is equitably shared to optimise its use.

Table 2.2.1 Special Maintenance and Efficient O&M Areas (Ha)

Province	ISSP-1 SM Constr. Area	Area Requiring Additional SM2	Total Area under DEOM 1989/90	Area under DEOM requiring SM3	ISSP-2 SM Constr. Area	ISSP-2 PROM/ DEOM Area	Efficient O&M (Cumulative areas)					
							1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
C Java	68,339	40,925	93,602	29,802	101,709	101,754	158,102	206,139	256,548	303,983	357,681	396,470
C Sulawesi	-	-	-	-	18,460	20,711	-	-	18,687	20,545	49,451	54,296
E Java	65,508	36,945	175,287	24,706	146,107	12,934	236,845	270,052	282,602	310,577	354,525	396,176
Jatiluhur	60,192	27,176	11,072	-	79,256	9,911	64,823	71,264	87,566	96,076	117,970	153,565
Lampung	12,794	12,794	40,366	-	23,850	1,550	51,030	62,880	64,430	69,430	108,208	114,541
S Sulawesi	64,954	22,843	-	-	51,974	22,100	48,073	64,954	80,745	86,030	127,781	163,161
S Sumatera	16,620	16,620	-	-	6,836	9,657	15,238	16,601	24,692	24,692	37,415	41,274
W Java	63,838	41,451	144,956	102,878	96,423	56,405	204,131	224,611	248,814	274,694	313,759	351,449
W Sumatera	14,683	14,629	8,224	8,224	19,251	13,383	21,085	24,157	26,357	33,797	46,787	60,233
Yogyakarta	17,256	10,011	8,143	8,143	23,055	1,193	24,149	25,399	25,399	29,528	35,040	42,227
Total	384,184	223,394	481,650	173,753	566,921	249,598	823,476	966,057 *	1,115,840	1,249,352	1,548,617	1,773,392

* Total EOM in ISSP-1 is 988,250 ha including 22,193 ha in NTB

Efficient maintenance may be defined as those activities required to ensure that the system is kept in a suitable condition to perform the function for which it was designed. Rehabilitation of systems should not be necessary any more, if efficient operation and maintenance (EOM) is properly carried out.

Efficient O&M requires:

- operation and maintenance related to the "needs" of the system, based on inventories and operation guidelines. Needs will be identified in terms of physical infrastructure, staffing, equipment and facilities for each system, starting at Cabang Dinas (Seksi) level,

- establishing system irrigation requirements and procedures, and methods for efficient water distribution,

- regular inspection of all parts of the system to identify their condition and the need for repair of structures, canals, equipment and facilities,

- proper programming, budgeting and implementation of regular preventive maintenance to ensure that systems do not deteriorate to the point that rehabilitation is required.

Preparatory activities required for the initiation of EOM (designated as PROM) include the preparation of a Plan of Operation and Maintenance (see section 2.2.1), completion of a Needs Based Budget (NBB), staffing and staff training.

EOM should be introduced only on those schemes where Special Maintenance is completed, schemes are operational, and the preparatory activities are developed and in place.

At the end of ISSP-1 the area under EOM was 844,169 ha. Another 153,574 ha are expected to be brought under EOM in FY 1990/91, bringing the total up to 988,250 ha. The areas expected to have EOM in the years 1991/92 to 1994/95 are shown by province in Table 2.2.1. The figures include both EOM and DEOM areas.

Direct Efficient O&M

EOM may be introduced directly on on-going schemes (DEOM) at the time of handover from construction, provided that the preparatory actions mentioned above have been completed. About 360,000 ha are expected to enter the EOM programme directly during ISSP-2.

For schemes for which not all preparatory actions have been completed it should be noted that some items (preparation of POM and NBB, staff training, determining of O&M equipment and facilities needs) are among those that should commence well before handover.

Procurement of O&M equipment and supplies, and completion of all miscellaneous construction activities, however, should be funded under the project construction budget and not under PROM.

Areas requiring PROM (249,598 ha in total) are given by province in Table 2.2.1.

2.2.3 Extension of Turnover Programme

Introduction

The Turnover Programme started in 1987 with pilot activities in West Java and West Sumatera provinces, and was expanded during the following year to Central Java and DI Yogyakarta. In the third year, starting 1989/90, activities were expanded to East Java, West Nusa Tenggara (NTB) and South Sulawesi.

The executing agency for system turnover to date is the Directorate of Irrigation I (DOI-1) of the Directorate General of Water Resources Development (DGWRD), Ministry of Public Works. Responsibility for field implementation rests with the Provincial Irrigation Service (PRIS or DPUP, Sub Dinas Pengairan). The turnover project activities are being funded by the IBRD (Loan 2880-IND) and the Ford Foundation (grant).

The Institute for Social and Economic Research, Education and Information (LP3ES), a local NGO, has conducted training programmes and provided coordination for PRIS field staff who work as community organisers. The consultancy by LP3ES, funded by the Ford Foundation grant has been extended until April 1991. The International Irrigation Management Institute (IIMI) has also contributed to the Turnover programme by conducting research at pilot sites and providing information and analysis.

Legal Framework

To date the transfer of physical assets from PRIS to WUAs is behind schedule mainly due to delays in administrative procedures. A brief analysis of the legal framework, as relevant to the turnover programme, indicates that no major legal and administrative obstacles seem to exist. The following observations are made :

- A significant Government Regulation (PP) is no.23/1982. Article 2(1) stipulates that the management and regulation of irrigation water, physical systems and structures, including the operation and maintenance of the systems, in a province shall be the responsibility of the concerned provincial government.

- Implementation of turnover is awaiting the promulgation of decrees by governors and bupati following the Ministerial Ordinance (Permen, PU) no. 42/PRT/1989 of November 8th, 1989 on "System of Turnover of Small Scale Irrigation Systems and Management Authority to Water Users Associations". This Permen includes implementation instructions and technical guidelines.

Concept of System Turnover

Turnover project activities can be divided into seven successive phases :

(i) **System inventory** :

- collecting basic data on suitable PRIS systems from the Buku Pintar;

- categorizing systems for future treatment in the turnover process;

- selecting schemes for profiling.

(ii) **Profiling :**

- collecting in-depth information on social and technical aspects relevant to eventual turnover;
- compiling a list of system improvements proposed by farmers.

(iii) **WUA establishment/development :**

- an on-going activity starting at the profiling phase and continuing until several months after turnover. formalizing the WUA and getting it registered and legalized by decree of Bupati.

(iv) **Design and construction :**

- bringing the system into good working condition before turnover to farmers users;
- providing a key activity for farmers' participation and an impetus for WUA development.

(v) **O&M training for farmers :**

- this follows the completion of system improvements.

(vi) **Preparation for turnover :**

- preparation of administrative documents necessary for turnover. WUA registration through a decree by the Bupati should be complete by this time.

(vii) **Actual turnover :**

- formal transfer to the WUA of system assets and management, through the Bupati.

During the inventory of small irrigation systems, recorded in the Inventory Book of Public Works Irrigation Systems (Buku Pintar), the systems eligible for turnover are categorized according to previous construction and management assistance from Public Works and by their need for repairs and improvements. Three categories are identified :

- "A"-systems: built and managed by farmers with no PRIS involvement and in good condition. Turnover would involve mere reclassification in the Buku Pintar and registration of WUAs by the district government.
- "B"-systems: PRIS has assisted in building structures and or system operation and maintenance, but no further system improvements are required. Turnover to take effect after strengthening WUAs.
- "C"-systems: improvement of the system and development of the WUA are required. Before turnover a "socio-technical profile" of the system is made describing the existing system management and layout and listing improvements requested by farmers. The profile serves as a basis for technical design for construction.

There is an increasing tendency to deviate from these initial criteria. Previous non-involvement by PRIS would seem to be no longer sufficient reason for direct turnover. By inclusion of potential A schemes into the construction programme they become B or more likely C schemes.

In many cases the physical conditions in A systems warrant some improvement and the farmers often welcome free PRIS assistance.

Recent DOI-1 system information (March 1990) shows that in West Sumatera province 49 systems initially classified as A systems were recently reclassified as C. The practice is also reflected in DOI's proposed turnover extension programme for ISSP-2, where only group C systems are mentioned.

The reasoning is that problems of inequity can be overcome and spreading PRIS assistance would be in the interest of social justice. However, it also spreads the limited funds over a wider area.

Implementation Issues

As detailed in Appendix C.1, the turnover related issues can be summarized as follows:

- The preliminary Survey and System Inventory
- The Profile
- Designing System Improvements for Farmer Management
- Construction Stage
- WUA Development and Transition of O&M
- Implementing Agency

From the available turnover documentation, field visits and discussions with the agency and its consultants, the impression was gained that there are still some issues which have not been fully resolved yet. Some of these are highlighted below, where applicable reference should be made to Appendix C.1.

(i) Farmer participation in turnover.

It cannot be stressed enough that for successful and sustained turnover of small schemes, from the very beginning and in all phases of the programme full participation of and consultation with the farmer water users in those schemes is imperative. Two points may in this respect be made :

Prior to selecting a scheme for turnover assistance, the farmers concerned should be made aware of what is involved. They will be told what the government investment ceiling will be and what will be expected from them. Under turnover the SM assistance should be used as a symbol of what the relationship between WUAs and PRIS will be after turnover, where there is a joint investment, where both sides must economize, and where the agency assists farmers only in problems which are beyond their capabilities of resolving by themselves. It must be made quite clear that turnover is a joint operation, serving the interests of both sides.

In order to identify the real needs for system improvement, the turnover officer and representatives of the farming community, preferably the WUA(s) conduct a system walk-through. This joint on-site inspection tour, provides a sound basis for consensus between PRIS and system users on the annual work plan for system O&M and the corresponding Needs-Based Budget (NBB) that will be required for successful turnover

projects. Aware of what will be possible budget-wise, the farmers state their wishes and set their priorities in a realistic manner. The proposals are discussed, prioritized and agreed together so as to preclude later misunderstandings and ensure farmers' participation during the process through mutual accountability.

(ii) Construction design

Farmer design versions of whatever improvement has been agreed will often be inadequate technically and expert assistance will in most cases be needed. Any modifications and additions by outsiders will have to be verified with the WUA and their membership in regular meetings in the field to ensure that the final design still reflects the agreement made and is within the agreed budget. The most important technical design criteria should be those related to farmer manageability after turnover. Simple or traditional structures used by farmers should be designed and constructed where appropriate.

Technical designs should wherever possible be done by direct agency account (swakelola). Most PRIS sections have staff with the technical skills to make the kinds of simple designs typical for the turnover programme. These designs are more likely to be responsive to farmer aspirations and management capabilities. Involvement of design consultants may be required, but they should comply with the same criteria. This will also be conducive to adherence to the turnover timetable and prevent delays resulting from over sophisticated designs.

Turnover design manuals are urgently needed. These would help expedite administrative preparations for design and construction, improve supervision, and help ensure that structures are not oversized or too difficult for farmers to operate and maintain after turnover.

(iii) Construction

Whether construction is to be done by hired contractors or by force account (swakelola) cannot easily be resolved and will largely depend on local conditions: availability of qualified and reliable contractors, capacity (total workload and staff strength) of the government agency concerned, the volume of work to be covered in the turnover programme, etc. It is recognized that contractual construction has its advantages and will continue to be required. The PRIS will however have to perform the all-important tasks of daily on-site supervision, quick transfer of information on field problems to the turnover coordinator at the cabang level, quick follow-up action from the cabang, and be flexible within budget limitations.

The farmers, having a vested interest in the construction and the way in which the agreed system-level needs-based budget is spent, will at all times be kept fully informed. Meetings should be held prior to construction with the contractor, PRIS and WUA to plan with farmers the work schedule, which tasks will be done by which parties and pay arrangements. Openness in such matters is a prerequisite for mutual trust and farmers' sense of commitment in development of their system. PRIS should firmly require contractors to use farmer labour for unskilled tasks where and whenever possible. Similarly, farmers should be given subcontracts for procurement of local materials. For a number of reasons, some farmer investment in system repairs should be strongly encouraged, the most important one being that the need for farmer equity would be fulfilled.

Efforts will have to be made to reduce the emphasis on construction as such. The tendency would seem to exist in selecting turnover systems to give priority to schemes with a relatively high volume of construction. While, admittedly, these systems need assistance, this should not become the leading principle in the programme. Relatively better-off schemes, with a developed infrastructure and needing little upgrading, should equally be eligible to be selected and be ready

for early turnover.

(iv) PRIS involvement after turnover

It needs to be stressed that, after system turnover to farmers has taken effect, the WUAs will not be totally abandoned and left on their own. It will be made quite clear to them that whenever they need guidance, advice or technical assistance they can seek it from PRIS (juru, ranting, cabang). Juru should make it their task to regularly call on the area to see that everything is in order. These routine visits will also have a psychological value.

Even though routine O&M will be essentially the farmers' responsibility, there will continue to be a need for occasional repairs and heavy maintenance which are beyond their means. This may be the case after flash floods or other natural disasters, but may also occur through normal wear and tear. It is understood that the responsibility of Public Works for system headworks will not entirely cease at turnover. Similarly, farmers may request Public Works assistance in designing of new structures in their schemes. Such support may, staff strength permitting, be provided free or at cost price. Continued follow-up and routine irrigation extension services and counseling of WUAs turned-over small systems will, explicitly, find expression in the regional budget (APBD). The PRIS involvement after Turnover is regulated in ministerial regulation (Permen) no. 42/PRT/1989.

Progress during ISSP-1

During stage one, starting FY 1987/88, 22 small irrigation systems were selected as pilot sites in West Sumatera and West Java. They were targeted for turnover by June 1990, but turnover is expected to be completed by end December 1990.

In West Sumatera 28 schemes were inventoried, 13 were subsequently profiled and ultimately 12 selected for turnover. Their combined area size is 1,792 ha with individual sizes ranging from 50 to 475 ha (there are three systems over 150 ha). The average system command area is 149 ha. Area-wise, construction works are reported to have been completed for 86%, completion of the remainder is expected shortly. All 12 WUAs in the systems concerned have been legalized by SK Bupati.

All 10 stage one systems in West Java province (out of 45 inventoried) have been completed according to target, both in terms of construction and WUA registration. The total pilot area comprised 1,209 ha. Apart from one system > 150 ha (Cinangka II, 441 ha), the average system size is 85 ha.

The second stage of the Project started in 1988/89 and encompassed 185 additional schemes, including 16 B types, selected from an inventoried number of 345, in the provinces West Sumatera (70), West Java (53), Central Java (22) and DI Yogyakarta (40). Area-wise, the stage two project schemes counted for 12,288 ha, with a scheme average of 66 ha.

In summary, progress to July 1990 of the first and second stage turnover schemes together is as shown in Table 2.2.2.

Table 2.2.2 Physical Improvements and WUA Development, Turnover Project, Stage 1 and 2, by area (ha) and number (schemes, WUAs)

Province		System Improvement			WUA Development		Turnover to WUA
		on-going	Compl	Total	CB 3)	reg	
W Sum	(ha)	249	6,285	6,534	6,534	6,534	0
	(no)	1	81	82	82	82	0
W Java	(ha)	0	5,589	5,289	5,289	5,289	5,289
	(no)	0	63	63	63	63	63
C Java	(ha)	0	1,636	1,636	2,065	2,065	2,065
	(no)	0	18	18	22	22	22
DIY	(ha)	0	1,199	1,199	1,401	1,329	698
	(no)	0	33	33	40	39	22
Total	(ha)	249	14,409	14,658	15,289	15,217	8,053
	(no)	1	195	196	207	206	107

1) compiled from DOI-1 system info, July 1990
2) including B-schemes, no construction
3) CB: constitution & bylaws completed

In 1989/90, Stage Three started by introducing turnover to three additional provinces, (East Java, NTB and South Sulawesi) bringing the total number of ISSP-1 turnover provinces to seven. 544 schemes were inventoried of which 111 were selected for turnover. The total area involved was 9,784 ha, an average per scheme of 88 ha.

By July 1990, the design of all schemes and construction of three has been completed. WUA constitution and by laws have been agreed for 68 schemes and 33 have been legalised by SK Bupati.

In Stage Four, 600 schemes have been inventoried of which 96 are selected for turnover. The total area involved is 6951 ha, an average per scheme of 72 ha.

ISSP-1 turnover systems include 18 over 150 ha, 5 of which are over 250 ha. Their provincial distribution is as in Table 2.2.3.

Table 2.2.3 ISSP-1 Turnover Schemes by Size and Province [1)]

Province	TOP Stage	All Schemes	150-249 ha	Over 250 ha
W Sumatera	1,2,3,4	82	4	2
W Java	1,2,3,4	193	6	2
DI Yogya	2,3,4	82	-	-
C Java	2,3,4	22	1	-
E Java	3,4	-	-	-
NTB	3,4	25	2	1
S Sulawesi	3,4	10	1	-
7 provinces		414	13	5

[1)] selected for profiling; another 21 schemes over 150 ha were inventoried earlier.

The initial target set for ISSP-1 (SAR) of 20,400 ha will not quite be attained for a number of reasons such as the time required to develop and institutionalize policies and procedures for this innovative activity. Construction of 14,549 ha has been completed and 8,053 ha have been handed over to WUAs. The balance is expected to be handed over before the end of FY 1990/91. Overall progress to July 1990 is presented in Appendix C2.

Turnover extension during ISSP-2

The Directorate of Irrigation I envisages for ISSP-2 an expansion of the turnover programme to 130,000 ha in 8 provinces and Jatiluhur.

Broken down to the six provinces involved in turnover during ISSP-1, and the two provinces proposed for inclusion in ISSP-2, the DOI expansion programme reads as shown in Table 2.2.4.

Table 2.2.4 Turnover Programme ISSP Second Time Slice, 1991 through 1994

Province	ha	
West Sumatera	24,000	
West Java	24,000	
Central Java	36,000	
DI Yogyakarta	4,000	
East Java	30,200	
South Sulawesi	2,800	
Subtotal (ISSP-1 provinces)	121,000	(93 %)
South Sumatera	1,000	
Lampung	2,000	
Subtotal (ISSP-2 provinces)	3,000	(2 %)
Jatiluhur (POJ)	6,000	(5 %)
TOTAL	130,000	(100 %)

The Aide Memoire of the IBRD Mission in June 1990 stated that, prior to appraisal :

> "a proposal should be prepared by DGWRD covering aspects related to (i) the nstruction of permanent headworks, if and as required, prior to the turnover of small ıemes; (ii) the proposed rate per hectare for SM works on these small schemes; (iii) echanisms to involve farmer equity contribution; and (iv) area targets for schemes ıarger than 150 ha that can be turned over to WUAs".

Such proposals have been prepared by DGWRD and are presented in Appendix C3.

Development approach

From the above table it can be concluded that the proposed expansion is concentrated in the major irrigation provinces. This is consistent with the GOI adopted policy, supported by the Bank, of a concerted development approach whereby all ISSP-2 components will reinforce one another and be more effective. Such a coordinated approach will also ensure that the largest possible rural population will share the benefits of the ISSP-2.

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For practical reasons it is proposed that, initially attention should continue to be concentrated on schemes below 150 ha in size. Gradually the emphasis will shift to larger schemes up to 500 ha in the future. The selection of schemes can only be made after inventories are completed.

The turnover expansion programme will be particularly focused on those small schemes that are located adjacent to EOM and ISF areas. It is imperative that such small systems are not left in isolation, but given priority when planning the annual turnover programme.

2.2.4 Advanced Operation Units

Background

Advanced Operation Units (AOUs) were established, commencing in 1986/87, in each Wilayah in West and Central Java in the framework of WJIP and CJIP. The primary role of these AOUs has been the trial introduction of the Operation and Maintenance Procedures developed under these two projects. Under ISSP-1, additional AOUs have been established in South Sulawesi (2), NTB (2), Jatiluhur (2), Lampung (4), S Sumatra (2) and W Sumatra (2); whilst the AOUs in WJIP and CJIP are not strictly part of the ISSP-1 programme, the strong links between ISSP and these two projects has enabled data from CJIP and WJIP to be incorporated into the ISSP programme.

The overall objectives of the AOU programme during ISSP-1 have been :

- to assist in, and demonstrate, intensive field level application of all aspects of efficient O&M;
- to test and develop appropriate methods and procedures for operation;
- to develop improved procedures for budget planning and the execution of systematic maintenance;
- to establish the relationship between engineering requirements and agricultural production by fostering the close interaction of government staff and beneficiary farmers through improved channels of communication.

AOUs were selected to cover an area within one Ranting Dinas, as this is the key administrative unit in the development of efficient procedures. Having AOUs as a focus for EOM enables the intensive application (with priority allocation of resources and close attention by PRIS and consultants) of new procedures within these areas. It should be noted however that although the term "operation" is used for the AOUs, the units are in reality used for the advanced introduction of efficient procedures for both operation and maintenance.

Inevitably application and development of improved procedures requires time; perhaps three or four cultivation seasons initially and a further period for trial if modifications are made. Half the number of AOUs under ISSP-1 have been through three seasons and for these units modifications to the operation procedures have already been identified. However, in order to obtain positive results from these AOUs it is essential to continue the programme into the ISSP-2 period.

AOU Programme

It is intended to review the ISSP-1 AOU programme towards the end of 1990. This review will incorporate action plans for each AOU together with an assessment of the need to continue individual AOUs, and the future role of AOUs under ISSP-2. Recommendations on the role of AOUs within the additional ISSP-2 province of Central Sulawesi will also be made.

The AOU programme in West and Central Java Projects will effectively continue until late-1991, as a longer term approach has been adopted to the introduction and trial of EOM. This programme included upgrading of the main system, and improvements in staffing numbers and facilities to ensure that physical contraints were effectively removed, and did not act as constraints to the trial of the procedures. Under ISSP-1, the infrastructure was supposed to be fully complete, however often it was not and the expected priority allocation of resources also did not fully materialize. Thus within the ISSP AOUs the trial introduction of EOM procedures has been more difficult, but perhaps more representative of the overall introduction within EOM DIs.

(a) Operation Procedures

The operation procedures developed under CJIP and WJIP have been further refined and introduced during ISSP-1. This model (termed the reference operation model or ROM) was formulated for technical systems, with a service area within one Ranting Dinas, a run-of-river water source and water shortage in one or more seasons. Although it is considered suitable for the majority of technical irrigation systems that have been selected for EOM, it needs to be modified to make it more suitable for other types of irrigation systems that occur. The approach for development of such modified procedures is discussed in Appendix A1.

Any development of alternative procedures needs to be carried out within the framework of an AOU programme, to allow monitoring and testing of procedures to be fully coordinated. As a first step, the AOU irrigation systems in ISSP- 1, CJIP and WJIP have been classified based on the various system parameters that are likely to occur (see Table 1 of Appendix A.1). This classification suggests that the most significant parameters are as follows:

(i) complex layout, of any size.

(ii) simple layout :

- within Ranting/Cabang/Wilayah;
- water shortage/sufficient water;
- seasonal mono-culture/mixed cropping.

Using these parameters, together with type of water source, eight broad scheme categories can be defined. For seven of these categories the ROM needs to be modified and the resulting procedures tested in an appropriate AOU. The key scheme parameters within these eight broad categories, together with the applicable AOUs, are given in Table 3 of Appendix A.1. The suggested programme for the development of improved operation procedures utilising the AOUs is given in Figure 2.2.1.

In the process of the development of operation procedures, emphasis will be placed on identifying the interaction between system operation and design. It may be possible to make modifications to infrastructure in future Special Maintenance (SM) design packages to simplify operation by the adoption of elements of proportional distribution. This should receive consideration during system planning and the required modifications, to the extent feasible, included at the SM design stage. This concept is discussed further in Appendix A.1.

Development of Improved Operation Procedures

Figure 2.2.1

	ISSP - 1												ISSP - 2											
	1987/88	1988/89	1989/90	1990/91									1991/92									1992/93		
				A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
1. Preparation of Reference Operation Model (ROM)																																																
2. Staff Training																																																
3. Introduction of ROM in AOU																																																
4. Trial Introduction of ROM in EOM Areas																																																
5. Review and develop appropriate procedures in AOU-ISSP 1																																																
6. Prepare guidelines on development of Appropriate Procedures																																																
7. Prepare Additional Reference Models																																																
8. Application of appropriate Reference Models in ISSP-1 EOM Areas																																																
9. On-the job training (refresher) (ISSP-1 Areas)																																																
10. Indentification of operational problems and preparation of guidelines in AOU-ISSP 2, EOM ISSP-2																																																
11. Application and Monitoring of appropriate ROM for ISSP 2 EOM areas																																																

(b) Maintenance Procedures

Improvements to existing maintenance procedures have been prepared and are now being used in the AOUs and more generally in EOM areas. Unlike operation procedures, improvement to maintenance procedures also involves administrative and financial aspects and thus changes have wider implications.

The following issues need to be resolved through the introduction of the procedures in the AOUs

i) Optimum levels of staffing.

ii) Methods of maintenance execution (to ensure quality of maintenance works) :

- system of assigned permanent labour (pekerja) for routine maintenance;
- service type contracts for routine maintenance;
- size of maintenance contract packages;
- unit rate and lump sum maintenance contracts.

iii) Sustainable method of inventory of maintenance needs.

iv) Optimum levels of staff transport.

v) Methodology for monitoring system performance and benefits, maintenance expenditures and costs.

Studies and trials initiated during ISSP-1 should be continued in the AOUs to generate guidelines for wider application.

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2.3 Swamps

2.3.1 Introduction

Six provinces were included in the ISSP-1 Swamps component i.e. N Sumatera, W Sumatera, S Sumatera, Bengkulu, Lampung and S Kalimantan.

Three on-going projects were taken up, one each in the provinces N Sumatera, Bengkulu and Lampung, covering a total area of 43,775 ha of which about 23,100 ha have been completed. To fully complete these projects a number of essential works remain to be carried out under the ISSP-2 programme.

Special Maintenance (SM) works were started in N Sumatera, W Sumatera, S Sumatera, Lampung and S Kalimantan. The total area requiring SM in these 5 provinces is 123,060 ha. Of these, 47,520 ha have been fully completed. Because of insufficient available funds a number of schemes could not be completed (47,290 ha) and are proposed to be carried forward to ISSP-2. On another 5 schemes (27,250 ha) construction has not yet started; these will not be included in ISSP-2.

Efficient operation and maintenance (EOM) was introduced in five provinces on a total area of 148,860 ha of which 29,150 ha came under DEOM, i.e. without special maintenance.

The proposed programme for the ISSP-2 Swamps component is described in Sections 2.3.2 to 2.3.5 below.

Handing over

It has been stated in the SAR on ISSP that completed on-going projects and schemes for which SM has been finished would be handed over to PRIS for the introduction of EOM. DGWRD would assist these authorities during a transition period of 1 to 2 years in organising technical aspects and in the establishment of a sound institutional framework for O&M.

However, little or no progress has been made on the transfer of schemes to PRIS DPUP, with the exception of Rawa Sragi I and II. Upon completion projects are being transferred to P2JP. This is an intermediate agency under the Head of the Regional Office of MPW, to implement EOM until this can be taken over by PRIS.

2.3.2 On-going projects

On-going Swamp projects taken up in ISSP were assumed to comply with the following criteria:

- high priority project in a resource constrained situation
- project should have at least 30% completion status
- adequate water availability and quality
- minimal land clearing
- technical and economic viability

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Three on-going projects have been included in ISSP-1 and two are proposed to be completed in ISSP-2 :

Province	Project	Area (ha)
Lampung	Mesuji/Tulang Bawang	20,000
N Sumatera	Sei Kualuh	9,375
	Total	29,375

Completion of the third on-going project (Peninjauan/Penago in Bengkulu) is not included in ISSP-2 because it requires further study and re-appraisal.

These projects are briefly described below.

Mesuji/Tulang Bawang

This project was identified during the "Nationwide study of coastal and near coastal swamp lands" in 1985. Detailed designs were prepared and construction started in F.Y. 1984/85 with APBN funds. On request of GOI the project was appraised in 1986 and included in the ISSP-1 programme for completion.

The earthworks for the flood protection dikes and drainage canals as well as the structural works on Units I and II are completed, while the same works for Unit IV will be completed by September 1990. In addition an access road of 12 km has been constructed.

To fully complete the project a number of essential works remain to be carried out under the ISSP-2 programme. It is proposed that the following components be included in ISSP-2:

- rehabilitation of 240 stoplog structures, in the tertiary drains which have foundation problems and consequently do not function as a result of considerable subsidence. These stoplog structures are constructed to prevent a dramatic draw down of the water table during dry season and simultaneously conserve moisture for polowijo crops.

- construction of 100 km laterite surfaced access road to connect settlements along the primary canals with the main access road. These roads would increase the accessibility of the settlements considerably and would make farmers less dependant on water transportation for their agricultural inputs and outputs.

- land development of 7,000 ha (first holding) comprising additional land clearing and field bunding for water retention on rice fields with the objective to achieve a higher cropping intensity in the early years of agricultural development.

DOS has requested the settlers and land clearing of the second holding be included in the project. This has been agreed during pre-appraisal in June, but the cost will be met by GOI.

It is expected that at the end of FY 1990/1991 some 7,049 families will have settled in the project. The land development of the first holding is estimated to reach 100% in project year 2 to 5, depending whether land development will be included in the ISSP-2 component. The development of the second holding may take up to 8 years depending

on further Government intervention through Second Stage Development. The DAAD of Agriculture is presently assigning consultants for the preparation of land development plans.

Sei Kualuh

A feasibility of the greater Sei Kualuh area (12,000 ha) was made in 1979 by LAPI/ITB, followed by a detailed design for an area of 8,200 ha, the gross area actually being 9,375 ha. Construction started in 1981 by the P2DR land swamp development project under central funding. With a major part of the construction works completed the project was included in the ISSP-1 programme.

During the ISSP-1 period Rp 800 million ISSP-1 funds and Rp 800 million OECF funds will have been spent at the end of FY 1990/91 on infrastructural works. These works include road construction, flood protection, drainage and structural works.

Due to the high pressure on land on the East coast of North Sumatera and because of the favorable agricultural potential of the area it may be expected that full land utilization will be achieved rapidly. At the end of the current financial year 4,600 ha will be under sawah and 800 ha under coconuts. Upon completion of the project these areas will increase to 7,175 ha and 1,200 ha respectively. Land development for this scheme is not considered necessary as the project would be occupied by motivated spontaneous settlers.

Peninjauan/Penago

The Peninjauan/Penago area located in the Bengkulu Province was included in the ISSP-1 programme as an on-going project after a project appraisal by the ISSP-1 preparatory consultants. Isuda Parama was assigned to complete additional design work for the areas.

Based on the present implementation the area can be divided as follows:

Area I, which is under construction with funds from the ISSP-1 loan. This includes:

Peninjauan I, II, III and IV-A	6,500 ha
Penago I	2,300 ha
Total area	8,800 ha

Area II; the design for this area is financed by the ISSP-1 loan but construction has not started yet.

Peninjauan IV B/C/V and VI	4,100 ha
Penago II	1,500 ha
Total area	5,600 ha

In order to justify further completion of the project under ISSP-2 it is recommended that the project or at least area II is re-appraised for the following reasons:

- Inconsistence in soil data which are presently available; it is in particular important to verify peat depths as this determines the land suitability for

agriculture development to a large extent.

- The land status is not clear; information with regard to which areas are given out to smallholders and which to private companies respectively is ambiguous.
  For sound agricultural planning this information is required.

- The development options based on resources and land status should be further elaborated.

- An integrated inter departmental action programme for development should be made to avoid delays or stagnation in area development resulting in retarded project benefits.

Special attention should be given to the Penago II area as it is expected that this area includes considerable areas of deep peat with low agricultural potential. It is proposed that in the first year of ISSP-2 (FY 1991/92) the above activities should be undertaken prior to the continuation of project implementation.

For the above reasons and because of the result of the economic analysis (see Chapter 5) completion of Peninjauan Penago has not been included in ISSP-2.

2.3.3 Land Development and Drinking Water Supply

For the completion of on-going projects a minimum land development component comprising additional land clearing/preparation and field bunding has been included in ISSP-2 to allow the settlers to achieve a higher cropping intensity in the first years of settlement. In addition allocation has been made to guarantee the supply of drinking water in dry spells. These costs will be met from the GOI contribution to the project.

2.3.4 Special Maintenance

To avoid further deterioration of the existing Swamp infrastructure a number of Swamp Schemes were included in ISSP-1.

The SAR for ISSP-1 states that Special Maintenance for selected Swamp schemes to be taken up in ISSP-1 would include the following components:

- additional canal structures
- desilting of drainage canals
- flood protection works
- access improvements
- constructing of flushing canals for acidic soils reclamation.

The Special Maintenance programme for swamps would be tailored to the requirements of each scheme and involve maintenance and upgrading activities. The project would ensure that there is a systematic planning at each stage so that the organisation, methods and expenditures on O&M are geared to meeting the performance standards for the systems as they are developed. At the start of ISSP-1 there was no clear Special Maintenance concept for Swamp schemes,

other than the one developed for irrigation schemes. In essence, however, the swamp schemes call for a different approach altogether.

As irrigation schemes are generally matured, well established schemes, swamp projects are at the beginning of a development process in which specific phenomena such as potential acid clays, unconsolidated soils and the subsequent soil subsidence play an important role with regard to water management. Moreover, the different tidal regimes and salinity intrusions are aspects to be considered when developing a water management system. Other, quite often more important matters such as agricultural support, institutional development and the like call for a more integrated intervention, rather than a single valued operation such as rehabilitation and/or special maintenance of the hydraulic infrastructure.

The water management requirements for swamp land differ considerably from place to place depending mainly on tidal regimes and soil phenomena. It is, therefore, difficult and undesirable to introduce standard solutions for swamp schemes in respect to water management.

For this reason a re-assessment of future swamp development schemes is of pivotal importance to obtain a justified and balanced swamp development programme. Only areas with specific or pronounced drainage and/or flooding problems should classify for programmes such as special maintenance, while such activities should be seen as temporary measures to solve immediate problems, to be followed by integrated development actions (Second Stage Development) which are required for almost every swamp scheme.

A more permanent hydraulic infrastructure will be established only after the Integrated Development Programme which aims at a more efficient use of resources. The SM in first stage development schemes should therefore be limited to the most necessary deferred maintenance of probably temporary systems. This basic approach was insufficiently used when designing the ISSP-1 Special Maintenance programme for Swamps. Although certain areas very much needed SM, the ISSP-1 programme for swamps was started with insufficient insight in to the constraints prevailing in swamp schemes in general.

The ISSP-1 programme commenced with the assumption that the average cost for SM would be 100 US$/ha. However, it appeared that the actual average cost far exceeded this amount; engineer's estimates averaged some US$ 170/ha. For this reason a number of schemes scheduled for ISSP-1 were not completed. It is proposed that these schemes will be completed during the ISSP-2 programme. Table 2.3.1 presents the status of Special Maintenance of Swamp schemes expected at the end of ISSP-1, and planned for ISSP-2. It is proposed that the partly completed SM schemes amounting to 47,290 ha are completed as soon as possible.

2.3.5 Efficient Operation and Maintenance

The main objective of the ISSP-2 programme is the introduction of sustained and efficient O&M for schemes where the hydraulic infrastructure is functioning in accordance with established water management criteria.

Table 2.3.1 Special Maintenance in Swamp Areas

Province/Scheme	ISSP program (ha)	ISSP-1 completed	ISSP-2 proposed (ha)
N. Sumatera :			
Percut	2,100	2,100	-
Rawa Gebung	950	-	-
Secanggang	550	550	-
Pulau kampai	850	850	-
W. Sumatera :			
Lunang	4,500		4,500
Lasi	500		500
Silaut	3,200		3,200
Anai I	2,200		2,200
Anai II	5,000		5,000
S. Sumatera :			
Delta Saleh	19,090	partly	17,290 (1)
Solta Upang	8,420	8,420	-
Sugihan kiri	35,600	partly	14,600 (2)
Lampung :			
Rawa Sragi I + II	15,400	15,400	-
S. Kalimantan			
Seluang	3,500	3,500	-
Belawang	5,700	5,700	-
Muhur	2,600	2,600	-
Tabung Anon II	5,200	5,200	-
Puntik Terentang	3,200	3,200	-
Puntik Danda B.	2,900	-	-
Sakalagung	3,400	-	-
Total	124,860	47,520	47,290

1) Area which will be covered by the forthcoming I.I.S.P/ADB project, excluded.

2) Jaluran 13 and 18 only.

Table 2.3.2 EOM in Swamp Areas

			ISSP - 1				ISSP - 2			
			Year 1 EOM (ha)	Year 2 EOM (ha)	Year 3 EOM (ha)	Year 4 EOM (ha)	Year 5 EOM (ha)	Year 6 EOM (ha)	Year 7 EOM (ha)	Year 8 EOM (ha)
On-Going Projects	N. Sumatera	Sei Kualah			1,600	3,100	4,640	7,000	9,375	9,375
	Lampung	Mesuji - T.B. I			6,000	6,000	6,000	6,000	6,000	6,000
		II		6,400	6,400	6,400	6,400	6,400	6,400	6,400
		IV				7,600	7,600	7,600	7,600	7,600
		Sub-total		6,400	14,000	23,100	24,640	27,000	29,375	29,375
Special Maintenance	N.Sumatera	Percut			2,100	2,100	2,100	2,100	2,100	2,100
		Secanggang				550	3,150	3,150	3,150	3,150
		Pulau Kampai				850	850	850	850	850
	W.Sumatera	Lunang				4,500	4,500	4,500	4,500	4,500
		Lasi			3,700	500	500	500	500	500
		Silaut				3,200	3,200	3,200	3,200	3,200
		Anai I			2,200	2,200	2,200	2,200	2,200	2,200
		Anai II			*	5,000	5,000	5,000	5,000	5,000
	S.Sumatera	Delta Saleh		6,800	19,090	19,090	19,090	19,090	19,090	19,090
		Delta Upang			8,420	8,420	8,420	8,420	8,420	8,420
		Sugihan Kiri				14,600	14,600	14,600	14,600	14,600
	Lampung	Rawa Sragi I + II		15,400	15,400	15,400	15,400	15,400	15,400	15,400
	S.Kalimantan	Seluang			3,500	3,500	3,500	3,500	3,500	3,500
		Belawang			5,700	5,700	5,700	5,700	5,700	5,700
		Muhur			2,600	2,600	2,600	2,600	2,600	2,600
		Tabung Anen II				5,200	5,200	5,200	5,200	5,200
		Puntik Terentang				3,200	3,200	3,200	3,200	3,200
		Sekalagun				-	-	-	-	-
		Sub-total		22,200	62,710	96,610	99,210	99,210	99,210	99,210
Schemes for EOM direct	S.Sumatera	Karang Agung I	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
		Karang Agung II		5,000	10,000	10,000	20,000	30,000	30,000	30,000
	S.Kalimantan	Barambai	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
		Puntik Danda B.				-	-	2,900	2,900	2,900
	Lampung	Rawa Sragi III				6,650	6,650	6,650	6,650	6,650
		Sub-total	12,500	17,500	22,500	29,150	39,150	52,050	52,050	52,050
		Total	12,500	46,100	99,210	148,860	163,000	178,260	180,635	180,635

* = includes 1,800 ha under ADB - IISP
Secanggung : SM carried-out under rivers (3,150 ha)

It should be understood that the introduction of EOM in Swamps is a comprehensive and far more complicated activity than for established irrigation schemes. Major constraints encountered during the introduction of EOM are as follows :

- absence of involvement of the provincial authorities in planning and implementation of swamp schemes;
- lack of institutional capacity for O&M, facilities and manpower;
- deficiencies in the original project planning and designs for the water management system. In fact, in many cases it is not a matter of deferred maintenance only but schemes often require a modified design to achieve the objectives.

Before the start of the ISSP-1 programme O&M manuals were available for only a limited number of schemes while no skilled O&M staff was available. During the ISSP-1 programme O&M manuals were prepared by the ISSP-1 consultants while trainers of the Jurus and Pengamats were trained in all 5 provinces. The institutionalisation of a provincial O&M organisation however lags behind. Recently an O&M organisation, the P2JP, has been set up within the Directorate of Swamps which is temporarily responsible for EOM implementation until a permanent provincial organisation has been established.

EOM has been introduced in five provinces included in the ISSP-1 Swamps component. At the end of FY 1990/91 the total area under EOM will be 148,860 ha. It is expected that at the end of ISSP-2 EOM will have been effected in about 180,635 ha. Details of the EOM programme are presented in Table 2.3.2.

IV

2.4 Rivers

2.4.1 On-going Projects

Two on-going projects were reviewed for possible inclusion in ISSP-2. These are :

(i) Pemali River Project, and

(ii) Babak River Project.

The Pemali River Project (Figure 2.4.1) in Central Java is currently being implemented in ISSP-1 and DGWRD has put forward proposals to expand the scope of work and carry it over to ISSP-2. The Babak River Project (Figure 2.4.2) was designed and tender documents prepared under ISSP-1 but its implementation was deferred because of delay in the start of construction and lack of funding in ISSP-1. After discussions with the IBRD Pre-appraisal Mission in June 1990 neither of these on-going projects will be included in ISSP-2.

2.4.2 Monitoring of Small River Mouths (SRM's)

Introduction

Under ISSP-1 five (5) Small River Mouths (SRM's) were constructed, to test on a pilot basis the suitability of a low cost design to eliminate the need for frequent maintenance dredging of river mouths. Such dredging has traditionally been performed in order to improve navigability for fishing boats and reduce flooding. The design philosophy adopted in the pilot SRM's was to provide a less expensive river mouth structure which can be self flushing using the power of the tidal prism and the flood flows.

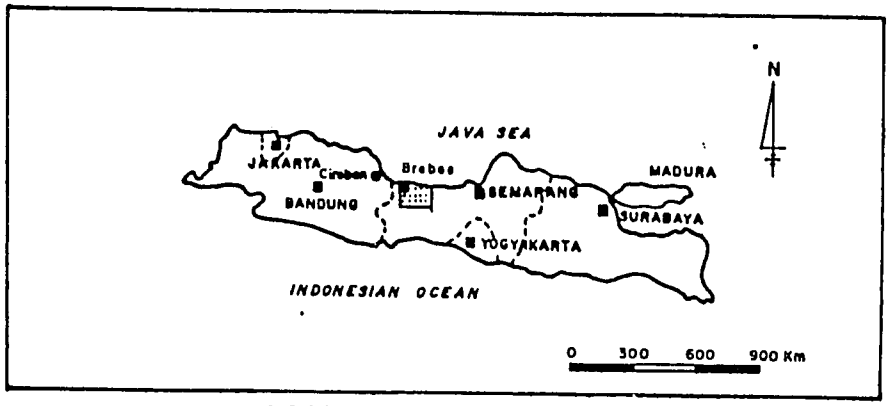
The design guideline for the improvement of the river mouths was developed in 1987 [MacDonald, Dec 1987]. Although different structural elements were suggested in the guidelines, the five (5) pilot SRM's were implemented with gabion training walls. The designs at all the pilot SRM's are similar, but the dimensions of the structural elements vary with site condition. For details of design at each SRM reference should be made to the various design reports [MacDonald, Nov. 1987].

The location, date of completion and cost of construction for the five (5) pilot SRM's are as follows ;

	Name	Location	Cost (Rp. Million)	Completion Date
1.	Kabuyutan R.	Tanjung, C. Java	761	Feb. 1989
2.	Ciasem R.	Subang, W. Java	1,688	Nov. 1989
3.	Lohgung R.	Tuban, E. Java	1,147	Feb. 1990
4.	Pariaman R.	Pariaman, W. Sumatera	470	Mar. 1990
5.	Lumut R.	Sibolga, N. Sumatera	1,252	April 1990

Figure 2.4.1

PEMALI RIVER PROJECT - LOCATION MAP



JAVA AND MADURA

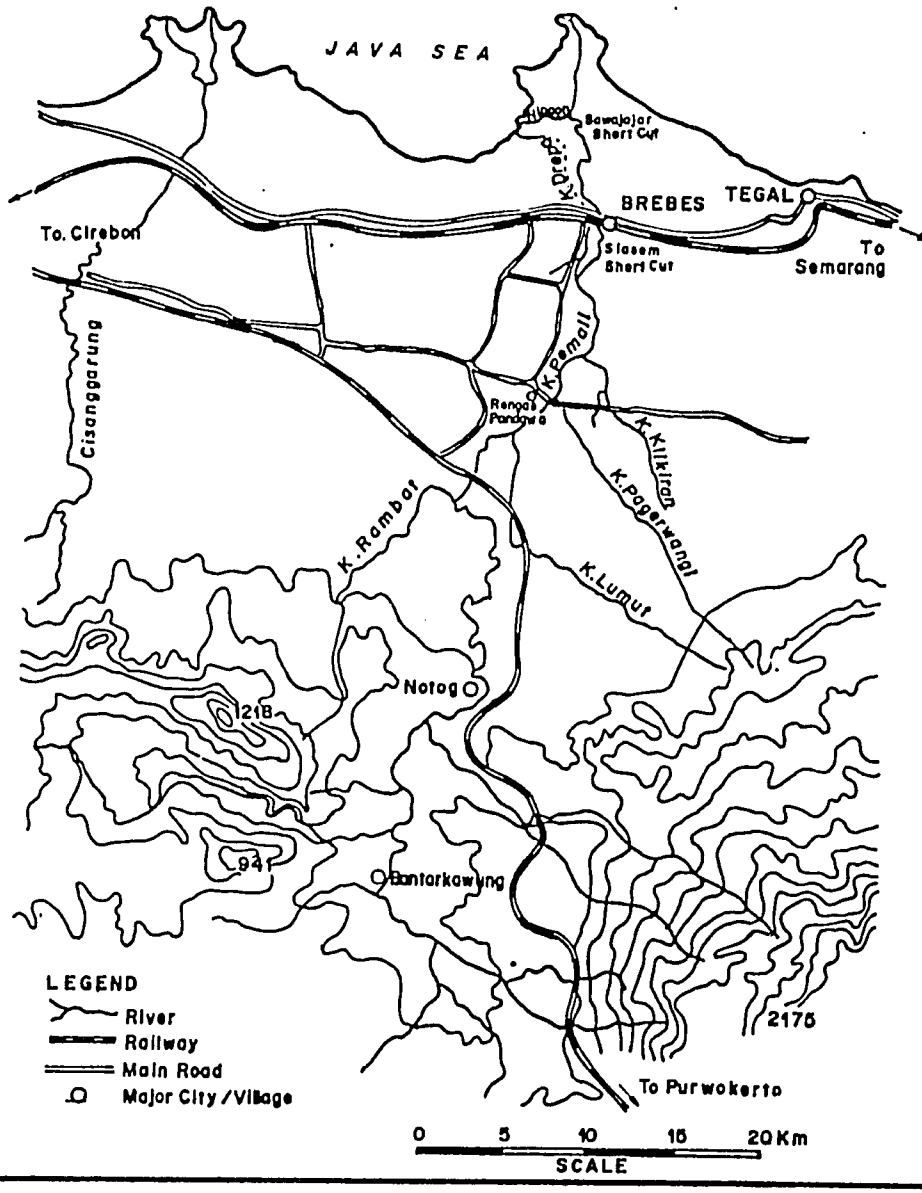
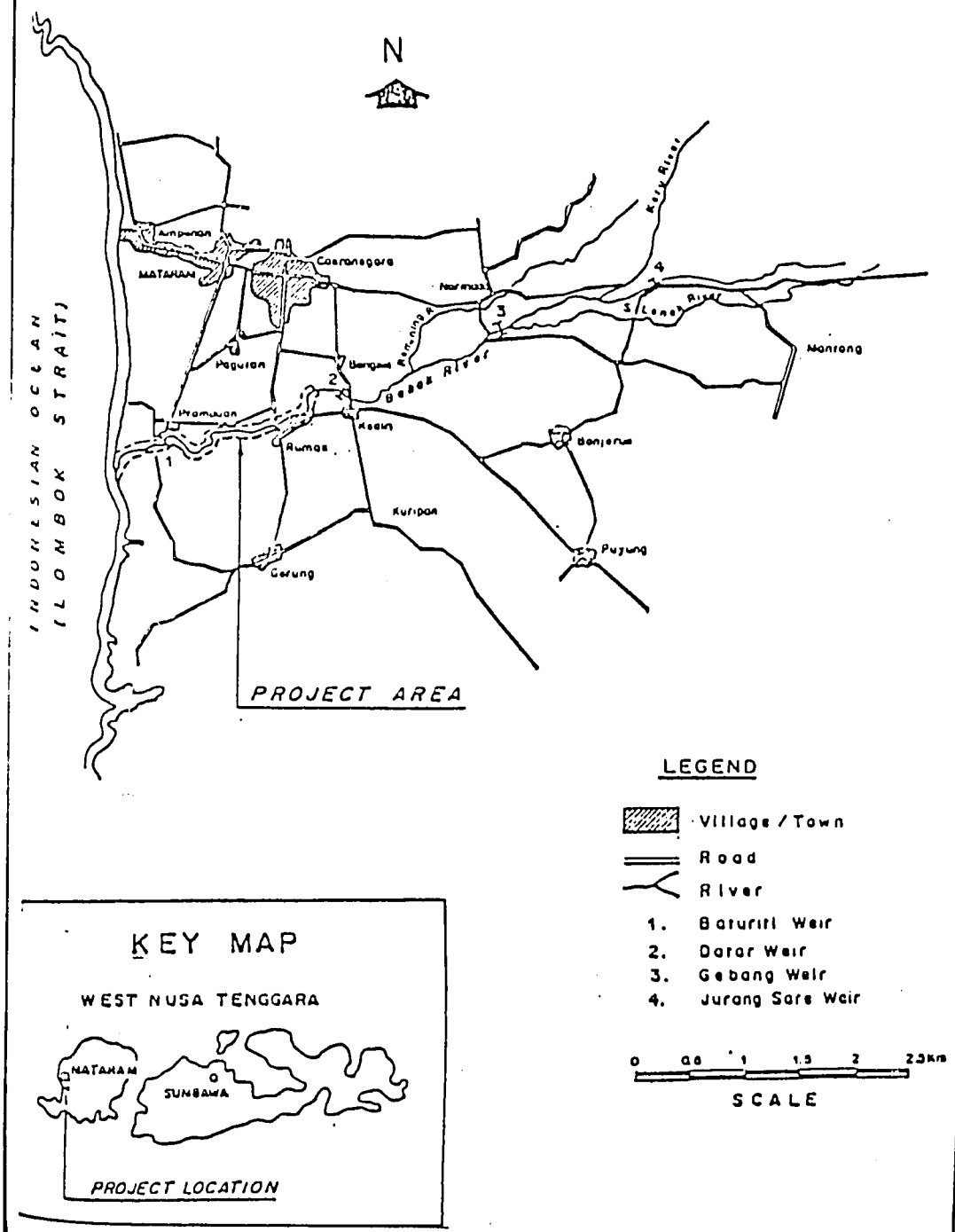


Figure 2.4.2

BABAK RIVER PROJECT LOCATION MAP



Monitoring Under ISSP-1

The pilot SRM's were planned to be monitored after completion of construction, to evaluate the performance and, to determine the O&M requirements. The first monitoring activity began in Aug. - Sep. 1989 under ISSP-1 and was undertaken by the On-Going River Projects Supervision Consultants. The monitoring effort was directed among others to ; (i) evaluate the performance of the SRM's, (ii) assess design problems with a view to up date/modify the Design Guidelines , (iii) recommend remedial measures where failures have occurred or design problems have been encountered, (iv) provide recommendations for maintenance activities and, (v) propose adequacy of the designs. Also, the consultants proposed a detailed plan for monitoring based on actual conditions at each SRM [Indah Karya, Oct. 1989]. The monitoring activity covered all of the five (5) pilot SRM's and a sixth river mouth at Sambong River mouth near Pekalongan in C. Java. This river mouth was established through dredging outside the ISSP-1 scope of work and was included in the monitoring scheme to compare with a non-flumed river mouth.

The first round of monitoring reported in Indah Karya, Oct. 1989 was a fact finding study with limited topographic measurements. The second round of monitoring was undertaken during January-February 1990 and the results are reported in a second report [Indah Karya, Jan. 1990]. Since many of the SRM's were just being completed the second monitoring work was limited to establishing the framework and completing the first set of topographic and hydraulic surveys. Some general trends have been observed but conclusions are very preliminary.

The On-Going River Projects Consultants under ISSP-1 expect to undertake two more rounds of monitoring, one in May/June 1990 and, the second in Oct/Nov 1990. It is anticipated that with the May/June 1990 monitoring, the basic framework of monitoring for all the six SRM's should be in place. Financing is available in the consultants contract to complete monitoring work for the above two rounds of monitoring.

Adequate budget will be available after completion of monitoring in 1990 in the On-Going River Projects Consultants Contract against monitoring activity, which can be used to cover one more round of monitoring in 1991, prior to start up of ISSP-2 in June 1991. The fund available can cover topographic survey, hydrographic survey and local consultant man months for O&M monitoring and performance data analysis. Thus, no prefinancing is required to cover costs of monitoring.

Monitoring Under ISSP-2

The monitoring program established for the six SRM's needs to be extended in ISSP-2. It is proposed that the monitoring program be undertaken for a total of four years from the date of completion of the SRM. The last of the SRM was completed in April 1990 and the monitoring program began in earnest in January 1990. The monitoring program will continue through to March 1994. This would mean that the monitoring program will extend for 34 months in ISSP-2, assuming that ISSP-2 will begin in June 1991. During this period a total of eight rounds of monitoring will be undertaken.

The monitoring scope of work and activities have already been established [Indah Karya, Oct 1989 and Jan. 1990]. This will be further reviewed and changes made, if any, after the next round of monitoring in May/June 1990. It is recommended that this scope of work be followed during the rest of the monitoring period in ISSP-2. To compare the pilot SRM's with other river mouths with annual or cyclic dredging, necessary data should be compiled on dredging at Sambong river mouth or at other locations that are dredged, with details of cost and environmental issues.

An important monitoring activity that has not been undertaken so far is to obtain semi-annual aerial photos at each site to monitor the changes to the coastline. During ISSP-1 a budget of Rp. 80 million was provided for this activity in the monitoring program. However, it has been indicated that tenders called for aerial photos of the SRM's were about Rp. 400 million. At this rate it will require about Rp. 1200 to 1500 million to obtain semi-annual aerial photos over the 3 years in ISSP-2. This is nearly 25% of the investment cost and hence is not recommended. It is suggested that good quality topographic maps be prepared using an overlay technique once a year using previous surveys, to clearly indicate the coastline changes.

It is proposed to have a mid term evaluation of the SRM performance and the monitoring program in late 1991. A final evaluation should be undertaken in Jan. - March 1994 period. This evaluation should, in addition to analysing the SRM performance, provide design recommendations and update the Design Guidelines prepared in 1987.

O&M of Small River Mouths

Adequate provision must be made for manpower and budget to undertake regular and effective O&M of all the SRM's that are included in the monitoring program. The operational part should include quarterly visual inspection of the training wall for settlement, loss of rip-rap material, damage to basket, tilting and corrosion of the mesh. The extent of sedimentation upstream and in the flume section should be determined every six months. The staff gauges and other hydromet gauging stations must be inspected quarterly to ensure proper functioning.

Extent of maintenance work required will be decided from the regular inspection. The maintenance activity can involve repairs to gauges, maintenance of access road and removal of vegetative growth on the structure and its vicinity. Should sedimentation problems become serious the maintenance options can prove expensive. This can involve annual maintenance dredging of the river mouth and/or extension of the training wall. Actión has to be taken to implement these if found necessary.

The Perbaikan dan Pemeliharaan Sungai (PPS) office at the DPU in C. Java, W. Java, E. Java, W. Sumatera and N. Sumatera must be provided with a maintenance budget amounting to 3 to 5 percent of the cost of the SRM annually to undertake O&M inspection and monitoring activities and to do needed maintenance. PPS office should prepare O&M budget request which should be reviewed by DOR. Major repairs if necessary to the SRM should be decided in consultation with DOR and separate budget provided for its implementation by PPS. The budget will be provided by GOI.

2.4.3. River Basin Management

Introduction

The objective of River Basin Management in ISSP-2 will be to translate the concepts of water resource management based on a river basin approach to activities that will improve basin wide irrigation management. River basin management is complex and at present it has neither adequate institutional support nor are there proper programs to implement the activities. The Ministry of Public Works is responsible for the management of basin water resources but has so far been unable to develop and implement a suitable program because of resource and institutional constraints. Ineffective O&M of rivers and riverworks has been a major root cause in not achieving better water resources management. Hence, under ISSP-2 a few river basins will be selected to undertake river basin management on a pilot basis to improve and increase

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the Ministry's capability and capacity in this area. As stated earlier, the focus in these pilot projects will be to support improved irrigation management.
The major attention in the pilot project will be given for (i) river management to improve low flow and flood flow operation, (ii) river basin water management to improve water allocation to the various users, (iii) O&M and, (iv) institutional arrangement and strengthening. The cost of basin water management and cost recovery will be studied to determine ways of resource generation to meet the expenditure. These and other aspects of the pilot project components/activities are discussed in greater detail later in this section.

Selection of River Basin Pilot Projects (RBPP)

Selection of representative river basins was undertaken with a view to improve overall management and allocation of water resources through greater attention to institutional, procedural and physical aspects in the context of a river basin. Since water resources management is one aspect of river basin management it is necessary that the river basins selected should not be complex or large with issues that could distract from water resources management for improved irrigation. The selected basins should be representative in the sense that it should be a typical basin having rural, semi-technical and technical irrigation systems in varying condition of operation. Having some coverage under SM, EOM, Turnover and ISF under ISSP-1 or ISSP-2 is important to understand better, aspects of basin water management and its relative need.

Other considerations that went into the selection of the RBPP were (i) the size of catchment and catchment condition, (ii) the size of hydromet network, data availability and mapping, (iii) flood problems, river infrastructure and its condition, (iv) irrigation network, irrigation system condition, coverage in ISSP 1 & 2, (v) water pollution and competitive uses and (vi) institutional willingness to undertake pilot work. It was also felt desirable to select both river basins that lie completely in one province and those that straddle two provinces so different institutional arrangements could be tested.

A preliminary list of 14 river basins was first compiled. All of these basins had some sort of river activities that were completed or were on-going. The river projects in ISSP-1 such as Pemali, Babak and Wampu were considered but were discarded due to various reasons. The Cisanggarung river basin that was in ISSP-1 was included. Subsequently, discussions were held with DOI I, DOR and ISSP-2 Preparation Consultant Team to narrow the list. It was decided to select four river basins for field visits to obtain more information.

The preparation consultants along with DOR officials visited four river basins during March 27, 1990 to April 21, 1990.

Discussions were held with PRIS and PPS officials to obtain information on water management, irrigation and flood situation. Field visits were made to inspect the river condition, river infrastructure and irrigation infrastructure. Based on the information collected a simple grading system was setup to select the RBPP. Based on further discussions with DOR the following two RBPP have been selected for inclusion in ISSP-2.

(i) Cisanggarung River Basin,

(ii) Opak River Basin

Description of Pilot Projects

A short description of the two pilot projects selected for inclusion in ISSP-2 is presented in Appendix D. This is based on the ISSP-2 Preparation Team's visit to the various pilot projects and information collected during the course of project preparation.

(i) Cisanggarung RBPP

The present status of the river management and river basin water management in the Cisanggarung basin is presented in Appendix D.2. This river basin straddles two provinces, W. Java and C. Java, and is managed by Cimanuk Project, a Central Government agency. Under ISSP-1 the basin has been provided with a 25 year flood protection system and the infrastructure is in good condition. The basin has a number of technical, non-technical and rural irrigation systems which are in ISSP-1 or will be in ISSP-2. Introduction of basin water management will permit increased cropping intensities and a more equitable water distribution. Cimanuk Project is a well established project with adequate man power and a good technical capability. Implementation of an RBPP in this basin will yield better results.

(ii) Opak RBPP

A short description of this basin is presented in Appendix D.3. This basin is in the province of D.I. Yogyakarta with the City of Yogyakarta located in the basin. Flooding problems exist, confined mostly to the lower reaches downstream of the confluence of Oyo river. Current level of flood protection is low and the existing river infrastructure is in fair condition. The basin has a number of irrigation systems and a 23 m^3/s interbasin canal diverts water from the neighboring Progo river into the Opak basin for urban flushing in Yogyakarta and to supplement irrigation supplies in the lower reaches. A number of irrigation systems in this basin were in ISSP-1 program. Basin water management will be of importance in this basin. The river basin is managed by the Provincial PPS unit under the D.I. Yogyakarta Sub-Dinas Pengairan. The PPS unit is weak and will require strengthening. Introduction of an RBPP in this basin will provide experience of managing the water resources not only for agricultural purposes but for urban water use also. This could make the pilot project somewhat more complex.

Pilot Project Components

The activities in the pilot project are in three groups. These are (i) River Management, (ii) River Basin Water Management, and (iii) Institutional Development and Training. A list of project components is presented in Table 2.4.1. A short description of the components is presented in the following paragraphs.

(i) River Management

The activities in this group are primarily related to the O&M of the river infrastructure and flood operation and management. The major activities are,

a. Inventory and Classification of River Works :

There is a need for establishing a classification system for river works which standardizes the documentation at all levels. Along with it, a system of inventory has to be established which is not only useful for documenting assets but is helpful in preparing the annual O&M program. It is suggested a Register of River Works (Buku Sungai) be developed on similar lines as the Irrigation Register (Buku Pintar).

b. Flood Updating :

A flood updating and flood routing study should be completed to define the level of flood protection available, flood levels and identifying the weak points in the system. All the RBPP have such studies but these will need updating.

c. Flood Warning System or Monitoring :

For high flow management an appropriate Flood Warning System (FWS) or a simple flood monitoring system is essential. Current flood management in the basin involves mostly post-flood mitigation effort. It is proposed that a simple FWS be developed and installed where appropriate.

d. Preparation of River Operation Guidelines and O&M Manual :

Each river basin must have its own operation and O&M manual detailing the schedules, technical information and activities to be undertaken in simple explicit terms.

e. River Maintenance :

Three types of river maintenance are identified. These are (i) Preventive Maintenance, (ii) Corrective Maintenance and (iii) Emergency Maintenance. The Preventive Maintenance consists of routine maintenance, periodic maintenance and repairs Corrective Maintenance includes special maintenance, rehabilitation and rectification. Emergency Maintenance are those maintenance activities that are undertaken when flood threat or imminent damage conditions exist. It is proposed to include in the RBPP activities and costs related to preventive maintenance only since these are predictable. Other maintenance activities will be programmed in RBPP but will be budgeted outside of RBPP as required.

f. Preparation of Plans, Programs and Budgets :

A system of planning, programming and budgeting for river management will be developed and instituted. For corrective maintenance it is proposed that a three (3) year rolling budget be introduced to help in long term budgeting of river improvement works.

g. Surveys :

Three types of surveys are proposed. These are (i) River surveys and mapping once in five (5) years, (ii) Sediment surveys, and (iii) Flood and damage surveys.

h. Inventory, Inspectioning and Monitoring :

It is proposed that procedures be developed and implemented for (i) inventory of O&M equipment, tools and materials, (ii) inspection of river system, river infrastructure, FWS, O&M equipment, hydromet gauges, etc, and (iii) monitoring during flood season.

i. O&M Reporting System and Annual Review :

Setup and implement a system for O&M reporting and annual review for river management. This is an important activity and should be used as a vehicle for improving river management.

(ii) River Basin Water Management

The activities in this group are focused on developing appropriate tools for a dynamic water balance and water allocation model, to implement basin water management and to monitor allocation. The major activities are ;

a. Hydromet Network Upgrading :

Under the pilot project the hydromet network in the basin for water management will be defined and the network itself upgraded through repair or purchase of new equipment. Operational plans will be developed and implemented to obtain required hydromet data for water management.

b. Water Management Study :

In each of the RBPP a study will be undertaken to inventory the legal and illegal 'take offs', discharges into the river system, update water availability, setup water balance and water allocation model, calibrate model and prepare a manual for water allocation and its monitoring. As part of this activity a water data bank will be developed.

c. Setup Water Management Unit :

A water management unit will be setup at the appropriate location to undertake the software work and coordination of water management activities.

d. Implement, Monitor and Update Water Allocation :

This will involve the field activities related to water allocation and water management, coordination with the respective Cabang Dinas Pengairan and Ranting, monitoring of the withdrawals and updating of the water balance and allocation model as well as documentation.

e. Preparation of Annual Budget and Review :

A system for costing and budget preparation will be developed and implemented. Appropriate methods for annual review of the basin water management will be setup and tested during the pilot project's life.

(iii) Institutional Development and Training

The activities in this group are related to the institutional aspects of river management and river basin water management. In addition, required training will be imparted to the pilot project staff. The major activities are ;

a. Institutional Development :

A study will be undertaken to determine the institutional needs, manpower requirement, job description, staffing budget needs and institutional arrangement. During the course of the pilot project steps will be taken to develop the institutions as required.

b. Institutionalize an MIS System :

An appropriate MIS will be developed and installed to assist in the work of both river management and river basin water management. The system will cover areas such as, budget, infrastructure inventory, inspection and monitoring, costing, O&M reporting, water management reporting and O&M implementation.

c. Training :

Separate short term training programs will be developed for river management and river basin water management and implemented. A two week annual training will be undertaken limited to the staff of the pilot project. In addition the consultants will provide on-the-job training to the pilot project staff.

A check list of river basin pilot project components is given in Table 2.4.1.

Table 2.4.1 RIVER BASIN PILOT PROJECT COMPONENT

A. RIVER MANAGEMENT

1. Inventory of Data
   - Collect aerial photos, mosaics, topographic maps
   - Assemble river surveys and survey data
   - Collect "Asbuilt" drawings of river infrastructure
   - Assemble all flood and related reports
2. Inventory and Classification of River Works
   - Setup classification system
   - Undertake field inventory
   - Documentation
   - Setup infrastructure and river data bank
   - Prepare Register of Infrastructure (Buku Sungai)
3. Survey of River and River Infrastructure Condition
   - Fieldwork
   - Documentation
4. Update Flood Study
   - Update flood hydrology
   - Flood routing and level of protection
5. Flood Warning / Monitoring System
   - Need and type of FWS
   - Design of FWS
   - Establishment of FWS
   - FWS operation
   - Flood monitoring
6. Prepare O & M Manual
7. Prepare River Operation Guideline
8. River Survey and Mapping
   - River longitudinal and cross sectional survey
   - River strip topographic survey

   (To be undertaken once in five years)

9. Sediment Survey

- Sediment discharge survey
- River mouth sedimentation survey
- Aggradation and degradation survey

10. Prepare Plans and Program for O&M

- Preventive maintenance
- Corrective maintenance
- Emergency maintenance
- River Operation
- Inspection and monitoring
- O&M equipment
- O&M tools and materials

11. Prepare Annual and Rolling Budget

- Operation and monitoring
- Flood monitoring
- Preventive maintenance
- Emergency maintenance
- Three year rolling budget for corrective maintenance

12. Procure O&M Equipment, Tools and Materials

13. Inventory of O&M Equipment, Tools and Materials
(To be undertaken annually)

14. Inspection and Flood Monitoring

- River infrastructure inspection
- River system inspection
- FWS and gauge inspection
- O&M equipment inspection
- Flood season monitoring

15. Implement River Operation and Maintenance

- River Operation
- Preventive maintenance (routine, periodic & repairs) to be done by force account or petty contracts
- Emergency maintenance as required to be done by force account or petty contracts
- Corrective maintenance as required to be done by contracts

16. Flood and Damage Survey

17. O&M Reporting System

- Setup O&M reporting system
- Implement O&M reporting system

18. O&M Annual Review

B. RIVER BASIN WATER MANAGEMENT

1. Inventory of Data

- Collect rainfall, flow and climatological data
- Collect flood data
- Collect data on hydromet network

2. Upgrade Hydromet Network

- Assess hydromet network condition
- Select hydromet network for RBWM
- Prepare plans for improvement

- Procure equipment and install
- Setup operation plans for hydromet network

3. Water Management Study

- Inventory of all demands/takeoffs
- Inventory discharges into rivers from agriculture return flows, urban and industrial sources
- Update water availability
- Develop and setup river basin water data bank
- Prepare water balance
- Develop data collection program
- Develop and calibrate a water allocation model for river basin
- Setup manual for water allocation

4. Setup River Basin Water Management Unit

5. Implement Data Collection Program

- Hydromet data
- Flow data
- Diversion data

6. Implement Water Allocation System

7. Monitor and Update Water Allocation

8. Establish Water Quality Assessment

- Identify WQ problem reaches
- Setup ambient WQ measuring stations
- Prepare and Implement WQ program
- Assess water quality on a regular basis

9. Prepare Annual Budget

- Water quality assessment
- Water data collection
- Water management activity

10. Annual Review of River Basin Water Management

C. INSTITUTIONAL DEVELOPMENT AND TRAINING

1. Institutional Development

- Study institutional needs
- Identify manpower requirements
- Prepare job descriptions
- Assess budget requirements
- Setup required institutions and staff them

2. Develop and Instal Appropriate MIS System for River Management and River Basin Water Management

3. Construct Required Office / O&M sheds

4. Training

- Develop Separate Training Program for

  (i) River Management
  (ii) River Basin Water Management

- Implement Annual Training Program for

  (i) River Management
  (ii) River Basin Water Management

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Cost Recovery

River Management and River Basin Water Management activities are directed towards improved water supply to irrigation, domestic and M&I supply, fisheries, hydropower, ecological purposes and flood protection for rural and urban areas. As such, ultimately, the costs incurred have to be borne by the respective heneficiaries. At present most of this cost is met out of Government revenues. Central Government policy now is to gradually shift costs of O&M and operation to Provincial Governments through decentralization, so that these are funded out of local resources and/or through direct cost recovery from beneficiaries. To strengthen and further this policy it will be necessary to identify the possibility of setting up Water Service Fee (WSF) in a river basin to cover costs of basin water management.

It is proposed to identify activities and cost those activities that would ultimately form part of the WSF. Initial efforts will be made to develop detailed ideas on structuring of a WSF that can be taken up for further analysis through a separate study.

Pilot Project Schedule

The pilot project activities will be spread over a three year period beginning in early 1992. It is essential that a minimum of two years field activity for river management and river basin water management be undertaken before the results are evaluated. The schedule of activities is shown in Figure 2.4.3.

2.4.4 Seluna Basin Water Management Project (Phase-2)

In the past decade the Government has undertaken major development projects on the Seluna River basin of Central Java to increase hectarage under irrigation and to improve irrigation system functioning. Two major projects, the Kedung Ombo multipurpose project and Dumpil Irrigation project, are nearing completion. With this around 72,000 ha in seven district service areas will receive technical irrigation while 14,600 ha in the upper areas will continue to receive supplementary irrigation water through semi-technical and rural systems. A short description of the Seluna River basin is presented in Appendix D.4.

Major water use in the Seluna River Basin is for agriculture. However, water resources in the basin support fisheries close to the coastal region and M&I raw water supply. A major raw water supply project from the Seluna basin (2 - 3 m^3/s) to the city of Semarang is being planned. A few small towns receive domestic water supply from the river. Small and medium size industries in the Purwodadi and Kudus area will require industrial water supply in the future, although the quantities will be limited.

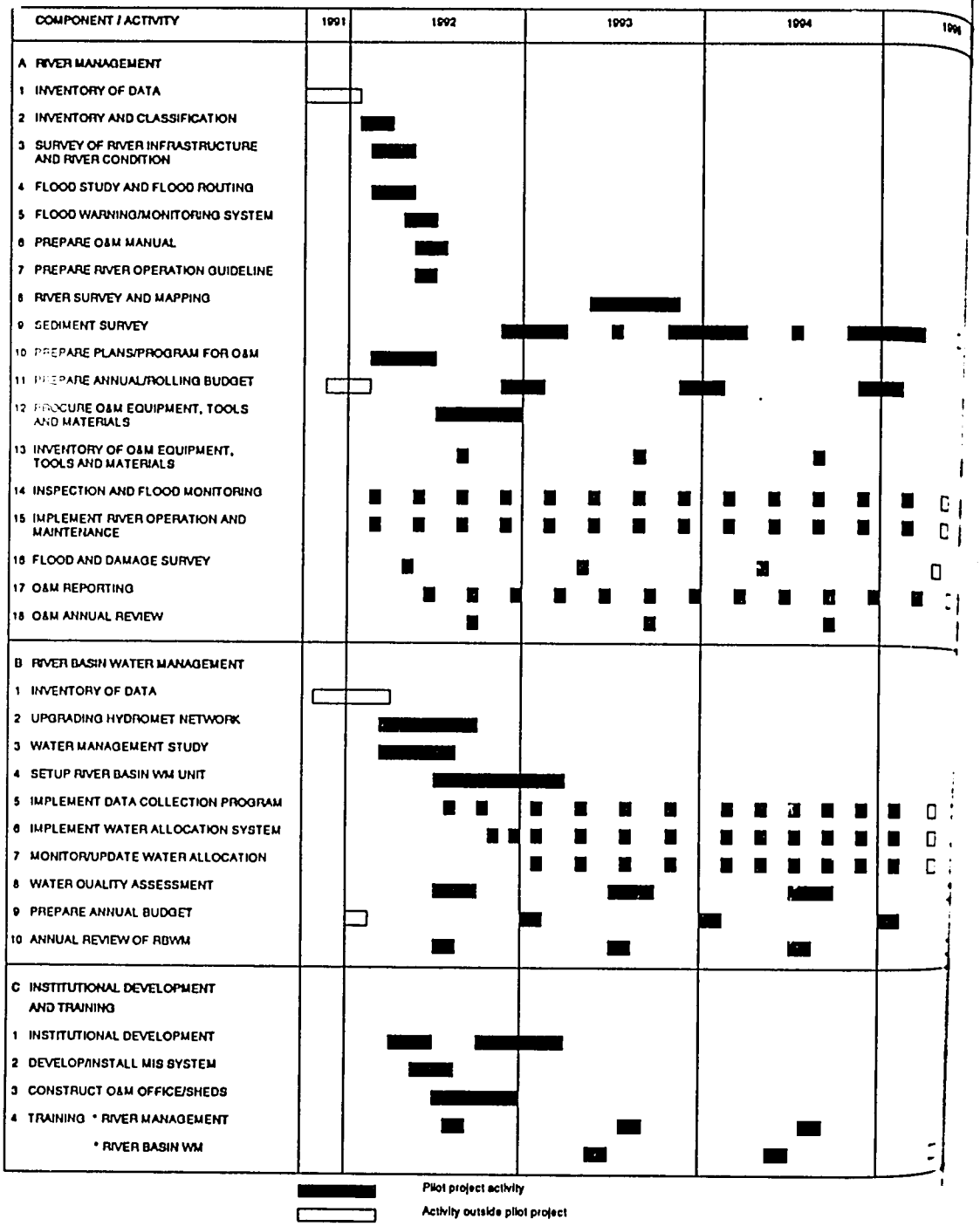
Flood control downstream of the Kedung Ombo dam in the Seluna river will improve because of the reservoir. It is expected a 100 yr return period flood protection will be available downstream of the dam. However, possibility of levee breach exists because of structural weaknesses. The Lusi river, a major tributary to Serang, will experience flooding problems. Although flood studies have not been undertaken for this river basin, it is indicated that current level of flood protection in the Lusi river is for floods with a frequency of 6 - 8 years.

Water Management Project (Phase - 1)

At present water management is confined to each technical irrigation system. To improve river basin water management (water allocation/monitoring), a water management component was included in the IBRD Loan No 2543/IND for implementing the Kedung Ombo Project. Initially

RIVER BASIN PILOT PROJECT ACTIVITY SCHEDULE

Figure 2.4



the proposal called for developing an integrated water management project based on state of the art technology. Later, because of various reasons, this was scaled down to levels that are manageable with the available resources. The Institute of Hydraulics (Puslitbang Pengairan - IHE) is assisting the Jratunseluna Project in defining the water management system and in its development.

Studies undertaken so far have come up with recommendations for (i) changes required in the hydrometric network to support the flow forecasting and water management; (ii) a communication system based on a "backbone" network, support by localized VHF data gathering and transmission system, and (iii) an operational model for day-to day determination of Kedung Ombo reservoir releases. The software development for integrated operation of the Dumpil barrage, Kedung Ombo reservoir and the Klambu barrage is not yet undertaken. Currently work is underway to finalise equipment selection and procurement. It is anticipated that procurement and installation of the equipment will be completed in late 1991. By the end of 1991 (termination of Loan 2543/IND) the Water Control Center at Kudus will be completed. Thus, much of the water management equipment procurement and installation will be completed by the end of 1991.

Water Management Project (Phase - 2)

Following development of the Water Control Center at Kudus and installation of the hydromet network there is a need for implementing, through a limited time project approach, the water management activities. During this period the activities will focus on (i) completing and testing of software, (ii) debugging system problems, (iii) testing of hydromet system and data gathering, (iv) developing and implementing an integrated operational model for three headworks (Dumpil, Kedung Ombo and Klambu), (v) water balance/water allocation model, (vi) developing and implementing activities to translate allocation from model to field, (vii) monitoring of allocation, (viii) enforcement of allocation, (ix) developing appropriate reporting systems and (x) institutionalislng the water management activities.

It is proposed to implement a two year Phase -2 water management project beginning in April of 1992. The preparation activities will take about six months so that the field water management activities can begin with the wet season cropping in October 1992. The project period will cover three cropping seasons between October 1992 to March 1994 during which adjustment to both institutional working and technical matters can be undertaken.

The project will be implemented by Jratunseluna Project assisted by IHE. The DPUP Wilayah and concerned Cabang Pengairan will be provided with limited technical assistance for start up and debugging of the software and telemetry system, translation of water management concepts to field activities, monitoring of allocation and water quality data collection.

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2.5 Groundwater Irrigation

2.5.1 On-going Projects

The Groundwater Development Component of the first time slice of ISSP is scheduled to be completed by the end of FY 1990/91. By that time the following systems are expected to have been implemented, as shown in Table 2.5.1.

Table 2.5.1 Implementation of ISSP-1 Groundwater :

	DTW systems		ITW systems		STW systems	
Province	nr	ha	nr	ha	nr	ha
East Java	51	1,199	60	494	179	537
C Sulawesi	--	--	20	133	--	--
S Sulawesi	--	--	21*)	151	1	3
Lombok	129	1,797	--	--	--	--

Note : *) including MTW

In addition, drilling of 20 DTWs and 23 ITWs in East Java, 10 ITWs in Central Sulawesi, and 16 ITWs and 6 MTWs in South Sulawesi are scheduled to be drilled by the end of FY 1990/91. Completion of implemention of these wells is planned to be done in ISSP-2.

The World Bank Mission which visited Indonesia from March 8 to March 25, 1990 has agreed to include a small groundwater component under ISSP-2. This would cover a period of 18 months to 2 years and include:

(a) installation of equipment procured under ISSP-1, and

(b) procurement of equipment for the first year of a separate groundwater project, which is expected to start in FY 1992/1993.

A variant which could be considered, would be

(b) procurement <u>and installation</u> of equipment for the first year of a separate groundwater project.

The "Proposal for Groundwater Development Component of Second Irrigation Subsector Project", prepared by DOI-II and the project consultant and dated July, 1990, is attached to this report as Appendix A.2.

The proposed scope of work to be carried out in 1991/92, would be,

- implementation of the schemes for which tubewells, topographic maps, design drawings and pump units are available;
- formation of water users associations including basic training on operation and maintenance, water management and agricultural design of the systems implemented;

- drilling of tubewells which will be implemented with an irrigation system and pumping facilities in the first year of the forthcoming new groundwater development project;

- preparation of the first year implementation works of the forthcoming new groundwater development project, which would consist of procurement of equipment and materials, topographic mapping, design of irrigation systems and tender document preparation.

For further details, reference is made to Appendix A.2, Chapter 2.

2.5.2 Procurement of Equipment and Materials

Materials and equipment for implementation activities in the first year of the forthcoming new project are needed to be procured during FY 1991/92 under ISSP-2. Details are given in Appendix A.2, Section 2.3.

2.6 Development and Extension of Irrigation Service Fee

2.6.1 Introduction

Proposals for extension of ISF are based on experiences gained and preliminary collection results achieved during the 1989/1990 cropping season (ISF cycle) under ISSP-1.

Collection Results (ISSP-1)

In their progress report no.5 (April 1990), the ISF consultants present the preliminary results of ISF collection for the first cropping season in three of the pilot schemes. Against the targets (set forth in the initial payment requests adjusted for exemptions and reductions) the collection efficiency ranges from 55% in Subang (W.Java) to 97% in Sukoharjo (C.Java). With several weeks left for collection, expectations are that the target will be achieved. Subang is a test-case for ISF exemption, as 93% of the area was stricken by a pest attack (insects) in February 1990 which is estimated by the Agricultural service to have destroyed 45% of the yield. In SIDRAP, ISF collection will start only in September 1990, after the wet season (May through August). For more details Table 2.6.1 refers.

The GOI intends to continue the ISF programme, further improve its concept and expand its geographical scope during the second time slice of ISSP. Having passed the initial introduction and implementation phase in each area selected for expansion, i.e. after the first annual cropping cycle and fee collection, ISF project activities will essentially be incorporated into routine Local Government business, even though increased guidance and supervision from provincial and central agencies will be necessary. Subsequently, the "project" activity, introducing and implementing ISF, will be focused on other areas earmarked for the purpose. Such a step-by-step approach will ultimately result in a nation-wide ISF coverage in accordance with the 1987 GOI policy statement which, inter alia, aims at full irrigation operation and maintenance cost recovery (of which ISF would be an essential component) throughout Indonesia by the end of the century.

Since its first introduction (in February 1989) and implementation in pilot schemes in four kabupaten, viz. Subang in W Java, Sukoharjo in C Java, Nganjuk in E Java and Sidrap in S Sulawesi, the ISF concept has constantly been assessed on its merits and adjusted to suit area specific conditions and requirements, as and where considered necessary. The present concept as it is emerging, has matured to an extent that it is by and large replicable in other areas, even though local variations may continue to be required.

In this chapter the ISF component will be reviewed from two angles. First, the key elements of the ISF concept, as developed under the pilot scheme, will be highlighted. Secondly, the geographical expansion of the programme is discussed. A consolidated area coverage is proposed, because it will be cost-effective, offer best chances of sustained success and fit in with overall ISSP-2 development strategy. However the location and extent of areas where ISF is to be introduced should be flexible and take account of further experience gained as the ISF programme progresses. A review of progress to date should be made during the first three months of ISSP-2 and the programme confirmed or adjusted accordingly. In Section 3.7 the institutional implications of the proposed ISF expansion programme in ISSP-2 will be reviewed, and an indicative programme presented.

2.6.2 Key Elements of the ISF Concept as Developed Under the Pilot Scheme

ISF activities to be undertaken can be sequenced in what is referred to as the ISF Service Cycle, which is attuned to the annual agricultural cycle, or cropping calendar, in the area concerned. Essentially, the agricultural cycle runs from planting in the wet season to harvesting at the end

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Table 2.6.1 Irrigation Service Fee

Preliminary Results of ISF Collection, First Season (1990)

	ISF District	Subang	Sukoharjo	Nganjuk
1.	Name System	Rancabango/ Wates/Sengon	Jumoneng	Ngudikan/Widas
2.	Area Baku	2,895	955	2,224
3.	Area ISF registered (ha)	2,705	955	2,177
4.	No. of Gabungan P3A	2	6	5
5.	No. of P3A	30	26	29
6.	No. of Farmers	6,121	3,244	6,232
7.	No. of Seasons/yen	2	3	3
8.	Basic Flat Fee/ha (Rp)	45,549	43,676	33,723
9.	ISF Fee Year 1/ha (Rp)	14,800	12,085	16,490
10.	Fee Season 1/ha (Rp)	7,800	3,383	4,777
11.	Area on which fee reduced (ha)	2,530	120	101
12.	Total ISF Target Season 1/area (Rp)	6,974,190	2,881,178	9,269,800
13.	Area harvested	100 %	96 %	100 %
14.	Collection Period elapsed	6 weeks	3 weeks	3 weeks
15.	Remaining Coll. Period	2 weeks	1 weeks	1 weeks
16.	Fee Collected (Rp) on April 21, 1990	3,833,808	2,642,266	8,689,118
17.	Collection Efficiency	55 %	92 %	97 %

Source : ISF Quarterly Report No 5 (April 1990)

of the dry season. The ISF Service Cycle precedes and overlaps the cropping cycle. Project activities can be subdivided into four inter-related consecutive phases :

- Introduction
- Pre-implementation
- Implementation
- Final assessment

Introduction Phase

(i) Review of Preconditions

For ISF to be introduced, a number of basic conditions need to be fulfilled. Proper understanding and acceptance of the concept, by officials and users alike, is a prerequisite for successful introduction. ISF is to be understood as a service fee with inherent requirements for service that must be accepted, by the PRIS (cabang dinas) as the service provider and by the local government as the service overseer, and for payment of the fee by the users as service recipients. To avoid premature failure through low collection efficiency, ISF should find a credible basis for introduction. It should be emphasized that proper introduction of the new concept of ISF requires a careful approach with comprehensive information provided about the mechanics and procedures, to all concerned.

(ii) Legal Framework

ISF introduction needs to be sanctioned by appropriate legislation. For the ISSP-1/ISF pilot kabupaten a ministerial decree (Kepmen) was issued (no.63/1989) accompanied by instructions and technical guidelines. Subsequently, similar decrees by provincial governors (SK Gubernur) and bupati (SK Bupati) were promulgated. Together this is considered to provide sufficient legal basis. Prior to introduction of ISF in new kabupaten under ISSP-2, similar legal arrangements will be required.

(iii) Notification of Procedures

Officials at provincial level and, particularly at the district and subdistrict levels need to be informed accurately about procedures at the start of the introduction phase. This notification of ISF concepts, policy, approach, procedures etc. requires intensive communication with on average 60 officials per province. Moreover a series of technical meetings are held in the kabupaten at the start of the next phase of ISF. There should be no misconception about objectives and careful communication with all concerned is required. Any questions and comments that arise from this extensive information campaign will be handled by key personnel from DGPUOD, Bappeda I and/or PRIS.

(iv) Socio-Hydro Mapping and Inventory

A highly significant part of the area inventory is to obtain a clear picture of the land tenure situation in the ISF area, from an irrigation and ISF point of view. Hydrological boundaries often do not coincide with administrative boundaries.

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Land holdings and ownership have been registered for IPEDA/PBB purposes on an administrative (at the lowest level: desa) basis. For ISF assessment and collection, it is necessary to know the number and location of tertiary gates and other division structures, the length of canal between gates, the number of water users per tertiary turnout, their village origin, their relationship to the plot owners, the size of their holding, their participation in water users associations (WUAs), etc.

Organising these data by tertiary block into an ISF-relevant data base has, in ongoing ISF pilot projects in Java, been a delicate and time-consuming exercise. It should be noted that, as a spin-off effect, in the process of comparing and cross-checking irrigation and cadastral information, valuable working relationships develop between ranting pengairan and village (pemdes) officials. Transfer of newly established ISF data to the irrigation data base (Buku Pintar Pengairan) is also important.

Eventually, monitoring developments in land tenure and keeping the ISF registers up-to-date will be tasks of the WUAs. As these organisations are generally not yet well-developed and fully functional, socio-hydro mapping should initially be done by the ISF Consultants in conjunction with desa and irrigation officials and P3As (WUAs), as applicable. ISF activities help to stimulate the formation and activity of WUAs.

Pre-Implementation Activities

(i) System Walk-Through

An important element of ISF is the so-called system walk-through, a periodic site inspection tour along the main system by both parties in the O&M service agreement. The main idea of a walk-through is that the service supplier, PRIS (represented by the canal supervisor or mantri pengairan) and the service recipient, the water-users (represented by the chairman of the P3A or Gabungan P3A) jointly determine what needs to be done in terms of repairs and maintenance of the irrigation main system to ensure adequate water delivery to users during the next agricultural/cropping cycle. The biannual inspection by the Ranting dinas to prepare the Buku Catatan Pemeliharaan (Maintenance Note Book) should be so planned as to coincide with the seasonal walk-through. The note book should be modified to include comments/observation by P3As concerned.

Thus the walk-through provides the basis of the mutual ISF/O&M service agreement and adds a psychological stimulus to the water users association whose active participation is essential. Apart from the contract partners the system inspection tour in the initial stages of ISF introduction should be attended by representatives from Pertanian, Dipenda tingkat II and Pemda (desa and kecamatan).

(ii) Plan of Operation and Maintenance

Following the system walk-through, the annual work plan for the system's operation and maintenance is be made by Pengairan based on past experience and reflecting the consensus of both parties during the site observations.

The work plan is to be validated against and incorporated into the overall Water Distribution Operational Plan (Indonesian: rencana operasional pembagian air, ROPA) for the entire system, subsequently agreed upon between Pengairan and the Federation of WUAs, and submitted to the ISF Consultative Body "Badan Musyawarah" for final approval. The BAMUS is a component of the ISF pilot programme and its linkage to the Kabupaten Irrigation Committee will be reviewed in due course.

The ROPA will take into account the cropping intensity, the drainage facilities, the minimum crop water requirements, the level of tertiary development and the cropping calendar in the area concerned.

(iii) Needs-Based Budget

Once the O&M plan has been defined, it has to be costed in sufficient detail to reflect the actual needs for O&M as have been agreed upon during the system walk-through. It is therefore important that water users (ISF subjects) are informed in advance through their WUAs about the costs associated with implementing the O&M work plan. It will enable them to assess the financial implications of the O&M budget required which is the basis for the fee to be paid.

(iv) Service Agreement

In the service agreement the acceptance of the system O&M work plan and the needs-based budget by all parties concerned (including the BAMUS IPAIR) will be recorded so as to provide the formal basis for the irrigation services to be rendered and the fees to be paid. To be included in the document are the factors for ISF tariff calculation, i.e. the service levels (for irrigation, drainage and tertiary development) which have been decided upon for the system concerned, the intended results of the irrigation service as expressed in cropping intensity per tertiary unit or block, the introduction factor and the water security factor.

(v) GOI Commitment

It is recognized that the total cost of system O&M will not all be recovered from ISF alone for some years to come. Maximum ISF collection will not be reached until the sixth year after introduction. Moreover, replacement costs which are part of the needs-based budget may lift the O&M cost above the users' ability to pay.

Consequently, GOI will have to make a commitment at the start of ISF in any area. The part of the cost which cannot yet be collected through ISF will have to be met by the Government (through APBD or APBN). If this condition is not fulfilled, the system concerned will still deteriorate and ISF will not serve its purpose. Users' willingness to pay will diminish and the ISF programme may fail as a result. The GOI commitment as a partner in footing the O&M bill is therefore crucially important for the success of ISF.

Implementation

(i) Start of Service

The transition from a pre-implementation (preparatory) phase to one of implementation is gradual. Actual implementation of ISF may be assumed to start when the afore-mentioned activities have been concluded. Ideally, this should be when the rainy season sets in and all farmers start planting paddy aware that after harvesting part of the crop they will have to pay ISF. Both the yields and the fees to be collected will depend on the service agreement which has been concluded between their representatives in the WUA and the government irrigation service. An important factor in this connection is the degree of discipline among the farmer water users in an ISF service area (and the entire irrigation system) in complying with what has been agreed, particularly in respect of the area's cropping plan (pola tanam) and calendar and the related water distribution scheduling.

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(ii) List of Planted Area

The water distribution operational plan (ROPA) specifies the crops to be planted in each tertiary unit or block. After planting has been completed in the irrigation scheme (typically covering a period of 4-6 weeks) an inventory of the planted area is made. For each WUA area a List of Planted Area (Indonesian: daftar areal tanam, or DAT) is compiled to serve as a basis for comparison with the ultimate yields of the area.

For ISF administrative reasons the spread in planting and harvesting dates should be limited and not exceed six weeks. This will require discipline in farm and irrigation management which is now lacking in many areas.

The DAT will be primarily the responsibility of the P3A (WUA) but the result will also need agreement from both the Cabang Dinas Pengairan and the Revenue Office (Dipenda II).

(iii) Payment Advice

The information obtained from the DAT is the basis of what is termed the ISF Payment Advice - a preliminary estimation of the total amount of ISF to be expected from the tertiary unit or block concerned. The advice (Indonesian: surat tagihan) is to be served by the Dipenda II to the P3A, or the Gabungan P3A, for information of their members.

(iv) Service Monitoring

During the season, users and irrigation officials should contact each other at least every 4 weeks, to discuss any matters including complaints related to the mutual agreement which either side may wish to raise. This will prevent serious disagreements arising between parties when final assessment bills are submitted.

(v) List of Harvested Area

In analogy with the DAT, each season some weeks before harvesting time (also covering a period of 4-6 weeks), the area to be harvested will be recorded. The resultant List of Harvested Area (Indonesian: Dafter Areal Panen, or DAP) will, together with the DAT for the corresponding area, constitute the basis for final ISF assessment.

In compiling the DAP, some input may be required from the PPLs (agricultural extension service field workers), for example in respect of crop failure and the eligibility of cultivators to be exempted from paying ISF.

The harvest inventory as well as the subsequent fee assessment take place at a time when water deliveries are being reduced and fields drained of water to prepare for harvesting.

(vi) Final Assessment Bill

Each successive season, based on the DAT and the DAP, the Kabupaten Revenue Office (Dipenda II) will prepare the ISF Final Assessment Bills and serve them to the respective P3As with copies to Cabang Dinas PU Pengairan, Bank Rakyat Indonesia (BRI) and, in summary form,to the Badan Musyawarah IPAIR (Bamus).

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(vii) Fee Collection

Each season's ISF activities are concluded with fee collection and depositing. Some details with regard to collection mechanism procedures and scheduling need some further testing in the ongoing ISF Pilot areas. The main activities of this final phase are as follows:

- Shortly after harvesting, the P3As, having been served with the ISF assessment bill by Dipenda II, start billing their members;
- Dipenda II will, for the time being, supervise all collection activities;
- Collection should be completed one month after first notice has been given to P3As;
- Collected fees are deposited into ISF-specific accounts with the local BRI branch in the name of each P3A, only to be released at the discretion of the Bupati/Chairman of the BAMUS. Funds may then be put at the disposal of the Cabang Dinas PU Pengairan to meet subsequent expenditure on O&M of the system concerned.

At collection time there is dialogue between users, irrigation service personnel, agricultural extensionists and village officials. Issues discussed include : the extent and quality of the service, compliance with the service agreement by both sides, ways and means to improve the service, validity of the cropping calendar, fee collection and fund allocation, the plan of operations (POM), etc. All O&M related issues are open for discussion. This has a positive impact on performance of all concerned with the next season or ISF cycle.

Final Assessment

(i) Service and Collection Performance

The year's agricultural and ISF service cycle is followed by a thorough evaluation of irrigation service performance and fee collection efficiency, matching initial expectations and targets with end results. The annual assessment should be preceded by seasonal interim evaluations so as to keep check on such matters as ISF payment arrears, sanctions to be initiated for non-payment, any reasons for low collection efficiency in an area, etc. Such information should be the result of regular project/routine monitoring by the ISF Implementation Team and/or the IPAIR. Findings of the internal evaluation efforts may lead to reviewing ISF policy, methodology and procedures to be adopted for the new annual cycle. They may also affect proceedings in other ISF areas.

(ii) Cost Accounting

Similarly, the Cabang Dinas PU Pengairan will need to review actual O&M expenditure over the previous year against the initially prepared needs-based budget, and report to the BAMUS. On the basis of such cost versus returns analysis it should be possible to assess, after several years, whether actual O&M costs may be reduced whilst maintaining a stable and sustainable irrigation system.

(iii) Fund Release and Fund Use

Any release of ISF funds as available in the system-related accounts is to be authorized by the Bupati in his capacity as Chairman, of BAMUS. Upon request by the Cabang Dinas PU Pengairan, approved by the Bupati and under supervision of the regional financial office (Keuangan Daerah), monies can be transferred from the system's collection account of the Pemda (Local government) to the system's expenditure account of Pengairan. It is stressed that transfer of ISF monies to any other account should not be allowed. The key to ISF concept is that funds collected in a system are to be utilized within that system only and then exclusively for system O&M purposes.

Appendix C.4. depicts the ISF cycle in more detail.

2.6.3 ISF Area Coverage in ISSP-2

Approach

During the second time slice of ISSP, ISF will be introduced and implemented in systems that adjoin the present ISF pilot systems and in systems in additional provinces. The approach to be adopted for ISSP-2 may include some modifications to the approach used in the pilot programme, after review of the results which are due to be reported in March 1991. Planning should be flexible so that the extent and location of ISF areas can be modified as necessary to take account of experience gained as implementation proceeds. The extent of the ISF areas will also depend on the planning and progress with SM and introduction of EOM.

At least during the ongoing learning process, an approach of consolidation and flexible expansion is believed to be conducive to project efficiency and cost effectiveness. The objective of sustainable system operation and maintenance is more likely to be achieved in new ISF areas that are within easy reach of the ISF coordinating and supervising agency. A consolidated programme will lead to more efficient use of the available resources.

It should be emphasized that the only yardstick for successful introduction of ISF in a self-contained irrigation system is 100% collection efficiency, not only from a cost recovery point of view, but particularly in terms of social acceptance. It shows that ISF is not felt as just another government initiated tax adding to the burden of farmer water users, but appreciated as providing value for money. Farmers' willingness to pay can be attributed to three relatively new factors inherent in the ISF concept, i.e. (1) fund use in their own system (2) farmers' involvement in POM and NBB through system walk-through and service agreement, and (3) the opportunity for users to express their feelings on service quality.

A major precondition for effective introduction and successful implementation of ISF is that efficient operation and maintenance (EOM) has been completed in the area, or is being carried out. It has now been accepted that EOM and ISF when introduced in tandem form a strong combination. Synchronized action planning of both ISSP components is discussed in Section 3.2.2. Other supportive activities when focused on the same areas will strengthen the development process even further. This is also the essential meaning of the training approach, as formulated in Section 2.8.2. It is imperative that ISF follows the service cycle which in most kabupaten in Java will start in April. This is particularly relevant to the actual start of ISSP-2 and the involvement of technical assistance. Moreover, since the approximate ISF results for one year will be known in September, the government share in the cost can be budgeted in the next DUP/DIP.

2.6.4 Expansion programme

ISF will be introduced to the provinces of W. Sumatera, Lampung, Yogyakarta, Bali and West Java outside Jatiluhur. It will also be expanded in Jatiluhur and the provinces of C. Java, E. Java and S. Sulawesi where ISF was introduced under ISSP-1, by including additional Kabupatens. GOI plans to expand ISF coverage by at least 700,000 ha, and has a strong desire to cover a substantially larger area, during ISSP-2. The distribution of this area by province has yet to be decided.

The ISF programme will be planned to follow the SM/EOM or DEOM sequence where possible and will be determined annually in October as part of the budgetary planning process. Consequently the Kabupatens to be included cannot be decided at this stage.

Systems with area under 500 Ha will not be included in the ISF programme.

2.7 Rural PBB Tax Valuation and Land Re-classification

2.7.1 Introduction

Out of the 15 million hectares of land which are registered by PBB for taxation, about 1.7 million have been or are being mapped and re-classified with the financial assistance of the World Bank. In a similar way, another 500,000 hectares are being mapped and registered supported by ADB funding.

Through the execution of WTC I and II, Kedung Ombo, Central and West Java projects as well as the ISSP-1 program, the World Bank has been supporting the efforts for increased taxation of rehabilitated land under irrigation. A list of re-classification projects funded by the World Bank is shown in Table 2.7.1.

The main activities of the re-classification projects are in the fields of mapping, identification and registration of land holdings and land holders, land classification and valuation, with some institutional strengthening and tax administration. Due to the amount of data to be handled, the automation process recently started in a modest form, should be strengthened to obtain the improvements necessary for the efficient use of the databases and its regular up-dating. After the analysis of alternatives for the type of software required and its selection, the automation can be further operationalised.

It is expected that all re-classification projects actually undertaken, will be completed by the end of 1990. Data obtained is or will be available for inclusion in the tax rolls for 1990/91 and 1991/92. The recently proposed and developed land classification system will be tested further, and is expected to be functional by the end of 1990. Training of PBB personnel and field implementation are to follow.

Streamlining of the tax administration and the tax collection system for rural areas, will be executed through the implementation of the Payment Point System, originating from the Urban Sector Loan to PBB, using several recommendations proposed by NEDECO.

Although not all projects under execution have been finalized, the PBB activities within ISSP-2 will be focused mainly on the consolidation of the activities carried out up to now. This means a further concentration on the improvement of the existing databases for mapping, land classification and valuation, and tax administration, through automation and the related updating process.

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Table 2.7.1 : Re-classification projects in Indonesia

Loan nr	Name	ha	KPPBB
IND-2560	WTC I WTC II	233,500 266,500	Bekasi, Bogor, Purwakarta, Cirebon, Bekasi
IND-2543	Kedung Ombo	103,000	Semarang, Kudus, Pati, Ungaran
IND-2649	CENTRAL and WEST JAVA		
	Ciujung-Cisadane	107,000	Serang, Tangerang
	Rentang	115,000	Cirebon
	Cirebon	123,000	Kuningan, Cirebon
	Sumedang	75,000	Garut
	Pemali-Comal	116,000	Pekalongan, Tegal
	Gambarsari-Pesangg	60,000	Purwokerto
	Jratunseluna	75,000	Ungaran, Kudus, Semarang
IND-2880	ISSP-1		
	Bengawan Solo	102,000	Surakarta, Madiun, Klaten
	Brantas I	100,000	Mojokerto, Kediri, Tulung Agung
	Brantas II	78,000	Malang, Tulung Agung
	Sumatera I	42,000	Tebing Tinggi, Bukit Tinggi
	Sumatera II	30,000	Lahat, Metro
	Sulawesi Selatan	15,000	Pare-Pare
	NTB Lombok	23,000	Mataram
	Total	1,664,000 ha	

Based on the results of ISSP-1 and considering the short and medium term goals of PBB, there is a need for consolidation of this first phase. This means a reduction in mapping work, but also

- further strengthening of the processing of the actually available data;
- intensification of classification and automation processes;
- continuing limited training of PBB personnel.

2.7.2 Proposed Programme

Data Base Maintenance

Due to the strong need for automated data handling, all data obtained during the execution of the earlier mapping projects should be incorporated into the standard software package to be selected by PBB. New data or modifications of older data should be systematically brought into

the system on a regular basis.

Up to now, the mapping contractors have the administrative data concerned already in one form or another in computerized form. Since it is not included in their contracts, the graphical part has been automated only in a few cases. Data not yet computerized should be brought into the automated form, through digitalization and keying-in. The data already stored in different types of software should be converted to the PBB standard package. The program and the data for land classification and valuation will form an integral part of the overall computerized system and will have to fit the software chosen.

For PBB (central), Kanwil and KPPBB regional offices, selective task descriptions should be made and implemented. Not all tasks are required to be carried out at all levels. Some, like the maintenance of the graphical component of the database should be concentrated at Kanwil level only.

Identification and Registration

To obtain equity among the tax payers, the Ministry of Finance wants the detailed revision of data related to the upland areas (or darat) mapped at parcel level during the previous phases. Its inclusion will raise the tax revenues from these complete administrative units subjected to the improved taxation level. For most of these areas, existing photographs and mapping data can be used as basis. Detailed measurements of individual holdings in the uplands and the identification of the land holders would be complementary to the work carried out earlier. Whenever the photogrammetric mapping can not be executed (e.g. poor quality of existing aerial photographs), manual terrestrial measurements and mapping methods should be used for this purpose. For the completion of the upland mapping in existing re-classification areas, an inventory rate of 60,000 ha per year over a three year period should be possible, as much of the required material and information is already available at the PBB offices, obtained from earlier mapping contracts.

Land Classification and Valuation.

The first test round of the recently proposed land classification method showed its technical feasibility and the cost effectiveness for the application on a routine basis. Although the exercise of testing the method has not yet been completed, it will be necessary to plan its implementation during ISSP-2. In the first place, training of PBB personnel will have to take place for those PBB staff members who will be involved in the land classification. This means formal training is required in the discipline of the natural resources analysis and aerial photo-interpretation to upgrade the technical know-how of the selected staff members. Strong emphasis will be given to the practical transfer of knowledge in the form of on-the-job training during the initial period of the project.

Secondly, the program should be made operational with the complete involvement of the mentioned PBB staff members and automation experts. The foreign consultants for these disciplines will guide this process, and solve the technical difficulties encountered.

Automation

As already mentioned, part of the soft and hardware requirements are still to be met for the optimal benefit of the data processing and retrieval.

Though the selection of a suitable package still will have to be made for the graphical and alpha-numerical (and/or combined) software, it is expected that most KPPBB's and Kanwils

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involved in the re-classification projects will be equipped with the type of equipment mentioned below.

From the Kanwils and KPPBB's involved in the re-classification projects, 17 KPPBB's and 6 Kanwils will be selected for this purpose.

These offices will use the following type of equipment which is considered as basic:

- KPPBB : computer
- Kanwil: computer, digitizer and plotter

At present; 39 sets of computers are in the process of being acquired by PBB through international tendering.

Required related software packages (depending on the type of software package chosen) are:

- KPPBB : lotus, dBase, WS/WP, Mapinfo
- Kanwil: Lotus, dBase, WS/WP, Mapinfo and ArcInfo,

Furthermore for training purposes at the Jakarta PBB Training Center, three sets hard and software are to be obtained.

2.7.3 Expected Revenue Levels of the Proposed Programme

The expected results can be expressed in two forms: either an increased level of taxation and revenues, or a cost reduction through higher efficiency obtained during the process stretching from data inventory to valuation and improved land administration.

From earlier projects it has been learned that the average tax levels for the sawah and upland (darat) based on the actually existing 'klasiran' data, are the following :

	Old	New
Sawah	13,517 Rp/ha	20,033 Rp/ha
Darat	5,018 Rp/ha	9,737 Rp/ha

For the darat areas, although not yet geographically determined, a simple cost-benefit balance between generated revenues and project costs as far as mapping, registration, land classification and valuation is concerned, is given in Table 2.7.2.

For the calculations, the above mentioned average agricultural land values are taken as basis. Strong variations are possible due to site specific values, but also recent re-valuations not taken into account here, can show a significant upgrading higher than those mentioned. After the klasiran and mapping has been finalized, the increased tax levels are applied to taxable area taking into account the assumed payment capacity of the owner or user (tax payer). Of the tax revenues, 19% will be retained for the Central Government and the tax collection fee, while the remaining 81% will be used by Local Government Tingkat I and II (provincial and district governments). Through the completed administrative inventory including data useful for tax

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Table 2.7.2 Benefits PBB/ISSP-2 Mapping Areas (Rp. mill)

		yr 0	yr 1	yr 2	yr+ 3	yr 4	yr 5	yr+ 6	yr 7	yr 8	yr+ 9	yr 10
Tax Revenues												
Upland	new v.			584	1,461	2,191	2,191	2,739	2,739	2,739	3,423	3,423
60,000 ha/yr	old v.	903	903	602	301							
(180,000 ha)												
Sub total A		903	903	1,186	1,762	2,191	2,191	2,739	2,739	2,739	3,423	3,423
Project Cost												
Upland identification & registration			1,020	1,020	1,020							
Cosulting services			128	128	128							
classification/valuat*			10	10	10							
maintenance**				51	102	153	153	153	153	153	153	153
Sub total B		0	1,158	1,209	1,260	153	153	153	153	153	153	153
diff. A-B		903	-255	-23	502	2,038	2,038	2,586	2,586	2,586	3,270	3,270
Revenue Accum. +project C)			-255	-278	224	2,262	4,300	6,886	9,472	12,058	15,328	18,598
Revenue Accum. +project D)		-903	903	1,806	2,709	3,612	4,515	5,418	6,321	7,224	8,127	9,030
ratio C/D %			-0.28	-0.15	0.08	0.63	0.95	1.27	1.50	1.67	1.89	2.06

yr+ valuation level after each 3 years period increased with 25%

* based on the actual "klasiran" data (1988-90)

** maintenance set at 5% of mapping cost

new v. = new land values

management, and the implementation of the Payment Point System in its automated form, PBB will be able to trace non-payers, which has not been possible up to now as the administration and the payment system were too complicated. A pre-requisite is the maintenance of the up-to-date database avoiding the loss of potential taxes through in-accurate data. Per year around 5 to 10% of the taxpayers administrative data changes could be considered as a potential tax loss when the administrative system is not updated correctly.

2.8 Institutional Strengthening and Training

2.8.1 Approach

It is widely recognized that developments in the subsector during ISSP-1 are hampered by a number of non-technical constraints. The Institutional Strengthening Study and subsequent discussions between the GOI and the IBRD have resulted in a clearer view as to how these predominantly structural problems may be addressed.

Institutional development and institution strengthening can be defined as the process of creating and strengthening the capability and effectiveness of institutions at all levels and to make effective use of available human, financial and other resources. Institution strengthening of the irrigation subsector is synonimous with public sector management and encompasses a host of activities, including :

- policy development
- organisation
- programming
- scheduling
- staffing
- personnel management
- information management.
- planning
- design
- budgeting
- processing
- training
- financial management

For the Ministry of Public Works many of these topics will be addressed under the forthcoming Institutional Development and Training Study. Many of them will also be relevant to ISSP-2 and may therefore be highlighted here. They jointly present an approach to and an action framework for institutional development.

2.8.2 Training Approach

The long term objective of all the training (both courses and follow-up) should be to ensure that all concerned government staff, local officials, water user associations and farmers are fully able to "operate and maintain" the whole irrigation system on a continuing basis at full development, i.e. after the introduction of both EOM and ISF. The training proposed should be an integral whole given in the correct sequence to achieve these objectives and comprise organisational, management and technical aspects.

Based on experience from ISSP-1, the following main considerations have been taken into account in planning the ISSP-2 approach :

i) The training should be needs based, strongly related to "job" tasks.

ii) The training should be given in the correct sequence.

iii) Training should be concentrated on PRIS O&M staff and WUAs.

These are described in detail below. In planning the training, the proposals of the Master Plan developed by the Training Coordination Project, training carried out under ISSP-1 (see Section 1.4.4, Training) and the planned programme of the Institutional Development Study have been taken fully into account, as well as linkages with the Institutional Development and Training Project (IDTP) which is due to start in September 1990 and coordination with other relevant training programmes.

Training Needs

All training should be based on the actual training needs of both PRIS staff (particularly of Cabang Dinas level and below), as well as WUA and local government officials to achieve the long term training objectives. For PRIS staff, the Institutional Development Study has presented lists of job tasks for the principal staff and these should form the basis of establishing the training needs. Training needs surveys have been carried out through the Training Coordination Project in existing and new ISSP provinces, using an interim system. The job should be considered as a whole and a complete package proposed. This may cover managerial, technical and water user related activities which should be addressed by one or more related courses. Some form of certification could be provided at the end of the training. For water user and related local government official training, the training should be concentrated on those "people" most involved (WUA and village level groups) and other groups should have only introductory/overview training.

Sequencing

For ISSP-2, there are two alternatives for irrigation development in the future :

- Scenario 1: Provinces where EOM and ISF will be introduced together after SM
- Scenario 2: Provinces where EOM will be introduced after SM and ISF will be introduced several years later.

Figures 2.8.1 and 2.8.2 present charts of the possible training needs and their sequencing for PRIS staff, WUA and local government officials involved in a typical irrigation area for each alternative.

In both cases, the training of PRIS staff for technical and managerial subjects will be similar (also refer to Section 2.8.4, Staff Training, Irrigation Operation and Maintenance).
Initially the training concentrates on carrying out the SM activities (design review and construction supervision), as well as the preparation of plans of operation and maintenance (POM). For the EOM introduction, the staff should be given training in related activities (O&M principles, EOM design, maintenance construction supervision and data management). It will be important, particularly for O&M, that all the facilities are available, such as working measuring structures, operation boards, O&M forms etc. so the training can be implemented. As EOM continues, there should be a second O&M course to consolidate the earlier course, as well as refreshers and motivation from superiors. A more general training need is management for senior Cabang level and PRIS staff (the PRIS part of which will be addressed by the IDTP programme). The staff will also receive WUA training as part of the WUA programme described below.

For WUA and local government officials, the approach will be different for the two scenarios. WUA organisational strengthening to be successful must be given an impetus by a project event. The payment of the irrigation service fee is a strong impetus to form a formal organisation whilst the SM construction activities and resulting more reliable water supplies at the time of EOM are a weaker impetus.

For Scenario 1, a joint programme of organisational strengthening leading to a formal WUA organisation and of technical (tertiary level O&M) aspects should be provided at about the time of EOM introduction, starting in the latter part of the SM construction phase. Initial training would be consolidated by follow-up activities.

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Possible Training Needs

Figure 2.8.1

Scenario 1 : EOM and ISF Introduction Together

PRIS Staff			WUA and local government officials	
Staff	Training Need Activity/ Proposed Training		Training Need Activity/ Proposed Training	Group
		Special Maintenance		
p. Cabang and nior PRIS staff	Management/Planning - course			
IS/Wilayah design aff	Supervision of Consultants carrying out survey and design - transfer of knowledge - course			
nstr. supv. staff , PL, PP	Construction Supervision - course			
ang O&M staff	Preparation of P.O.M - workshop			
		Efficient Operation and Maintenance		
		Stage 1 : Introduction	WUA Organisation and Strengthening and Tertiary level O&M - training	Provincial officials Kabupaten officials Camat level officials Village level officials Informal leaders WUA members
O&M Staff	Operation and Maintenance - O&M principles and practise course			
ang design staff	EOM survey and design - course			
tenance staff	Construction Supervision - course		Organisation Development - follow-up	WUA
Cabang, ang O&M heads, gamat	Management - workshop etc.		ISF Introduction - follow-up	WUA
ang staff	Data Management - course		Tertiary level O&M - follow-up	WUA
			Agriculture and on-farm water management - extension	WUA
O&M Staff	Operation and Maintenance - O&M second course + refreshers + motivation	Stage 2 : On-going	Organisation Development - extension/follow-up	WUA
ang design Staff	EOM survey and design - refreshers + motivation		Tertiary level O&M - extension/follow-up	WUA
tenance staff	Construction Supervision - refreshers + motivation		Agriculture and on-farm water management - extension	WUA
staff	Management - workshops etc.			
workshops on miscellaneous subjects				

Possible Training Needs
Scenario 2 : Later ISF Introduction

Figure 2.8.2

PRIS Staff			WUA and local government officials	
Staff	Training Need Activity/ Proposed Training		Training Need Activity/ Proposed Training	Group
		Special Maintenance		
Kep. Cabang and Senior PRIS staff	Management/Planning - course			
PRIS/Wilayah design staff	Supervision of Consultants carrying out survey and design - transfer of knowledge - course			
Constr. supv. staff PD, PL, PP	Construction Supervision - course			
Cabang O&M staff	Preparation of P.O.M - workshop		WUA Organisation and Strengthening and Tertiary level O&M - training	Provincial officials Kabupaten officials Camat level officials Village level officials Informal leaders WUA members
		Efficient Operation and Maintenance		
		Stage 1 : Introduction		
All O&M Staff	Operation and Maintenance - O&M principles and practise course		Organisation Development - follow-up	WUA
Cabang design staff	EOM survey and design - course			
Maintenance staff	Construction Supervision - course		Tertiary level O&M - follow-up	WUA
Kep. Cabang, Cabang O&M heads, Pengamat	Management - workshop etc.		Agriculture and on-far water management - extension	WUA
Cabang staff	Data Management - course			
		Stage 2 : On-going including I.S.F. Introduction	Organisation Development - extension/follow-up	WUA
All O&M Staff	Operation and Maintenance - O&M second course + refreshers + motivation		Tertiary level O&M - extension/follow-up	WUA
Cabang design Staff	EOM survey and design - refreshers + motivation		Agriculture and on-far water management - extension	WUA
Maintenance staff	Construction Supervision - refreshers + motivation		Irrigation Service Fee Introduction - Supplementary follow-up, (particularly for organisational matters)	WUA + officials
Senior staff	Management - workshops etc.			
Plus workshops on miscellaneous subjects				

For Scenario 2, a programme of training in technical aspects with some organisational strengthening, maybe not leading to a formal organisation of WUAs would be provided at the time of EOM introduction. Follow-up activities would be provided until the introduction of ISF when more organisational strengthening would occur leading to a formal WUA organisation.

All agricultural and farm level water management extension would be covered by the routine agricultural extension programme, and is outside the scope of ISSP-2.

2.8.3 Institutional Strengthening Irrigation

Organisation

The following issues of organisational strengthening and development will deserve special attention. They are in line with prevailing government policies and legislation which however, in certain cases, may need some adjustment to make implementation possible :

(i) Strengthening of the central departments concerned with ISSP in their overall guidance, coordination and policy-making functions as and where necessary.

(ii) Strengthening the provincial role in ISSP-2 implementation, all project components. Provincial agencies will particularly include :

- Home Affairs : on behalf of the governor the BAPPEDA I for coordination of ISSP related activities within the provinces. They will have strong representation on the provincial irrigation committee (PIC), irrigation steering committees, ISF guidance team, etc. Operational guidance and support will be extended to the Bupati with regard to their tasks as chairman of the kabupaten irrigation committee.

- Public Works : PRIS in management implementation guidance and technical coordination in water resources matters in the province, represented by the Sub Dinas Pengairan for irrigation, swamps and rivers development (the latter in conjunction with the Kanwil PU). Under DPUP supervision and guidance, the Cabang Dinas Pengairan will be given wider tasks and responsibilities for (irrigation) O&M within their areas of jurisdiction, particularly in respect of SM/EOM, ISF and Turnover related field operations at Ranting level. NB. Turnover of completed SM/EOM systems to provinces will put an increased burden on the Cabang offices.

(iii) Further rationalization will have to be considered in respect of :

- boundaries of Cabang dinas to coincide as much as possible with hydrological boundaries;

- boundaries of 'wilayah' (KPKD) to coincide, where practicable, with river basin boundaries for coordination purposes;

- gradual transformation of Irrigation Committees (at both provincial and kabupaten levels) to cover more effectively the wide range of tasks including water use, water allocation and water resource conservation. Eventually, the names of these committees may be changed into Water Resource Management Committees and legal arrangements made accordingly;

- establishing permanent secretariats for ICs to ensure day-to-day follow-up action of the decisions made by these committees;
- accelerating, through the kabupaten administration, the formation and strengthening of WUAs.

Manpower

The chances of successful implementation of the ISS recommendations (see section 1.4.2) with regard to institutional strengthening in general and manpower development in particular can be increased by taking into consideration the features of the Indonesian organisation 'culture'. They relate to the preference for group performance, the desire to avoid conflicts and the acceptance of centralized directives.

Consequently, major improvements regarding manpower development and especially personnel management should not be expected overnight. Improvement in performance, adequate staffing levels, staffing arrangements and the like require long term efforts.

Since officials involved in water resources O&M are employed by the government, the proposed actions and recommendations to improve either individual or organisational performance must comply with government regulations. For example, recommendations to develop career structures for non-technical staff must fit within the government system.

Manpower Planning and Manpower Development

In all organisations within the subsector, large or small, developments occur. No organisation is static. People come and go, requirements change with new technologies, vacancies need to be filled, new objectives have to be reached, etc. Clearly as a result of the developments in the water resources O&M sector, many activities in the field of manpower planning and development have to take place.

This is a gigantic task for the organisations within the subsector, not only because they have to plan, implement, monitor and evaluate these activities, but also because every change in the personnel of the organisation involves a great deal of administrative work: data needs to be compiled, files need to be updated, reports to be formulated and recorded.

The execution of all this may form a problem in itself, which could be increased by the fact that at the same time one is endeavouring to increase the quality of staff and their output. This objective can only be reached, if the personnel and planning departments are well provided with staff and equipment and make use of simple straightforward standardized procedures.

Each organisation should know in advance what the manpower consequences are of the developments that will take place in the near future, so that they can prepare and inform the employees and managers of what they need to do in the field of manpower planning and development.

To ensure success, and also to strengthen the institutional performance in the long term, the involved managers will have to be provided with an adequate set of management tools. They require a proper manpower policy, an adequate manpower planning system, up-to-date and complete manpower information systems, and consequently a proper manpower organisation, i.e. personnel departments.

These tools and systems are to be developed and implemented under the IBRD supported

Institutional Development and Training Project (IDTP), for the Ministry of Public Works as a whole.

Quantitative aspects

To formulate the manpower needs for the next decade more information is required. Various developments, such as improved performance of existing personnel, national agricultural policy changes, technological developments, and efficiency improvements, will affect the future manpower situation. Some of these developments will result in expansion, others in reduction of staff. Besides, due to the strengthening and realignment of functions, a shift of manpower may take place within the O&M organisations.

(i) Reasons for expansion of staff

- A recent study for Central Java indicated that the staff of the Ranting Dinas would have to be increased by at least 65 percent to fulfill the operation and maintenance tasks at the required level. Before any decisions are taken in this respect, further study is required. This should be done after the IDTP manpower planning systems are functional.

- New tasks may require additional staff, e.g. extension services, data management, or regular communication with water users (cf. ISF).

- The present situation with only about 55 percent of the entire workforce having permanent staff status, is likely to change and affect overall strengths. This figure was derived from a 1987 data compilation for 8 provinces, Table 2.8.1 refers. It has become a generally accepted principle that all staff required for O&M (all water resources components) should have a permanent assignment as civil servant.

- Both expansion of the agricultural areas and intensification of the irrigation programmes may require additional staff. Whether or not this will be the case will strongly depend on the locality and on local developments.

(ii) Reasons for reductions of staff

- A better organisation of the work with both specialization and delegation of tasks would reduce the number of staff. Furthermore, reduction of manpower requirements may result from increased efficiency.

- Improved knowledge and skills of key jobholders will result in improved performance and thus higher efficiency. Reallocation of qualified human resources to lower levels in the organisation may accelerate this process.

- New technologies and automation may reduce relatively labour intensive technical and administrative activities.

- Reduction of administrative procedures are expected to have a major impact on staff requirements. The improvement of planning and financial systems are to be addressed under IDTP.

- If reporting could be reduced to clearly defined line management, paper-work would be reduced considerably resulting in a significant decrease in tasks of administrative staff.

Table 2.8.1 Number of DPUP (Irrigation O&M) staff by level, employment status and salary grade in eight provinces, 1987/1988

	Province	Hectares (1) (ha)	PNS (2) by salary grade (golongan) IV	III	II	I	PNS Total	PHT + PH (3)	Grand Total
1	West Java	795,000	3	32	742	1553	2330	1966	4296
	(a) Sub Dinas (%)		2	25	5	3	4		2
	(b) Cabang Dinas (%)		1	75	95	97	96	100	98
2	Central Java	705,000	2	76	1329	3760	5165	-	-
	(a) Sub Dinas (%)		1	25	6	-	2	-	-
	(b) Cabang Dinas (%)		1	75	94	100	98	-	-
3	South Sulawesi	177,000	1	75	1308	1344	1146	69	1215
	(a) Sub Dinas (%)		1	44	17	2	20	25	20
	(b) Cabang Dinas (%)		1	56	83	98	80	75	80
4	North Sumatra	164,000	1	53	470	334	858	1327	2185
	(a) Sub Dinas (%)		1	58	32	4	23	1	9
	(b) Cabang Dinas (%)		-	42	68	96	77	99	91
5	West Sumatra	156,000	2	42	258	59	361	845	1206
	(a) Sub Dinas (%)		2	57	52	37	51	15	25
	(b) Cabang Dinas (%)		-	43	48	63	49	85	75
6	Lampung	76,000	-	17	469	507	993	382	1375
	(a) Sub Dinas (%)		-	65	42	19	31	29	3[illegible]
	(b) Cabang Dinas (%)		-	35	58	81	69	71	7[illegible]
7	South Sumatra	32,000	1	71	564	174	810	-	-
	(a) Sub Dinas (%)		1	68	60	26	53	-	-
	(b) Cabang Dinas (%)		-	32	40	74	47	-	-
8	South Kalimantan	9,000	1	13	256	134	177	263	440
	(a) Sub Dinas (%)		1	85	29	7	45	6	[illegible]
	(b) Cabang Dinas (%)		-	15	71	93	55	94	[illegible]
	Total (8 prov.)		11	379	5396	7865	11840	4852	10717
	Total (8 prov. exc 2 and 7)		8	232	3503	3931	5865	4852	10717

Source : Central and provincial Public Work offices

(1) Size of functional sawah area rounded up to nearest thousand, 1989 estimates

(2) PNS : Permanentcivil service staff (candidates included)

(3) PHT : non permanent, non PNS staff employed on project basis

PHL : seasonal laboures

- Last but not least, the turnover of technical and semi-technical PW irrigation schemes up to 500 ha will result in a considerable decrease of staff. Based on an assumed linear relationship between size and operational manpower at the Ranting dinas level, a 25% reduction of Ranting dinas staff may be expected, although in practice the reduction of the overall number of staff will be less than this. For example, the gradual transfer to the provinces of full O&M responsibility for larger systems,i.e. after SM/EOM has been completed, is likely to make up for the reduction.

On balance, through privatization deregulation and removal of some performance constraints, an overall reduction of the staff requirements between 10 and 15 percent may be achieved.

Qualitative aspects

To motivate the staff, first of all the impediments that prevent them from carrying out the tasks in an optimum manner should be removed.

- In relation to the prevailing cost of living, basic salaries at all levels of the government organisation are too low. As a consequence, many officials arrange additional income in primary work environment by participating in projects or consultancy work. Such activities can be beneficial to the performance as long as they are part of or directly related to O&M.

- The field staff, like gate and weir keepers, representing about 75 percent of the entire staff, cannot easily combine a second job with their primary work. Consequently, the performance of their activities is sometimes affected adversely by their absence, or by a high overall work load.

- Another issue is the civil servant status of the employees. Structural changes in irrigation O&M activities in the past (increase of tasks due to upgrading of the systems, extension of PW irrigation area, etc.) have not resulted in an extension of the number of permanently employed staff. Consequently, more non-permanent staff members have been assigned to carry out tasks required. The employment of these non-permanent staff members depends on the annual budget negotiations, and working hours may be limited by financial constraints. Part-time assignment also will not strengthen the identification with the group and a sense of pride in a job well done.

- Some 25 percent of the irrigation O&M staff working at the provincial level are recruited by DGWRD. In the past depending on their status they were either temporarily placed in the province ('diperkerjakan') or transferred to the provincial organisation ('diperbantukan'). Temporary assignments may be advantageous for the organisation in terms of quality control, career development (of permanent staff) and overall flexibility of the work force, but they do not contribute to the staff's sense of belonging to the DPUP. This situation is further reinforced by assigning temporary DPUP staff to APBN financed projects under responsibility of the PW Regional office (Kanwil PU). These temporary assignments should be reduced as much as possible, and a flexible transfer system for key functions between DGWRD and DPUP should be developed.

All these and other issues have been addressed in the Institutional Strengthening Study (1988) and expressed in recommendations for further action. See also Chapter 3, section 3.9.

2.8.4 Staff Training, Irrigation Operation and Maintenance

Substantial training has already been carried out under ISSP-1 and related projects in the ten ISSP-1 provinces (see Table 1.4.1). This has concentrated on Planning and Programming (course PD-1), Construction Supervision for SM and EOM construction (courses CS-2, CS-3) and O&M principles and practise (Courses OP-2, OP-3a, OP-3b). The project preparation team visited a series of provinces and had discussions on training needs with senior PRIS officials and consultants as well as discussions in Jakarta. In these discussions, and from the results of the training needs surveys carried out by the Training Coordination Project there was substantial consistency on what the future training requirements are :

i) Training should be concentrated at Cabang Dinas level and below.

ii) Courses on EOM planning programming and design for Cabang Dinas level staff (Course PD-1 and PD-2).

iii) Courses for staff involved in EOM construction supervision (Course CS-1, CS-2, CS-3).

iv) Refresher courses and follow-ups (Courses RF-1, RF-2).

v) Courses on data management (and computers) for Cabang and PRIS/ Wilayah staff (Course OP-4).

vi) O&M courses for PRIS staff (Course OP-1, OP-2, OP-3a, OP-3b).

These courses are summarised in Appendix B.2. All the course material exists, except for course OP-4 which needs to be developed.

All planning and design, O&M, and construction supervision staff working in incremental EOM areas will be taken as new participants under ISSP-2 to receive full course training; whilst about 30% of post-trained staff under ISSP-1, WJIP, CJIP and EJIP will be given refreshers, owing to limit of available funds.

Training needs and course arrangements for PRIS are assessed based on the levels of staff. Provision of on-the-job training to the staff working in ISSP-1, WJIP, CJIP, and EJIP areas, and incremental areas under ISSP-2 are as summarized in Table 2.8.2. Table 2.8.3 shows the estimated number of participants.

2.8.5 Institutional Strengthening Swamps

The present and proposed government organisation in swamps construction and O&M are described in Chapter 3 and depicted in Figure 3.4.1. Moreover, what has been said in Section 2.8.3 on irrigation would largely apply to swamps. It should however be noticed that this component of the DGWRD, apart from being relatively small area-wise, is the least developed in terms of organisation and staffing. Some further points may be added.

O&M, especially maintenance, in swamp development areas, like South Sumatera, differ from in irrigation areas, such as in Java, in that farmer beneficiaries in wetlands are inclined to underestimate the effects of proper drainage, and hence upkeep of the system, on agricultural productivity. The relationship may be less evident than in irrigated agriculture, where water is supplied and distributed rather than drained off. Irrigation suggests management of a scarce resource and all water users have a vital interest in it. Maintenance of irrigation canals is an accepted prerequisite for effective operation.

Table 2.8.2 ISSP – 2 Staff Training, Irrigation Operation and Maintenance

Level	Training Needs	TRAINING PROVISION					ISSP-2 Training Details			
		EAST JAVA	CENTRAL JAVA	WEST JAVA	ISSP-1	New Provinces	Course Nr	Days	Location	Trainer
PRIS/Wilayah	Planning and Design (SM & EOM)				•	•	PD-1	12	PRIS	A
	Refresher	•	•	•	•		PD-1(RF)	3	PRIS	A
	Construction Supervision, PD	•				•	CS-3	12	PRIS	A
	Operation and Maintenance					•	OP-2	6	Wil/Cabang	A
	Data Management	•	•	•	•	•	OP-4	12	PRIS	A,B
Cabang Dinas (Kep. Cabang Cabang Staff	Planning and Design (SM & EOM)	•	•	•	•	•	PD-2	12	PRIS	A
	Construction Supervision									
	SM (PL & PP, KD or PU)				•	•	CS-2/3	12	Wil/Cabang	A
	EOM (Maintenance Staff)				•	•	CS-2	12	Wil/Cabang	A
	Refresher	•	•	•	•		CS-2/3(RF)	3	Cabang	A
	Operation and Maintenance									
	Principles and Practice	)					) OP-2	6	)	
	Routine Management	) •	(Note 2)		•	•	)		) Cabang	A
	Follow-up,Refresher/Supervision	•	•	•	•		OP-2/3a(RF)	3	Cabang	A
	Data Management	•	•	•	•	•	OP-4	12	PRIS	A,B
Cabang Dinas Pengamat (Note 1)	Operation and Maintenance									
	Principles and Practice	)					) OP-2	6	)	
	Routine Management	) •	(Note 2)		•	•	)		) Cabang	A
	Follow-up,Refresher/Supervision	•	•	•	•		OP-2/3a(RF)	3	Cabang	A
Juru/Mantri KP Staff	Operation and Maintenance									
	Principles and Practise	)					) OP-3a	6	)	
	Practical 2nd Course	) •	•	•	•	•	)		) Ranting	A
	Follow-up,Refresher/Supervision	•	•	•	•		OP-2/3a(RF)	3	Ranting	A
PPA	Operation and Maintenance	•	•	•	•	•	OP-3b	2	Ranting	A
	Refresher	•	•	•	•		OP-3b(RF)	1	Ranting	A
All Levels	Education tours	•	•	•	•	•		various	various	
Senior Staff	Workshops	•	•	•	•	•		various	various	
Training of Trainers	Operation and Maintenance				•	•	OP-1	18	PRIS	B
	Refresher	•	•	•	•		OP-1 (RF)	6	PRIS	B,C
	Construction Supervision	•			•	•	CS-1	18	PRIS	B
	Refresher		•	•	•		CS-1 (RF)	6	PRIS	B,C
	Planning and Design	•			•		PD-3	18	PRIS	B
	Refresher		•	•			PD-3 (RF)	6	PRIS	B,C

Notes : 1. Pengamat attends Cabang Dinas level course, as well as attending Juru course as observer/ trainer.
2. Course partially given in ISSP-1, continue in ISSP-2.
3. Types of trainer
A – PRIS
B – Provincial or regional consultant + senior PRIS staff
C – PRIS Central training team + Provincial or regional consultant (C. and W. Java only)
4. For some courses, particularly O&M, there will be new trainees from new EOM areas in ISSP-2.

Table 2.8.3

Number of Participant

Staff Training, Irrigation, Operation and Maintenance

COURSE	PROVINCE										
	West Sumatera	South Sumatera	Lampung	West Java	Jati-luhur	Central Java	Yogya	East Java	South Sulawesi	Central Sulawesi	Total
Planning and Programming											
PD-1	10	8	7		6		7		28	30	96
PD-1 (RF)	35	22	18	148	19	142	22	247	33		686
PD-2	16	14	16		16		12		36	13	123
PD-3	3	3	3		3		3	8	3	3	29
PD-3 (RF)				8		8					16
Construction Supervision											
CS-1	4	3	3					12	3	8	33
CS-1 (RF)	8	6	6	13	8	12	8		6		67
CS-2	8	7	9				4		30	17	75
CS-3	6	4	4				3		15	11	43
CS-2/3 (RF)	18	6	13	165	15	200	12	280	54	60	823
Operation and Maintenance											
OP-1	3	3	3						3	10	22
OP-1 (RF)	8	6	8	20	16	20	8	32	9		127
OP-2	11	13	22					100	71	28	245
OP-3a	50	31	65	100	107	173	25	270	169	96	1,086
OP-3b	120	75	310	840	350	700	90	500	260	94	3,339
OP-4	16	12	13	54	24	62	11	92	27	10	321
OP-2/3a (RF)	28	17	45	385	35	240	50	600	55		1,455
OP-2/3b (RF)	10	8	20	35	15	120	95	170	24		497
Education Tours	50	50	50	100	50	100	50	100	75	25	650
Workshops (incl. POM)	125	125	100	400	200	400	100	500	150	100	2,200

Note : 1. Course content will vary from province to province
2. All participants numbers must be considered provisional
3. Courses maked (RF) are refreshes

In comparison, in wetlands the farmers are less dependent on system operation at the higher level, and maintenance of drainage canals would appear, to them, less vital. The very lack of clear benefits for good maintenance in swamp development, will have a negative bearing on the discipline required from farmers in drainage operation and maintenance systems.

Government Responsibility for Maintenance

Which maintenance activities are to be carried out under whose responsibility, should be clearly spelled out. In line with common practice in Indonesia, there can be little difference of view as to the fact that MPW, and particularly provincial public works DPUP would be ultimately fully responsible for operation, repair and maintenance of the primary (or navigation) canals, embankments, right-of-way and the secondary water control structures in swamp development areas.

Upon completion of major swamp development construction works, the responsibility for efficient O&M should, as much as possible and as soon as possible, be transferred to PRIS. This is in line with the GOI decentralization policy in the public works sector. It will be crucial that a separate sub-section for Swamps O&M is set up under PRIS. Similarly, the Cabang Dinas Pengairan and its ranting offices will be responsible for implementation coordination and supervision in their respective swamp areas. They will cover all O&M tasks in the main drainage system down to the tertiary level.

Users' Responsibility at Tertiary Level

Simultaneous with strengthening DPUP capability for main system O&M, it is recommended to focus attention on formation and development of an organisational set-up for O&M at the tertiary level.

On-farm works, farm bunds, secondary and tertiary canals, hamlet drains and outlets, and the tertiary structures should eventually be operated and maintained by the beneficiaries of the scheme, i.e. the farmers. As in irrigation, both Pengairan and farmers are to a certain extent interdependent. Failure of either one will have negative effects on the system as a whole.

As regards the field level organisation to be entrusted to the farmers beneficiaries, i.e. the O&M component beyond the direct responsibility of the provincial pengairan, the DPUP input will presumably be of a technical (supervisory, advisory) nature only. Here the organisation and responsible institution will initially be under a MOT (Transmigration)/UPT (transmigration settlement unit) administrative umbrella, but increasingly under that of the desa administration (kades, kadus, RK etc.) so that O&M at the tertiary level will pre-eminently be a community affair at the earliest possible stage. Ultimately, the creation of organisations similar to those in irrigation (WUAs) in charge of drainage O&M will have to be considered.

Proposed O&M Organisation

System maintenance being by far the most significant component at the field level, the single-most functional O&M grouping of farmers may be termed **Tertiary Drainage Group (TDG)**, normally consisting of a limited number of farmers who share the same tertiary drain and thus have the responsibility for its maintenance. In a typical former transmigration area, the 'command area' of such a tertiary would comprise some 4 ha houselots, 16 ha first holding (paddy) and 16 ha second holding (treecrops), i.e. total some 36 ha. Due to the layout of the drainage system, TDGs will comprise 20-30 heads of household (KK, farmers) joining forces on O&M of two tertiaries. The tertiary drainage area they share will be proportionately larger.

The organisation of field level drainage O&M groups (TDG) would be left as much as possible to local authorities, in first instance the UPT or Desa administration. The latter would seem to be best equipped for the job, as the Kepala Desa may effectively call upon his chosen deputies (Kepala Dusun, RW or RK). On the longer run the early active participation by the desa leadership in the development of village level organisation structures like those for drainage purposes will be beneficial. Initially, the TDGs will however be accountable also to the head of the UPT as the MOT field representative.

Operation

Each farmer will be responsible for his quaternary (or field) drains. As these do not have structures of any kind, primarily proper maintenance will be required. The operational responsibility of the TD Groups will be restricted to operation of the stoplogs in the tertiary canal(s) near the outlet to the secondary drains (SDP and SDU). The stoplogs are to be operated by a **log operator** who may either be appointed or contracted by the TDG.

The structures in the secondary drainage canals (SPD/SOU) are considered part of the main system and their operation is a DPUP Pengairan responsibility. A **water controller** (or juru drainasi), comparable to the juru pengairan in irrigation systems, will be in charge of all sliding and flap gates. The juru drainasi will also supervise all TDG-employed log operators.

At the primary (or navigation) canal level a **water guard** (pengairan) will be in charge of all drainage operations within the primary command area comprising a number of settlement units (UPT), or some 40-60 drainage units. All water controllers in the command area will be subordinate to the water guard who, in his turn, will report to the **pengamat** who will be the DPUP Pengairan representative in the drainage system concerned.

Maintenance

Maintenance of the following water courses will be the responsibility of the Tertiary Drainage Group (TDG): the quaternary drains in first and second holdings, the tertiary drains which traverse the area longitudinally, and the secondary drains, i.e the SDU (saluran drainase umum) at the far end of the second holdings, and the SPD (saluran pedesaan) close to the houselots.

Each TDG will be represented by a **contact farmer** who acts as the representative and spokesman for the group. Preferably, this function should coincide with that of chairman of the farming group (kelompok tani) so as to combine the complementary issues land (agriculture) and water (drainage management) as much as possible. It should however be noted that, in swamp areas, the tertiary drainage groups and farming groups do not normally coincide area-wise.

It may also be noted that membership of the TDG will be less voluntary than that of the kelompok tani. Truly effective drainage will be a major factor in both soil conservation and agricultural development and, given the normally huge investments made in swamps schemes, active participation of settler farmers in O&M through the TDGs will therefore be mandatory. Non-participation or poor performance should be penalized by making those concerned foot the bill of contracting the work if necessary.

Block-Level Maintenance

In devising a representative farmers' drainage body at the next higher, i.e. secondary level, it could be practical to follow the settlement/village pattern, rather than the drainage command area. A combination of two adjacent drainage units (often referred to as quarter-blocks) located on the same side of the main village road, and each belonging to a different hydrological unit, would constitute a workable entity. Such 'Consolidated Drainage Units' (CDUs) may comprise a number of TDGs and vary in number for each settlement area. The TDGs within a CDU would jointly elect a CDU committee (CDUC), chaired by the Kepala Desa or his deputy and with 3-5 members from the TDGs concerned.

This organisation, particularly at block level, as well as the manpower requirements need to be worked out in more detail. A further study to this effect, conducted by the Swamps Consultants and covering all swamps development areas under ISSP-2, is recommended.

2.8.6 Water User's Training and Strengthening

The Water User's Training and Strengthening under ISSP-1 comprised two projects (WUTP and WUASP) for Water User's Association (WUA) in larger schemes and one project (PIK) for turnover schemes. These were described in Section 1.4.4. There was further strengthening under the Irrigation Service Fee scheme.

Larger Schemes

For the larger schemes, covered by WUTP and WUASP, there was potentially considerable overlap in the training given and groups covered (see Figure 1.4.1). This was compounded by the ISF programme. For ISSP-2, it is important that the WUA training is rationalised. WUA basically need training in :

- organisational activities
- tertiary level O&M
- agriculture and on-farm water management

Agriculture and on-farm water management will be covered by routine agriculture extension activities by PPL, and is outside the ISSP programme. At present, WUASP and ISF cover organisational activities (in limited kabupatens) and WUTP covers tertiary level O&M (as well as organisational activities in non WUASP/ISF areas). WUTP is much more established than WUASP and ISF. In order to rationalise the WUA training programme, various factors should be considered but, there will be differences between the two scenarios of joint EOM and ISF introduction and later ISF introduction.

Based on discussions with concerned agencies in Jakarta and the provinces the factors should be :

- The majority of training should be aimed at the WUA itself and its members and local government officials most connected with the WUA (i.e. village level officials).
- Preferably there should be only one approach for each scenario, which should use the materials/methods from existing approaches.

- The Dept. of Home Affairs (reference Pres. Ins. 2/84 and Government Regulation 14/87) should have an important role.

- Some form of community organiser is useful in the early stages of WUA development.

- The training should be cost effective.

- Follow-up activities are essential.

- For Scenario 2, the training should be a fore runner to ISF introduction.

- WUA development should be sequenced to main system activities when there is a catalyst for WUA development (e.g. construction and improved water supplies or ISF introduction).

- At village level, there are already extensive training programmes and ISSP programmes should not provide more training inputs than necessary.

- The PPL and juru have considerable existing duties and are from a technical background. The jurus are often of a relatively low education level (primary school).

- The ISF programme will be substantially expanded under ISSP-2.

Based on these factors, the following approaches are proposed for the two Scenarios.

i) Scenario 1, Joint EOM and ISF introduction.

In this scenario the technical training and follow-up would be sequenced closely with the ISF activities. The Dept. of Home Affairs (ISF) would concentrate on information about ISF policy, communicating with the farmers, organisational strengthening, regulations and WUA formation while WUTP would provide technical inputs mainly on tertiary level O&M to the programme through training and follow-up. At present (April 1990), the ISF programme is developing a flow chart of activities for ISF introduction and ideally WUTP activities for any one area would be closely coordinated with their approach (see Appendix C.3). Figure 2.8.3 gives proposals for the proposed strengthening process for Scenario 1. This is very provisional, but generally similar comments as for Scenario 2 apply.

ii) Scenario 2, Later ISF introduction

This would generally follow the existing WUTP approach for the initial training and follow-up, when the WUA organisation would be strengthened but not necessarily leading to a formal organisation. Later at the time of the ISF programme the WUA organisation would be further strengthened. In the initial training technical guidance in tertiary level O&M and related activities would be given as well as an introduction to ISF principles.

Water User Strengthening Activities for ISSP-2 Scenario 1 - Joint EOM and ISF introduction

Figure 2.8.3

Strengthening process :

1. Initial Strengthening

Trainees	Training Type	Trainer	Duration
A1/A2 PU staff and related organisations	Expose	Joint WUTP /ISF	1 day
A1 : Provincial level officials	Introductory Workshop	Joint WUTP /ISF	3 days
A2 : Kabupaten level officials	Introductory Workshop	Joint WUTP /ISF	3 days
Irrigation Committees and BAMUS	Course/Workshop	WUTP/ISF	5 days
Instructor Training	Course	WUTP	18 days
B1 : Camat level officials	Introductory Course	WUTP/ISF	3 days
B2 : Village level officials	Introductory Course	WUTP/ISF	6 days
KPL (from group B2)	Practical Course - technical	WUTP	12 days
C WUA organisers + key farmers etc.	Practical course technical.	WUTP	15 days
CO (ISF)	Practical course - organisational and facilitator techniques	ISF	6 days
WUA/farmers	Organisational Strengthening	CO (ISF)	on-going

2. Follow-up

WUA/farmers	Practical-field - technical	KPL	5 times/yr
WUA/farmers	Organisational	CO (ISK)	

Notes :
1. CO (ISK) - community organiser, - agent of Home Affairs.
2. KPL - comprises village level officials - head of village, PPL, juru, woman's representative.
3. In addition, there would be training of trainers at provincial level.

Figure 2.8.4 gives proposals for the proposed strengthening process for Scenario 2. This is based on the present WUTP approach with the following changes :

- B1 : B2 level training is mainly introductory and only the KPL from that group have complete training to prepare them for the follow-up activities.

- KPL training would be more field based. The KPL team would also include a women's /youth's representative.

- A community organiser would be trained to facilitate the follow-up activities carried out by the KPL team. This training would be carried out by the Dept. of Home Affairs.

- The follow-up activities would be extended, initial follow-up, seven times in 1.5 years would be part of WUTP, subsequent follow-up five times per year would be through the Dept. of Home Affairs

- All training would be made as practical as possible with a minimum of classroom activities, except for introductory A1, A2 and B1, B2 training.

- The impact of the training would be monitored using standard forms during the training and follow-up period.

The water user's training for large schemes is a very important component of ISSP-2. During the Preparation Period, it has not been possible to study this aspect in much detail in the brief time available. It is proposed that a short review of all WUA training is carried out at the beginning of ISSP-2 and proposals made on how all the programmes should be integrated into a coordinated programme. This would be presented in the Training Component Inception Report. Continuation of the WUASP programme is contingent upon review of the results of the ongoing evaluation by Consultants for the Netherlands Government; these are due by August 1990. Due to the strong involvement of ISF in WUA organisation, continuation of the WUASP programme may not be justified.

To support the water user's training, further facilities will be required. These would include

- more tertiary demonstration units, which should wherever possible be located at the Advanced Operation Units.

- training facilities in existing ISSP-1 and new ISSP-2 provinces.

- mobile training units.

For ISSP-2, there will be water user training in each of the SM/EOM provinces. Table 2.8.4 presents an estimate of the number of trainees for each course under the WUTP component.

Target groups of training under ISSP-2 are the same as under ISSP-1; plus WUA motivator (Juru) group in the areas where WUAs are to be formed or under formation. (Details of target groups are attached). Target Groups A and B are proposed for in addition to new EOM areas also the Kabupaten (Regencies) in the ISSP-1 areas for maintaining the momentum of local governments to the continuous development of WUAs. Group C and follow-up training are proposed for 20% of target people. WUA Motivators (WM) are required for establishment of WUA's. Estimated number of WM to be trained will be 50% of field irrigation staff.

Water User Strengthening Activities for ISSP-2 Scenario-2, later ISF introduction

Figure 2.8.4

Strengthening process :

1. Initial Strengthening

Trainees	Training Type	Trainer	Duration
A1/A2 PU staff and related organisations	Expose	WUTP/ISF	1 day
A1 : Provincial level officials	Introductory Workshop	WUTP/ISF	3 days
A2 : Kabupaten level officials	Introductory Workshop	WUTP/ISF	3 days
Irrigation Committees	Course/Workshop	WUTP	5 days
Instructor Training	Course	WUTP	18 days
B1 : Camat level officials	Introductory Course	WUTP	3 days
B2 : Village level officials	Introductory Course	WUTP	6 days
KPL (from group B2)	Practical course - organisation and technical course and practical	WUTP	12 days
CO (see note 1)	Practical course - organisational and facilitator tecniques	Home affairs	6 days
C WUA organisers + key farmers etc.	Practical course - organisation and technical.	WUTP	15 days

2. Follow-up

WUA/farmers	Practical-field - organisation and technical	CO + KPL	5 times/yr

Note : Initially thrugh WUTP, then transferred to Home affairs.

3. ISF Introduction

WUA farmers	Practical-field organisational Strengthening.	CO(ISF)

Notes :
1. CO - community organiser, most likely an agent of home affairs, similar to ISF community organiser.
2. KPL - comprises village level officials - head of village, PPL, juru, woman's representative.
3. In addition, there would be training of trainers at provincial level.
4. For all levels training, ISF principles will be introduced.

Table 2.8.4 Number of Participants – WUA Training – Larger Schemes

TARGET GROUP	DESCRIPTION	NO OF PARTICIPANTS
Group A	1 New Prov. x 2 times/year x 3 years 40 participants 9 Old Prov. x 1 times/year x 3 years 40 participants	1,320
Instructors (I)	1 New Prov. = 3 Districts x 10 participants = 30 9 New Prov. = 137 Districts x 2 participants = 274	304
Group B + Field Adv. Group	New EOM Area = (811,687 ha x 6 participants) / 750 ha	6,500
WUA motivators (W.M.)	New EOM Area = (811,687 ha x 1 member x 50 %) / 750 ha	540
Group C	New EOM Area = (811,687 ha x 5 participants x 20 %) / 100 ha	8,120
Follow-up	New EOM Area = (811,687 ha x 5 participants x 20 %) / 100 ha	8,120
Officials	1 New Prov. = 1 x 13 participants = 13 9 Old Prov. = 9 x 3 participants = 27	40

New Province : C Sulawesi
Old Provinces : W Sumatera,S Sumatera,Lampung,W Java,C Java,D.I.Yogyakarta,E Java, S Sulawesi + Jatilunur

Turnover of Small Schemes

For the turnover programme it is proposed that the present approach should be followed, which has been successful. However the Ministry of Home Affairs should be more involved in a supporting role through assisting with the training, liaising with government officials and guidance to the water user associations and TP4 on organisational matters, both prior to and after turnover. Due to the inherent differences between farmer managed small schemes in the turnover programme and the larger schemes discussed above, it is felt that the involvement of WUTP is not justified and O&M should be developed through the TP4 and subsequent follow-up. If the TP4s need further advice, this can be obtained through the Ranting Dinas or Cabang Dinas offices of PRIS.

Table 2.8.5 presents an estimate of the number of trainees for training of instructors and TP4 training.

Irrigation Committees

Irrigation Committees have been established at two levels, provincial (PIC), and Kabupaten (KIC). On these committees the relevant officials of Public Works, Agriculture, Home Affairs and, as required, other sectors meet on a regular basis. The Irrigation Committees provide a forum for discussion and consultation between agencies. The PIC, chaired by the Governor, is in most provinces not very active, due to the already considerable inter-agency coordination and consultation at this level. The KIC, chaired by the Bupati, is more important and their duties include preparing policy decisions for irrigation development and discussion and agreement on cropping patterns, planting dates and irrigation scheduling in the Kabupaten, as well as guidance to farmers. The KIC at present in some cases are not totally fulfilling their duties and need further strengthening. It will be important that groups of water user associations are represented on the committees to reflect their new importance and that there is good cooperation with the Provincial Coordinating Committees.

At present, KIC already receive certain training activities through the WUTP programme, Groups A and B, but it is felt that additional training is required particularly in :

- irrigation development
- agricultural development
- organisation techniques of the committee
- legislation geared at committee activities
- guidance of water user's associations.

It is envisaged that a 5 day course/workshop would be run at the WUTP training centres, conducted by special training instructors. Under ISSP-2 about 500 members would be trained. Follow-up guidance would be provided by WUTP, if required.

WUA Strengthening and ISF

Viable and active water users organisations.are invariably referred to as indispensable field level institutions and for the past decade a great deal of effort has been given to the formation and strengthening of WUAs. The overall result of these efforts, measured by the level of activity, is on a country-wide basis so far rather disappointing.

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Table 2.8.5

Number of Participants– WUA Training – Turnover Schemes

COURSE	PROVINCE									
	West Sumatera	South Sumatera	Lampung	West Java	Central Java	Yogya	East Java	South Sulawesi	Jatiluhur	Total
Training of Instructors										20
TP4 Training (all 4 parts)	96	8	12	96	152	16	133	11	36	560

Note : Assumes 1 TP4 per 250 Ha, based on total design hectarages for each province.

It should be recognized, that farmers and water users can and do organise themselves whenever they feel this is beneficial to them. One strong motivation in development of WUAs is the introduction of ISF.

From the government and ISF project point of view, the existence of strong WUAs is a necessity. Without them, ISF is simply not possible and the programme is certain to be a failure. At the time ISF is introduced in an area, the WUAs in that area will have been formed, or activated, tertiary unit based, registered by the Bupati, and trained. Training in this connection meaning thorough familiarization with the ISF service concept requirements: system walk-through, service agreement, procedures, administration, accounting, etc.

From the farmers' point of view, the extra ingredient in the ISF approach that induces interest and cooperation, is that, since they share the same irrigation system, all have a common interest in improving main system irrigation services which directly affect agricultural performance. That is why, all farmer water users in an ISF system want to and have to participate in the programme and the training that comes with it. The WUAs, revitalized by the same concept, will see to this full participation of their members. No user will be allowed to deny his share in the collective responsibility for O&M of the system from which he draws water for one or more seasons. By cultivating a plot he is entitled to the service and liable to pay a fee for it. The WUA concerned will ensure that all users are fully familiar with the ISF concept and their inherent rights and duties. The (near) 100 percent collection efficiency achieved to date in ISF pilot areas, indicates that this basic awareness, and acceptance, has actually been attained.

2.9 Management Information System

Present Situation

Under ISSP-1 a management information system was developed for monitoring the financial and physical progress of construction contracts. The system was implemented in INTAL in DGWRD at the centre and in PRIS in two pilot provinces (C Java and Lampung). The system was developed as a data base application using Paradox, by local consultants. The contract is substantially complete but there are still some problems with the application, of which the most serious is how to monitor multiyear contracts and over year extensions (luncuran), because the DIP number which is used to track contracts may change from year to year. There are also some problems with the monitoring of some Special Projects which are administered directly by DGWRD centrally.

There have also been some technical problems with the software, perhaps caused by lack of experience with Paradox. Paradox was selected because, at the time of development, it appeared to be easier to learn and faster than other similar databases such as DBase 3 Plus. However there is now a considerable number of Indonesians with extensive Dbase application development experience and compilers are available which enable the programme to run faster. MPW therefore wish to convert the application to Dbase, whilst ironing out the few remaining problems during 1990/91. This will have the advantage of making it easier to find experienced staff to improve the application and experienced trainers to install the system and train operators. It will also help with standardisation as several other similar monitoring applications in use in Bina Marga and Cipta Karya are written using DBase. However it may also lead to delays if problems arise in making the conversion.

Once the application has been revised the plan is to introduce the system to the provinces of N Sumatera, W Sumatera, S Sumatera, W Java, Yogyakarta, E Java, S Sulawesi and NTB during 1990/91. Two teams of trainers selected from MPW staff will visit these provinces to install the application, train staff and make follow-up visits during 1990/91.

MIS in ISSP-2

The focus of the MIS system in ISSP-2 would be to provide monitoring information in the provinces which PRIS needs. Only if this is achieved will PRIS staff have the incentive to enter data accurately and on-time. By installing the system in more provinces during 1990/91, a start has been made to achieve this. The ISSP-2 programme will build on what has been done already and consolidate and improve the programme. It will include W. Sumatra, S. Sumatra, Lampung, W. Java, Yogyakarta, C. Java, E. Java, C. Sulawesi and S. Sulawesi. The programme cannot be determined in detail at this stage because it depends on the progress achieved over the next year.

During the first three months of ISSP-2, a review of the present situation should be made to see what progress has been achieved with implementation and extension of the system during 1990/91. Particularly attention should be paid to information flows and information requirements (who gets what, when and how often). The Institutional Development and Training Project (IDTP) will have been in progress for a year by the time of the review and the recommendations from the MIS and Planning Components should also be taken into account during the review. The review would be made by foreign and local Consultants in the central consultants team for irrigation under DOI-I.

In support of the existing MIS system, it was proposed by the IBRD pre-appraisal mission that a project monitoring (CPM) system based on proprietary Software be introduced on a pilot basin in two provinces in Java. The system would compare planned and actual progress of

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planning, design, construction and preparation for O&M on irrigation systems in the SM programme. The details of implementation again depend to some extent on the initial findings of IDTP. It is therefore proposed that the details of implementing the CPM system are confirmed and the pilot provinces selected during the above mentioned review.

The output from the review would be a detailed plan and schedule for the continued implementation and expansion of the MIS, including the introduction of a project monitoring system in two provinces, together with details of costs and support required to achieve this programme. It is envisaged that the support needed will consist of financial assistance for further training, for the supply of computer consumables and possibly local consultants to provide further assistance with implementation, if the system operating problems have not been ironed out. The training would be done by PRIS and DGWRD staff familiar with database applications and the system application. Assistance would be given as necessary by the irrigation component regional consultants. Training and other support is planned to continue for one year in the provinces where the MIS is already established, for two years in the provinces where it is being established in 1990/91 and for three years in the provinces where MIS will be introduced under ISSP-2.

The institutionalisation of routine transfers of data between the Centre and the Provinces, the coordination and sharing of data, software and hardware are issues to be addressed in IDTP. Depending on the achievements of IDTP, further support in this vital area may also be required. Costs for training and computer consumables are estimated in Chapter 4.

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2.10 The Role of Women in Irrigation System Operation Maintenance

In most regions of Indonesia women play a prominent part in irrigated agriculture. There are large regional variations in the jobs women do as a result of diverse social customs, however wherever rice is grown, on farm activities such as transplanting of rice seedlings, weeding and hoeing are almost exclusively done by women. Harvesting of paddy was also mainly done by women in many parts of Indonesia, although this situation is changing as traditional methods of harvesting are replaced by gangs of mainly male contract harvesters. On farm work not normally done by women includes land preparation, ploughing and application of fertiliser and pesticides. Women also play a large part in the marketing of crops and are also involved, to some extent, in farm management decisions about what should be grown, what should be sold for cash and what should be kept for home consumption or as reserves.

On farm water distribution and maintenance of farm channels is done mainly by men in Java and most other parts of Indonesia. Women are therefore rarely represented in Water Users Associations (WUAs) although they may influence decisions behind the scenes.

Irrigation system operation and maintenance by PRIS is almost entirely done by men. There are few, if any, female Juru Pengairan and Kepala Cabang Dinas. There are some female engineers in the Ministry of Public Works (probably as a percentage of total engineers employed more than in many equivalent institutions in developed countries).

In order to raise public awareness of the important role women have in irrigated agriculture, the actual activities done at present by women in different regions should be identified and quantified using empirical data collected in the field. Once this has been done, ways of improving the contribution women make to irrigated agriculture, through the exchange of ideas between women's groups, training and workshops, can be devised. Policies and objectives for the employment of men and women in agriculture also need to be formulated. Whilst at present the under use or inefficient use of women is a waste of human resources, the national economy will only benefit financially from the improved employment of women in agriculture if overall productivity is increased. This would require off-farm employment opportunities to be generated for the men and women no longer required for agricultural work.

As a first step a socio-economic study is required to identify the present role of women in irrigated agriculture and to assess their potential role in the future. The study would formulate ways and means to promote the more active and effective participation of women in all aspects of irrigation operation and maintenance. It would also investigate the effects of improved operation and maintenance of irrigation systems on women and examine whether changes should be made to diminish any undesirable consequences. It would also propose ways to provide for more active participation of women in WUAs, irrigation committees and other institutions concerned with irrigation. It would also suggest means for increasing public awareness of the importance of women in irrigated agriculture.

The study would be conducted in sample areas representing different agricultural practises and cultural customs. A review of existing research and publications should be made, depending on the information presently available, a preliminary study might be necessary to identify the number and location of appropriate sample areas and confirm the detailed terms of reference for the main study. Attention would be focused on the prevailing division of labour between the sexes, the participation of women in past and ongoing irrigation project activities and factors influencing this participation. The following issues would be addressed in each sample area:

- the participation of rural women in the planning and decision making associated with irrigated agriculture;

- access of women to agricultural land, inputs, extension and credit;

- the acceptability of women as farmers and water users to be members of WUAs and other institutions involved in irrigated agriculture;

- differentials between women and men in formal education, wage levels and other income;

- attitudes of women and men towards the increased and more effective involvement of women in irrigated agriculture;

- raising the awareness of men and women in general and members of PRIS in particular, that women constitute a significant and valuable human resource;

- appropriate ways and means by which the participation of women in all aspects of irrigation can be improved (e.g. training, workshops, extension etc.);

- methods of involving existing village institutions in developing the role of women in irrigated agriculture.

This study would be a major task because of the wide range of activities to be covered and the many regional variations in the role of women in society and in agriculture in particular. It is considered that this is not really appropriate for ISSP-2 in view of the limited funds and the desire to restrict technical assistance inputs. Consideration should be given to encouraging a bilateral or non governmental aid agency to support such a study in sample areas in all or some of the ten provinces where the ISSP-2 irrigation component will be implemented.

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CHAPTER 3

PROJECT IMPLEMENTATION

3.1 General

3.1.1 Overall Project Organisation

ISSP-2 will be implemented in 12 provinces and Jatiluhur and will involve the Ministry of Public Works, the Ministry of Home Affairs and the Ministry of Finance. Successful cooperation and coordination between these ministries and between the Centre and the provinces will have a most important bearing on the success of the project. The overall organisation of the project will be broadly similar to that setup for ISSP-1, although some changes in the organisation of the various consultancies is proposed.

The principal Executing Agency responsible for project implementation will be the Directorate General of Water Resources (DGWRD) within the Ministry of Public Works. DGWRD has already had extensive experience implementing similar integrated sub-sector projects, including, inter alia, ISSP-1, TISP and IISP.

Several Directorates will be responsible for project implementation, supervision and coordination within the Directorate General of Water Resources. The Directorates concerned will include the Directorates of Irrigation (DOI-I and DOI-II), for the irrigation and groundwater components; Directorate of Swamps (DOS) for the swamps components; Directorate of Rivers (DOR) for the rivers component; and Directorate of Planning (Bina Program) for coordination and planning. It should be noted that as a result of restructuring of the roles of DOI-I and DOI-II, only the groundwater component will involve DOI-II.

In the Ministry of Home Affairs, the Directorate General for Public Administration and Regional Authority (DGPUOD) will continue to be responsible for the implementation of the programme for the introduction and collection of irrigation service fees. In the Ministry of Finance the Directorate General for Taxation (DG Pajak) through its Directorate of Property Tax will continue to be responsible for the classification and re-valuation programme in connection with PBB tax collection.

The Project Steering Committee, chaired by BAPPENAS and comprising representatives from the concerned Ministries, which was formed for ISSP-1 will continue to provide overall policy guidance and coordination. The secretariat to the project Steering Committee and the five Working Groups for Transmigration, Institutional Strengthening, O&M, Turnover and Mapping setup under ISSP-1 will also continue to function as before during the initial stages of ISSP-2. However their role should be reviewed during the inception stage and modified as necessary. In order to streamline and improve policy guidance and interagency coordination of the overall national EOM and ISF programmes, it is suggested that the same Steering Committee and Working Groups deal with both ISSP-2, TISP, IISP and any other similar projects which may be taken up by IBRD, ADB or other agencies providing foreign assistance.

Overall coordination and review of project implementation will be provided by the Project Coordinating Unit led by a Project Coordinator who is a senior officer from DGWRD. This post, established under ISSP-1, is at present held by the Director, Bina Program. The Project Coordinating Unit will be assisted by General Coordination Consultants consisting of a small team of senior highly experienced foreign and local consultants. Details of this team are given in Section 3.1.2. Arrangements should be made to integrate both the Project Coordinating Unit and the General Coordination Consultants with the similar coordinating group dealing with the

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ADB supported TISP and IISP projects. It is also proposed the General Coordination Consultants deal with the coordinating of all IBRD projects in the irrigation sub sector rather than ISSP-2 alone. A Deputy Project Coordinator working full time in the Project Coordinating Unit with the General Coordination Consultants would strengthen the coordination and management of the ISSP and other similar programmes.

The project is primarily a provincial or regional project and, in keeping with government policy for decentralisation, most of the implementation activities will be done in the provinces using the existing provincial institutions. The general organisation and arrangements for coordination will be similar to those adopted for ISSP-1. Coordination at the provincial level will be through the existing Provincial Irrigation Committee and coordination at district level through the District Irrigation Committee chaired by the Bupati.

In order to strengthen the involvement of the provinces in the project, the consultancy services for the irrigation component will be organised, to some extent, in a different way to ISSP-1. Regional teams of consultants will be established who will deal with all aspects of the irrigation component. A small consultancy team will also be provided at the Centre to give specialist advice on O&M to DOI I and help them to supervise and coordinate technically the work being done in the provinces by the regional teams.

The detailed arrangements of the organisation and consultants for each component are described in Sections 3.2 to 3.8 below. The overall organisation of the project is shown in Figure 3.1.1.

3.1.2 General Coordination Consultants

A team of experienced consultants is required at the Centre to assist the Project Coordinating Unit. Their duties will be to advise and assist DGWRD in planning, budgeting, coordinating and monitoring all aspects of the project. They will also prepare Quarterly Progress Reports for submission to the Steering Committee and IBRD. As mentioned above, it would be preferable if the Project Coordinating Unit and the General Coordinating Consultants can be integrated into the coordinating unit for the similar ADB projects. If this is not possible then part of their duties should include liaison and coordination with the coordinating unit for similar ADB projects such as TISP and IISP.

The team will include the expertise shown in Table 3.1.1.

Table 3.1.1 Consultants for General Coordination

	Foreign		Local	
	No.	mm	No.	mm
Team Leader / Planning Specialist	1	24	0	0
Programming Budgeting, Accounts Spec.	0	0	1	48
Institutional Adviser	1	24	0	0
Total	**2**	**48**	**1**	**48**

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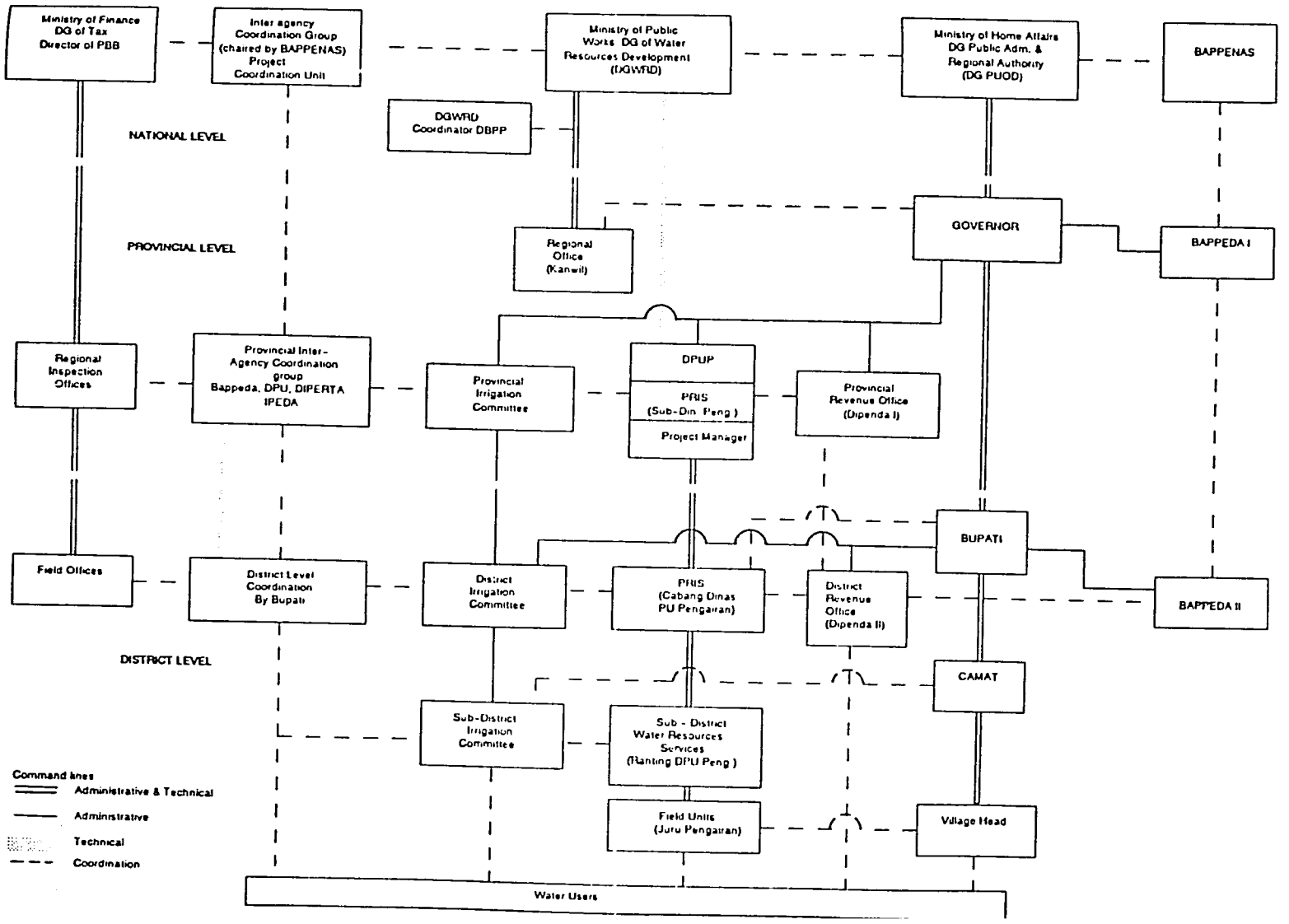
INDONESIA
IRRIGATION SUBSECTOR PROJECT (ISSP – 2)
Organisational Arrangements for Project Implementation

Figure 3.1.1



3.1.3 Overall Planning and Review

An Inception Report should be prepared for the project, confirming the implementation programme and scope of each component. This report should be prepared within three months of the start of the project. A Mid Term Review should also be prepared at the end of year 2 of the project. This review will compare planned and actual progress and plan the work to be done during the last two years of the project. The review will also identify the steps necessary to ensure a smooth transition from ISSP-2 to ISSP-3.

3.1.4 Action Plan

An Action Plan for the project was prepared at an inter-departmental meeting held on 27 and 28 August and is presented in Appendix G.

Implementation of the objectives formulated in the Action Plan of the Institutional Strengthening Study under ISSP1 requires continued strong guidance by a group of responsible staff under the direct authority of the Director General of the Water Resources Development Department, or his assistant the Secretary of DGWRD. The functional group proposed to be formed for purpose is described in Appendix G. A detailed action plan for this functional group is also presented.

3.2 Surface Irrigation

3.2.1 Organisation

The irrigation component of ISSP-2 will be implemented under DGWRD through DOI-I who are responsible for providing guidance and supervision to ensure that the technical standard of the works implemented is satisfactory. Implementation in the provinces is directly supervised through the Provincial and District Irrigation Services using their existing organisation. The organisation diagram is shown in Figure 3.2.1.

Designs for special maintenance are mainly done by local consultants under sub-contracts, though in some cases designs may be done directly by PRIS staff where there is spare capacity available. Construction for upgrading and special maintenance is done by contractors with the work supervised by Cabang Dinas and Ranting staff.

Maintenance work done as part of EOM will usually be identified and carried out by the normal maintenance gangs under the supervision of Pengamats and Jurus. In some cases where more difficult work is required the work may be done by contractors.

Designs for additional special maintenance (SM2 and SM3) are expected to be mainly completed before ISSP-2 begins. The construction work will normally be done by contract, but may be done by the maintenance gangs if the physical work required is small and of a routine nature. Where the additional special maintenance consists mainly of preparation of plans of operation and maintenance, system maps and schematics, this may be done by local consultants with support from District Irrigation Service staff.

3.2.2 Implementation Schedule

Sequencing of Activities

As mentioned in Chapter 1, ISSP-1 experienced some difficulties in achieving effective coordination of the various activities so that the optimum sequencing of development was obtained. Now that the activities required to achieve introduction of EOM and ISF are better understood and more clearly specified, proper sequencing should be less of a problem in ISSP-2. Furthermore the use of regional consultants dealing with all aspects of irrigation should help to reduce the chances of problems arising from the coordination of (for example) training and introduction of EOM.

In order to guard against unsuitable DIs being put up for special maintenance or efficient operation and maintenance, it is proposed to introduce checks into the development sequence.

During special maintenance the following activities should be completed:

- preparation of the Plan of Operation (POM);
- establishment of O&M organisation where necessary;
- recruitment of O&M staff where necessary;
- training O&M staff where necessary;
- establishment and training of WUAs if necessary;
- preparing a needs based budget (NBB);

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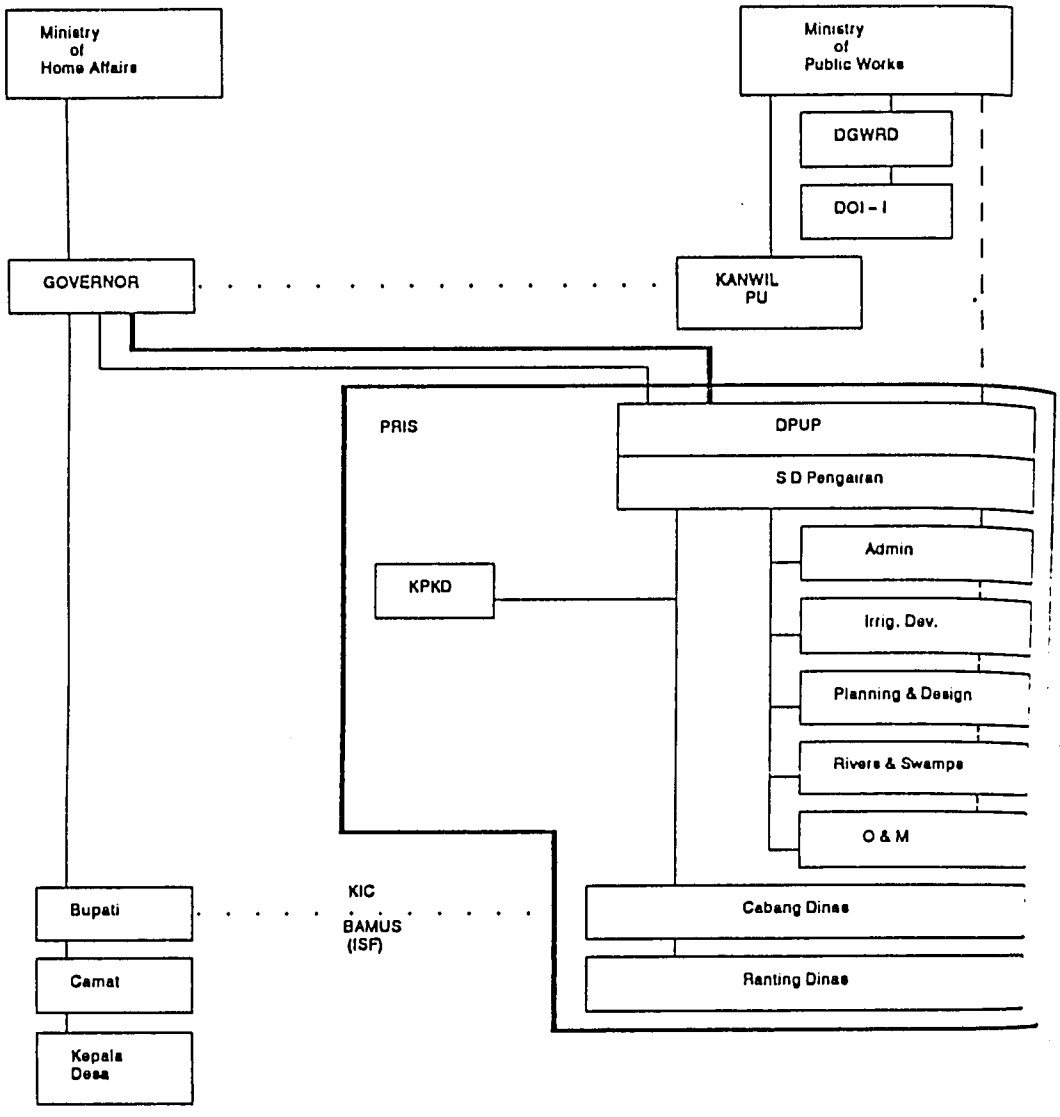
Organization for Irrigation Component

Figure 3.2.1



Command

Administrative responsibility

Technical supervision and guidance

Consultation, coordination

Note : Organization of PRIS varies from Province to Province

- securing O&M funds if provision does not exist yet;
- completion of any other O&M supporting requirements;
- procurement of any addition O&M equipment required.

On completion of special maintenance the proper execution and completion of these activities should be checked and certified by PRIS staff and the regional consultants. Construction quality has often been unsatisfactory in the past. The reasons for this include the award of contracts to inexperienced contractors and inadequate construction supervision. The regional consultants should advise and assist PRIS in supervising construction and should review the quality of special maintenance work as part of the certification process. Only after this certification process may the DI proceed into the IBRD supported EOM programme. If the DI fails the certification process, it would be subjected to PROM/EOM for one year during which remedial action would be taken.

All DIs entering the programme for efficient operation and maintenance from special projects, other than PIADP, would be subjected to PROM/DEOM for one year. During this intermediate year the outstanding items in the above check list would be completed and any outstanding remedial or clean-up work required would be done. In most cases the work required would not affect the entire irrigation system, it is therefore proposed that the DI would enter GOI's efficient operation and maintenance programme at the beginning of the year. However it would not enter the IBRD supported DEOM programme until it had been certified as ready for efficient operation and maintenance by satisfying most of the listed activities as described above. Provision has been made within PIADP for PROM activities to be completed as part of that project, it is therefore assumed that ex PIADP DIs would not need a further PROM period before entering the DEOM programme under ISSP-2. However certification should be done to ensure that the activities listed above have been completed.

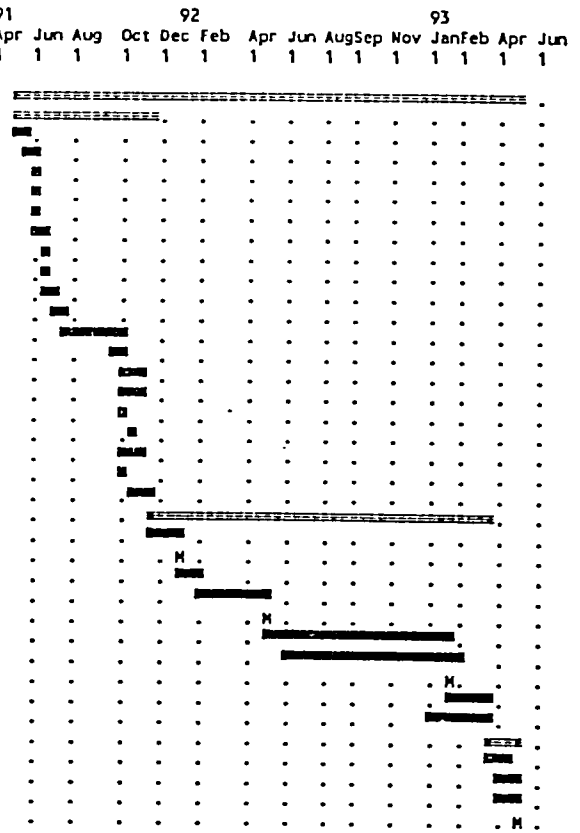
Bar charts showing the activities required for special maintenance on a typical DI are shown in Figure 3.2.2. The allocation of activities between DOI-I and PRIS is shown in Figure 3.2.3.

Implementation Programme

One of the objectives of ISSP-2 is to get as large an area as possible successfully into the EOM programme by the end of March 1995. Repelita V finishes at the end of March 1994 and the Government's target is to have some 2.157 million ha of irrigation (excluding swamp development) under EOM by then. Assuming that under the ADB supported EOM programme, some 100,000 ha enter EOM from TISP and a further 107,000 enter EOM from IISP by the end of Repelita V, a target of 1.9 million ha under EOM should be aimed at being achieved under ISSP-2 by end March 1994. The total area under EOM at the end of 1990/91 is expected to be 1.107 million ha of which 0.988 million ha is in ISSP-1. The additional target area to be introduced into EOM if possible under ISSP-2 from special maintenance or special projects is therefore about 0.9 million ha.

During the preparatory period and first two years of ISSP-1 some 603,000 ha of SM was designed, equivalent to 201,000 ha per year, as shown in Table 3.2.1. The same table also shows that about 400,000 ha of SM was constructed during the first three years of ISSP-1, averaging 133,000 ha per year. However 90% of the total area was constructed in the first two years and 250,000 ha was implemented in the second year. The annual design and construction rates varied from province to province, as well as from year to year. Based on the rates of implementation in Table 3.2.1, and discussions with DOI-I staff and their consultants and taking account of the experience gained in ISSP-2, the rates given in Table 3.2.2 below are considered reasonable estimates of the annual implementation capacities of each Province.

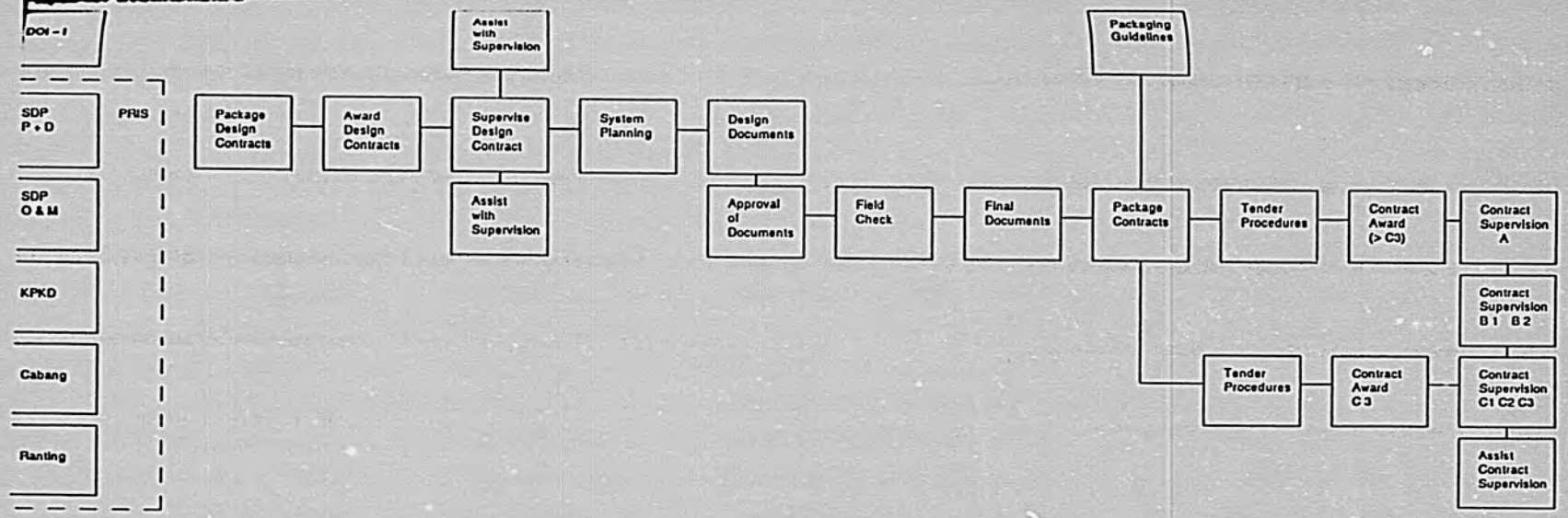
Task Name	Start Date	End Date	Duratn (Days)
Special Maintenance for a DI	1-May-91	30-Apr-93	731
Planning and Design	1-May-91	17-Nov-91	201
Collect available data	1-May-91	21-May-91	21
Review available data	15-May-91	29-May-91	15
Inspect DI in field	30-May-91	4-Jun-91	6
Discuss DI with O&M staff	30-May-91	4-Jun-91	6
Discuss DI with water users	30-May-91	4-Jun-91	6
Identify system constraints	5-Jun-91	10-Jun-91	6
Propose system improvements	11-Jun-91	16-Jun-91	6
Discuss proposals in field	11-Jun-91	16-Jun-91	6
Prepare revised system layout	17-Jun-91	7-Jul-91	21
Prepare system planning note	24-Jun-91	14-Jul-91	21
Prepare designs & drawings	15-Jul-91	7-Oct-91	85
Prepare maintenance plan	17-Sep-91	7-Oct-91	21
Establish O&M force	8-Oct-91	6-Nov-91	30
Prepare Needs Based Budget NBB	8-Oct-91	28-Oct-91	21
Agree changes in the field	8-Oct-91	13-Oct-91	6
Specify O&M equipment etc reqd	14-Oct-91	23-Oct-91	10
Prepare tender documents	10-Oct-91	30-Oct-91	21
Prepare Cost Estimate	1-Oct-91	7-Oct-91	7
Prepare POM	19-Oct-91	17-Nov-91	30
Construction	18-Nov-91	26-Mar-93	495
Invite Tenders	18-Nov-91	29-Dec-91	42
Tenders Opened	30-Dec-91	30-Dec-91	0
Evaluate Tenders	30-Dec-91	26-Jan-92	28
Approve evaluation of Tenders	27-Jan-92	30-Apr-92	95
Award Contract	1-May-92	1-May-92	0
Construct works	1-May-92	25-Jan-93	270
Establish WUAs	31-May-92	4-Feb-93	250
Works substantially complete	26-Jan-93	26-Jan-93	0
Maintenance Period	26-Jan-93	26-Mar-93	60
Prepare As-Built Drawings	27-Dec-92	26-Mar-93	90
Certification for EOM	27-Mar-93	30-Apr-93	35
Finalise NBB, POM, Schematics	27-Mar-93	25-Apr-93	30
Establish O&M budget	1-Apr-93	30-Apr-93	30
Review DI readiness for EOM	1-Apr-93	30-Apr-93	30
Certify system ready for EOM	1-May-93	1-May-93	0



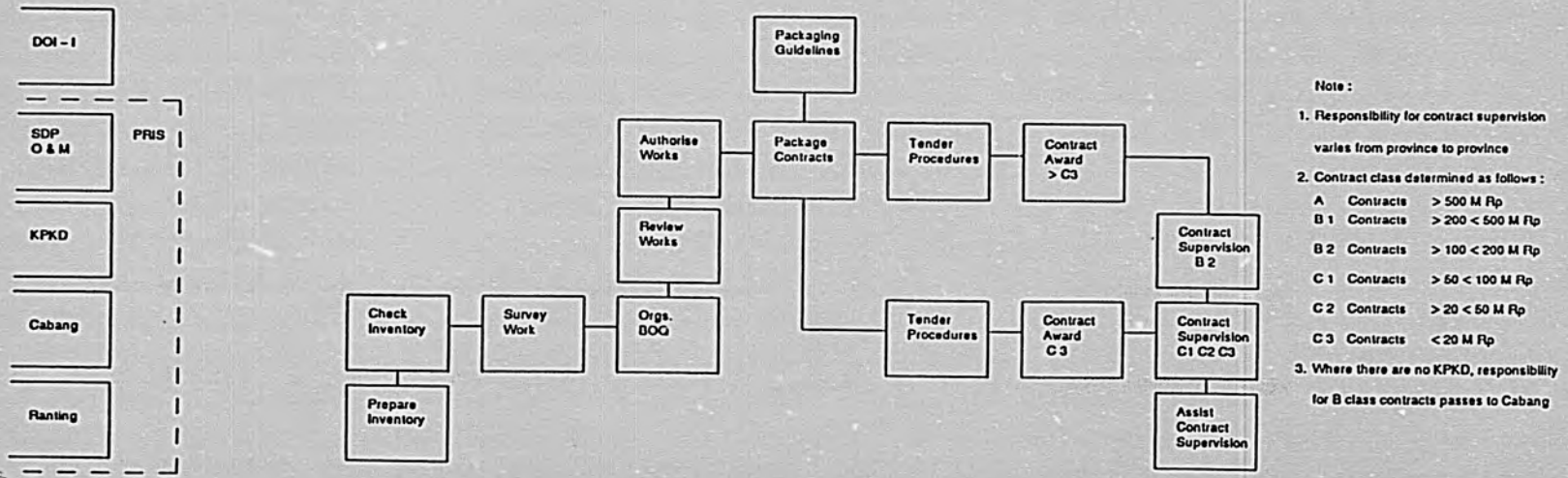
Special Maintenance Activities for a Typical D.I.

Figure 3.2.2

Allocation of Tasks



EOM Construction



Note :

1. Responsibility for contract supervision varies from province to province
2. Contract class determined as follows :

A	Contracts	> 500 M Rp
B 1	Contracts	> 200 < 500 M Rp
B 2	Contracts	> 100 < 200 M Rp
C 1	Contracts	> 50 < 100 M Rp
C 2	Contracts	> 20 < 50 M Rp
C 3	Contracts	< 20 M Rp

3. Where there are no KPKD, responsibility for B class contracts passes to Cabang

Figure 3.2.3

Table 3.2.1 ISSP – 1 Implementation (ha)

Province	Preparatory Period	87/88	88/89	89/90	Planned 90/91	Total
Special Maintenance Design						
West Sumatera	5,983	6,878	8,141			21,00[illegible]
South Sumatera	5,450	15,053	6,487			26,99[illegible]
Lampung	7,602	4,367	5,000			16,96[illegible]
West Java	14,917	54,684	21,099			90,70[illegible]
Jatiluhur	14,971	45,824	31,097			91,89[illegible]
Central Java	28,527	43,085	33,294	13,711	9,155	127,77[illegible]
DI Yogyakarta	5,423	10,565	5,686			21,67[illegible]
East Java	28,287	41,843	55,771		8,107	134,00[illegible]
West Nusa Tenggara	5,425	9,888	5,486			20,79[illegible]
South Sulawesi	15,384	33,242	33,691		2,184	84,50[illegible]
Total	131,969	265,429	205,752	13,711	19,446	636,3[illegible]
Special Maintenance Construction						
West Sumatera		5,983	6,878	1,822		14,6[illegible]
South Sumatera		5,469	9,788	1,363		16,62[illegible]
Lampung		1,700	8,964	2,130		12,75[illegible]
West Java		14,917	44,258	4,663		63,82[illegible]
Jatiluhur		9,760	43,991	6,441	16,302	76,45[illegible]
Central Java		21,849	42,651	3,839	11,810	80,1[illegible]
DI Yogyakarta		5,423	10,583	1,250		17,2[illegible]
East Java		19,321	42,237	3,950	10,394	75,9[illegible]
West Nusa Tenggara		5,423	10,625	1,500		17,54[illegible]
South Sulawesi		9,790	39,268	15,896	2,591	67,54[illegible]
Total		99,635	259,243	42,854	41,097	442,8[illegible]
Efficient O&M (Cumulative Areas)						
West Sumatera			14,207	21,085	24,157	
South Sumatera			5,450	15,238	16,601	
Lampung			42,066	51,030	62,880	
West Java		19,251	159,873	204,131	224,611	
Jatiluhur		6,265	16,025	64,823	71,264	
Central Java		51,586	110,593	158,102	232,969	
DI Yogyakarta			13,566	24,149	25,399	
East Java		120,763	181,846	236,845	270,052	
West Nusa Tenggara			10,500	20,693	22,193	
South Sulawesi			9,790	48,073	64,954	
Total		197,865	563,91[illegible]	844,169	1,015,080	

Notes :

1. Direct EOM areas for 1990/91 to be confirmed.
2. It is proposed to reduce Central java's EOM areas by transfering 26,830 has to the ADB funded IISP.
3. Special Maintenance design and construction for 1990/[illegible] excludes (to prevent double counting) the following SMC [illegible]

Jatiluhur	2,332
Central Java	21,409
East Java	19,530
South Sulawesi	37,478
Total	80,749

Source ISSP-1 Project

Table 3.2.2 Implementation Capacities for SM in ISSP-2

Province	Design (ha/yr)	Construction (ha/yr)
W Sumatera	7,000	7,000
S Sumatera	6,000	6,000
Lampung	7,000	7,000
W Java	30,000	30,000
Jatiluhur	25,000	25,000
C Java	30,000	30,000
Yogyakarta	7,000	7,000
E Java	40,000	40,000
C Sulawesi	7,000	7,000
S Sulawesi	17,000	17,000

Based on the inventories received from the provinces, the area with SM designs not yet constructed is 79,300 ha. There is also 223,000 ha of additional special maintenance (SM2) and 174,000 ha of additional special maintenance from direct EOM (SM3) which require construction and will have been designed by the time ISSP-2 begins. It is planned that most of the SM2 area and all the SM3 area will be constructed in 1991/92. In order to achieve this, it is vital that any designs or design reviews of SM2 and SM3 works are completed as planned during 1990/91. These areas will continue in EOM during construction as the remedial works in general only affect part of the irrigation systems. Some of the SM areas with existing designs will also be constructed in 1991/92 and enter EOM in 1992/93. Thereafter the area entering the SM programme each year is based on the DIs and implementation schedules proposed by each province, modified as necessary to suit the overall programme of implementation and feasible implementation rates. Priority has been given to DIs in ISF areas and to DIs with existing designs.

The annual schedule of design and construction for SM, SM2 and SM3 for each province is shown in Table 3.2.3. A summary of the overall programme is also shown on page 3 of Table 3.2.3.

In the first year of ISSP-2, the area available to enter EOM from SM completed in 1990/91 is 41,097 ha. Thereafter DIs can be introduced into the EOM/DEOM programme in the year after completion of SM or directly from special projects. The annual build-up of areas by province and for the overall programme of efficient operation and maintenance in ISSP-2 is shown in Table 3.2.4.

In order to meet these targets, design and construction of SM must in general each be completed within one year. This will involve fairly careful planning of budgeting and tendering procedures, particularly in the first year of ISSP-2 when procedures and terms of reference and specifications for design and construction have to be reviewed and revised as necessary. A bar chart showing the overall implementation schedule for special maintenance, EOM and PROM/DEOM is shown in Figure 3.2.4. This figure also outlines the tentative loan processing schedule and schedule for procurement of consultants. Unless the Central and Regional consultants can be positioned by April 1991, there will be problems in meeting the first year's implementation programme.

Bids for the first year's design packages must also be tendered by February 1991 if design is to start when the DIP becomes available in May 1991. If this is to be achieved, then the annual

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Table 3.2.3 ISSP-2 Irrigation Design and Construction Programme

		Existing Designs (ha)	Year 1 1991/92 (ha)	Year 2 1992/93 (ha)	Year 3 1993/94 (ha)	Year 4 1994/95 (ha)	Total (ha)	Available for ISSP-3 (ha)
W Sumatera								
Design Programme	SM	3,962	4,934	6,565	3,790		19,251	0
	SM2	14,629					14,629	
	SM3	8,224					8,224	
Total Designs		26,815	4,934	6,565	3,790	0	42,104	0
Construction	SM		3,962	4,934	6,565	3,790	19,251	
	SM2		14,629				14,629	
	SM3		8,224				8,224	
Total Construction			26,815	4,934	6,565	3,790	42,104	
S Sumatera								
Design Programme	SM	834	1,835	4,167			6,836	0
	SM2	16,620					16,620	
	SM3	0					0	
Total Designs		17,454	1,835	4,167	0	0	23,456	0
Construction	SM		0	834	1,835	4,167	6,836	
	SM2		16,620				16,620	
	SM3						0	
Total Construction			16,620	834	1,835	4,167	23,456	
Lampung								
Design Programme	SM	5,000	5,866	6,333	6,651		23,850	0
	SM2	12,794					12,794	
	SM3	0					0	
Total Designs		17,794	5,866	6,333	6,651	0	36,644	0
Construction	SM		5,000	5,866	6,333	6,651	23,850	
	SM2		12,794				12,794	
	SM3						0	
Total Construction			17,794	5,866	6,333	6,651	36,644	
W Java								
Design Programme	SM	13,774	29,785	31,886	20,978		96,423	0
	SM2	41,451					41,451	
	SM3	102,878					102,878	
Total Designs		158,103	29,785	31,886	20,978	0	240,752	0
Construction	SM		13,774	29,785	31,886	20,978	96,423	
	SM2		41,451				41,451	
	SM3		102,878				102,878	
Total Construction			158,103	29,785	31,886	20,978	240,752	

Table 3.2.3 ISSP–2 Irrigation Design and Construction Programme (Contd.)

		Existing Designs (ha)	Year 1 1991/92 (ha)	Year 2 1992/93 (ha)	Year 3 1993/94 (ha)	Year 4 1994/95 (ha)	Total (ha)	Available for ISSP-3 (ha)
Jatiluhur								
Design Programme	SM	8,510	21,894	25,684	23,168	14,170	93,426	14,170
	SM2	27,176					27,176	
	SM3	0					0	
Total Designs		35,686	21,894	25,684	23,168	14,170	120,602	14,170
Construction	SM		8,510	21,894	25,684	23,168	79,256	
	SM2		27,176				27,176	
	SM3						0	
Total Construction			35,686	21,894	25,684	23,168	106,432	
C Java								
Design Programme	SM	41,654	28,860	27,950	8,360		106,824	5,115
	SM2	40,925					40,925	
	SM3	29,802					29,802	
Total Designs		112,381	28,860	27,950	8,360	0	177,551	5,115
Construction	SM		13,927	30,924	27,950	28,908	101,709	
	SM2		40,925				40,925	
	SM3		29,802				29,802	
Total Construction			84,654	30,924	27,950	28,908	172,436	
Yogyakarta								
Design Programme	SM	3,699	3,512	7,060	7,420	1,364	23,055	0
	SM2	10,011					10,011	
	SM3	8,143					8,143	
Total Designs		21,853	3,512	7,060	7,420	1,364	41,209	0
Construction	SM		3,063	5,512	7,060	7,420	23,055	
	SM2		10,011				10,011	
	SM3		8,143				8,143	
Total Construction			21,217	5,512	7,060	7,420	41,209	
E Java								
Design Programme	SM	60,867	21,885	31,505	33,985	15,967	164,209	18,102
	SM2	36,945					36,945	
	SM3	24,706					24,706	
Total Designs		122,518	21,885	31,505	33,985	15,967	225,860	18,102
Construction	SM		26,523	43,948	41,651	33,985	146,107	
	SM2		36,945				36,945	
	SM3		24,706				24,706	
Total Construction			88,174	43,948	41,651	33,985	207,758	

Table 3.2.3 ISSP–2 Irrigation Design and Construction Programme (Contd.)

		Existing Designs (ha)	Year 1 1991/92 (ha)	Year 2 1992/93 (ha)	Year 3 1993/94 (ha)	Year 4 1994/95 (ha)	Total (ha)	Available for ISSP-3 (ha)
C Sulawesi								
Design Programme	SM	0	10,314	3,345	4,801	976	19,436	976
	SM2							
	SM3							
Total Designs		0	10,314	3,345	4,801	976	19,436	976
Construction	SM		0	10,314	3,345	4,801	18,460	
	SM2							
	SM3							
Total Construction			0	10,314	3,345	4,801	18,460	
S Sulawesi								
Design Programme	SM	17,631	4,310	14,390	15,643		51,974	0
	SM2	22,843					22,843	
	SM3						0	
Total Designs		40,474	4,310	14,390	15,643	0	74,817	0
Construction	SM		5,285	16,656	14,390	15,643	51,974	
	SM2		22,843				22,843	
	SM3						0	
Total Construction			28,128	16,656	14,390	15,643	74,817	
Overall Total								
Design Programme	SM	155,931	133,195	158,885	124,796	32,477	605,284	38,363
	SM2	223,394	0	0	0	0	223,394	
	SM3	173,753	0	0	0	0	173,753	
Total Designs		553,078	133,195	158,885	124,796	32,477	1,002,431	38,363
Construction	SM	0	80,044	170,667	166,699	149,511	566,921	
	SM2	0	223,394	0	0	0	223,394	
	SM3	0	173,753	0	0	0	173,753	
Total Construction			477,191	170,667	166,699	149,511	964,068	

Table 3.2.4 ISSP–2 Irrigation Efficient Operation and Maintenance Program

		Cumulative Areas in EOM Program				
		From ISSP-1 (ha)	Year 1 (ha)	Year 2 (ha)	Year 3 (ha)	Year 4 (ha)
W Sumatera	EOM	14,683	14,683	18,645	23,579	30,144
	DEOM	9,474	11,674	15,152	23,208	30,089
	Total	24,157	26,357	33,797	46,787	60,233
S Sumatera	EOM	16,601	16,601	16,601	17,435	19,270
	DEOM	0	8,091	8,091	19,980	22,004
	Total	16,601	24,692	24,692	37,415	41,274
Lampung	EOM	12,794	12,794	17,794	23,660	29,993
	DEOM	50,086	51,636	51,636	84,548	84,548
	Total	62,880	64,430	69,430	108,208	114,541
W Java	EOM	63,838	63,838	77,612	107,397	139,256
	DEOM	160,773	184,976	197,082	206,362	212,193
	Total	224,611	248,814	274,694	313,759	351,449
Jatiluhur	EOM	60,192	76,494	85,004	106,898	132,582
	DEOM	11,072	11,072	11,072	11,072	20,983
	Total	71,264	87,566	96,076	117,970	153,565
C Java	EOM	68,339	80,149	94,076	125,000	152,950
	DEOM	137,800	176,399	209,907	232,681	243,520
	Total	206,139	256,548	303,983	357,681	396,470
Yogyakarta	EOM	17,256	17,256	20,319	25,831	32,891
	DEOM	8,143	8,143	9,209	9,209	9,336
	Total	25,399	25,399	29,528	35,040	42,227
E Java	EOM	65,537	65,537	92,060	136,008	177,659
	DEOM	204,515	217,065	218,517	218,517	218,517
	Total	270,052	282,602	310,577	354,525	396,176
S Sulawesi	EOM	64,954	67,545	72,830	89,486	103,876
	DEOM	0	13,200	13,200	38,295	59,285
	Total	64,954	80,745	86,030	127,781	163,161
C Sulawesi	EOM	0	0	0	10,314	13,659
	DEOM	0	18,687	20,545	39,137	40,637
	Total	0	18,687	20,545	49,451	54,296
Overall Total	EOM	384,194	414,897	494,941	665,608	832,280
	DEOM	581,863	700,943	754,411	883,009	941,112
	Total	966,057	1,115,840	1,249,352	1,548,617	1,773,392

Note : Total Area transferred from ISSP-1 to IISP 49,000 ha consisting of 26,800 ha in C Java and 22,200 ha in NTB. These areas are not included in ISSP-1 total above.

Implementation Schedule – Irrigation

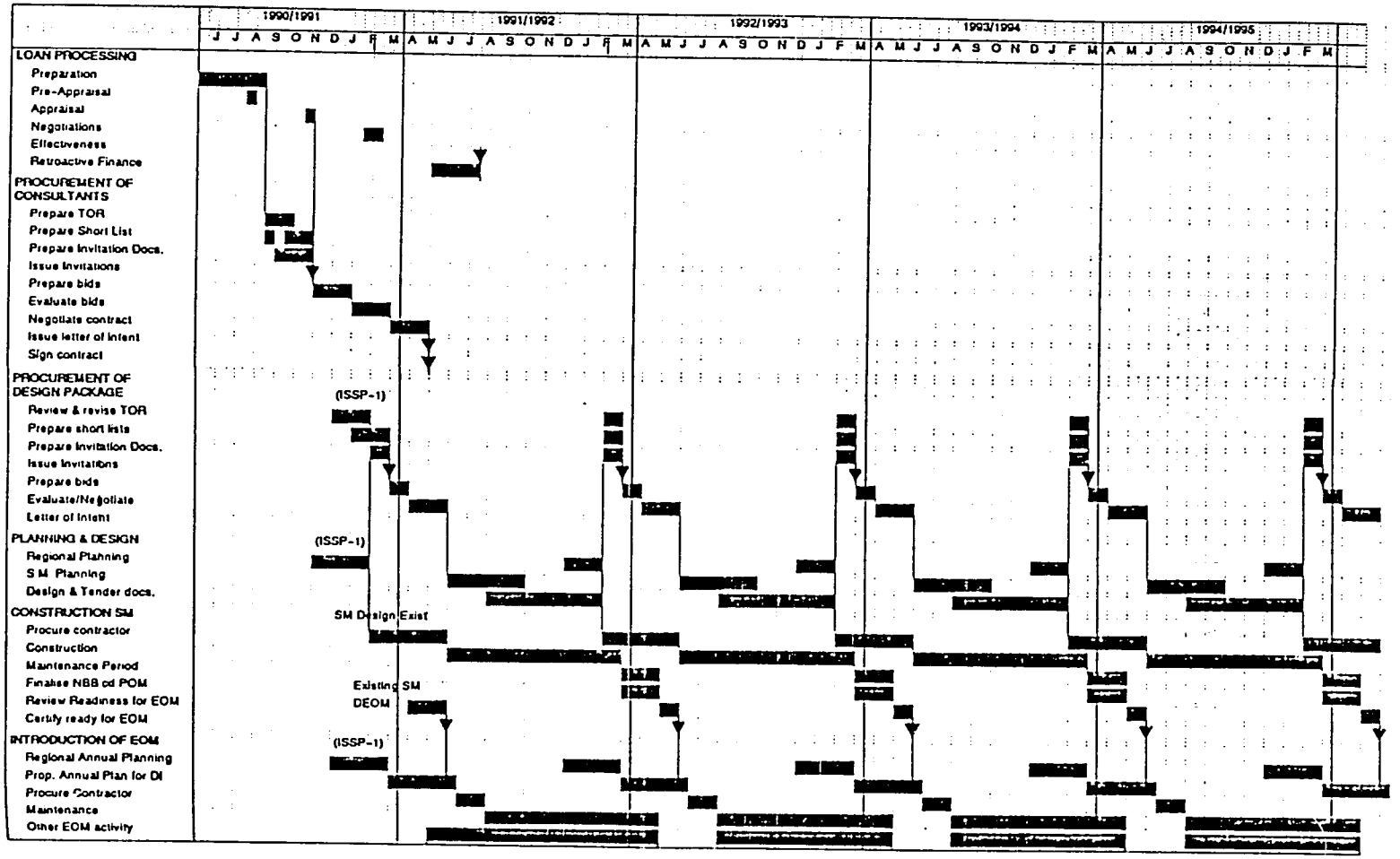

Figure 3.2.4

physical and financial planning, design specifications and tender documents and cost estimates will need to be started in September 1990 and completed by December 1990. Since this is too early for ISSP-2 consultants to be appointed, it is proposed that this work is done by the present ISSP-1 O&M consultants.

There should be a stock of designs completed in the last year of ISSP-2 for implementation in the first year of ISSP-3. Based on the above implementation rates, about 90,000 ha of SM designs should be available. The DIs to be designed for ISSP-3 implementation will depend on the progress of ISSP-2 implementation, particularly with respect to ISF. It is therefore proposed that these DIs are identified at the end of Year 2 of ISSP-2. At this time a mid-term review of the progress and lessons learnt during implementation should be prepared by the various consultants for each component.

3.2.3 Consulting Services

General

The total cost of the irrigation component (see Section 4.3) will exceed Rp 300 billion and cover about one million hectares in 9 provinces and Jatiluhur over a four year period. In view of the size and extent of this programme, it is vital that adequate inputs of experienced local and foreign consultants are provided to assist DGWRD at the Centre and PRIS in the provinces with the planning management and technical supervision of such an investment programme.

The overall approach to the consulting services for implementation of the irrigation component is to have regional consultants based in the provincial centres led and coordinated by a small technical team in the Ministry of Public Works (MPW) in Jakarta. The regional consultants would work within the PRIS organisation and the central consultants within DOI-I.

These consultants would provide technical advice, expertise and training on all matters relating to the irrigation components.

In addition to the main provincial and regional consulting services, local consultancy design contracts will be required to carry out the designs for special maintenance. The areas to be designed and the costs of design are given in Section 4.3.

Regional Consultants

The regional consultants would be responsible for providing technical advice, assistance and training to PRIS on all aspects of work involved in special maintenance, preparation for O&M (PROM) and introduction of efficient operation and maintenance (EOM). They would also assist with the development, testing and demonstration of irrigation operation systems through the continued use of existing Advanced Operation Units (AOUs) and the setting up of new AOUs in C Sulawesi. In addition they would provide technical assistance to PRIS staff engaged in the Turnover Programme on engineering related matters. They would also assist PRIS staff in improving the inventory of DPU schemes contained in the Buku Pintar Daerah Irigasi PU.

Experience on ISSP-1 and other irrigation projects has shown that there is a continuing need for advice and assistance in the activities described above to staff in PRIS. Consultants are largely free from day to day administrative matters and so can concentrate exclusively on the implementation of the ISSP-2 irrigation programme. They are also less constrained by institutional and organisational structure of PRIS and so can act as facilitators and coordinators between the various divisions and sub-divisions within PRIS both through official and unofficial

channels. Support with the planning, monitoring and management of the ISSP-2 irrigation programme is another area where experienced consultants have an important role to play.

It is proposed that the grouping of the provinces for the irrigation components of ISSP-2 would be as follows:

- Lampung, W Sumatera and S Sumatera;
- W Java and Jatiluhur;
- C Java and Yogyakarta;
- E Java;
- S Sulawesi and C Sulawesi.

Each regional team and team leader would be based in the offices of PRIS in the first mentioned province of each grouping with some members of the team spending most of their time in the other province(s). Details of the expertise and staffing proposed are given in Table 3.2.5.

Central Consultants

The central consultants would be a small team responsible for providing technical advice and guidance to DOI-I and for managing, coordinating and supervising the provincial teams. They would act as a link between the provinces and the centre, helping DOI-I staff to formulate and disseminate technical policies, guidelines and standards relating to upgrading, special maintenance and EOM to the provinces and informing DOI-I of technical developments and issues which may arise in the provinces during implementation. They would also assist DOI-I staff with the planning, budgeting and monitoring of the annual implementation programme.

In addition to experienced irrigation and O&M specialists the team would include a social scientist whose role, as Institutional Specialist, would be to provide planning and policy guidance to DOI-I and PRIS in matters relating to water user association formation and strengthening, the turnover programme and irrigation service fee introduction and collection. The Institutional Specialist would help to link the engineering aspects of the SM/EOM components with the legal social and economic aspects which are so important to the success of the turnover and ISF programmes. A Training Specialist would also be included in the Central Team. He would provide training advice to PRIS trainers and assist with the development and preparation of training materials.

Organisation and Staffing

It is proposed that both the central and regional consultants are provided from one group of firms working under one contract. This approach will enable procurement to be done more quickly and efficiently than would be the case if the consultancy was broken down into several smaller packages. As mentioned in Section 3.2.2, it is vital that procurement of this consultancy package is started prior to loan effectiveness, otherwise the start of the first year's programme of SM and EOM will be delayed. Furthermore, a single consultancy should be more effective at coordinating between provinces and between the province and the centre and thus avoiding unnecessary duplication of work. The expertise, staffing and manmonths are given in Table 3.2.5 and the staffing schedule in Figure 3.2.5. Continuous inputs have been assumed for the local consultants who will gradually take over from the foreign consultants.

Table 3.2.5 Consultancy Inputs for Irrigation Component

	Post	Location	—Man Months— Foreign	Local
	Central Consultants			
	Team Leader/Irrigation Specialist	Jakarta	36	
	Senior O&M Specialist	Jakarta		48
	Operation/AOU Adviser	Jakarta	12	
	Quality Assurance Specialist	Jakarta	36	36
	Systems Analyst/Inventory Specialist	Jakarta		12
	O&M Training/WUA Specialist	Jakarta	12	
	O&M Training Engineer/Media Specialist	Jakarta		24
	WUA Extension Specialist	Jakarta		48
	Sub-total		96	168
	Regional Consultants			
Lampung,	Team Leader	Padang	24	
W Sumatera and	Senior O&M Engineer	Padang	12	
S Sumatera	O&M Engineer	Padang		36
	O&M Engineer	Palembang		36
	O&M Engineer	Lampung		36
	Operation/AOU Advisor	Padang		18
	Turnover Engineer	Padang		48
W Java and Jatiluhur	Team Leader	Bandung	24	
	O&M Engineer	Bandung		36
	O&M Engineer	Karawang		36
	Operation/AOU Advisor	Bandung		18
	Turnover Engineer	Bandung		36
C Java and Yogyakarta	Team Leader	Semarang	24	
	O&M Engineer	Semarang		36
	O&M Engineer	Yogyakarta		36
	Operation/AOU Advisor	Semarang		18
	Turnover Engineer	Semarang		24
E Java	Team Leader	Surabaya	24	
	O&M Engineer	Surabaya		36
	Turnover Engineer	Surabaya		36
S Sulawesi, C Sulawesi	Team Leader	Ujungpandang	24	
	Senior O&M Engineer	Palu	12	
	O&M Engineer	Ujungpandang		36
	O&M Engineer	Palu		36
	Operation/AOU Advisor	Ujungpandang		18
	Turnover Engineer	Ujungpandang		36
	Sub-total		144	612
	Grand Total		240	780

Figure 3.2.5

Irrigation Component Consultants Staffing Schedule

Post No	Province	Loc	Year 1	Year 2	Year 3	Year 4	Man month F	Man month L
Central Team								
F1	Team Leader	Jkt					36	
L1	Sen O&M Specialist	Jkt						48
F2	Ops/AOU Adviser	Jkt					12	
F3	QA Specialist 1	Jkt					36	
L2	QA Specialist 2	Jkt						36
L3	Sys Anal/Inven Spec	Jkt						12
F4	O&M Train/WUA Spec	Jkt					12	
L4	O&M Training Eng	Jkt						24
L5	WUA Extension Spec	Jkt						48
L6	Instituonal Spec	Jkt						48
L7	Training Spec/Socio	Jkt						48
Lampung, West and South Sumatera								
F5	Reg Team Leader	Lam					24	
F6	Senior O&M Eng 1	Pdg					12	
L8	O&M Engineer 1	Lam						36
L9	O&M Engineer 2	Plm						36
L10	O&M Engineer 3	Pdg						36
L11	AOU Adviser 1	Lam						18
L12	Turnover Eng 1	Pdg/Lam						48
L13	Institution Spec 1	Lam						36
L14	Institution Spec 2	Plm						24
L15	Institution Spec 3	Pdg						24
West Java & Jatiluhur								
F7	Reg Team Leader	Bdg					24	
L16	O&M Engineer 4	Bdg						36
L17	O&M Engineer 5	Krg						36
L18	AOU Adviser 2	Bdg						18
L19	Turnover Eng 2	Bdg						36
L20	Institution Spec 4	Bdg						24
L21	Institution Spec 5	Krg						48
Central Java & Yogyakarta								
F8	Reg Team Leader	Sem					24	
L22	O&M Engineer 6	Sem						36
L23	O&M Engineer 7	Yog						36
L24	AOU Adviser 3	Sem						18
L25	Turnover Eng 3	Sem						24
L26	Institution Spec 6	Sem						24
L27	Institution Spec 7	Yog						24

Figure 3.2.5 Irrigation Component Consultants Staffing Schedule

Post No	Province	Loc	Year 1	Year 2	Year 3	Year 4	Man month F	Man month L
East Java								
F9	Reg Team Leader	Sby					24	
L28	O&M Engineer 8	Sby						36
L29	Turnover Eng 4	Sby						36
L30	Institution Spec 8	Sby						36
Central & South Sulawesi								
F10	Reg Team Leader	Upg					24	
F11	Senior O&M Eng 2	Pal					12	
L31	O&M Engineer 9	Upg						36
L32	O&M Engineer 10	Pal						36
L33	AOU Adviser 4	Upg						18
L34	Turnover Eng 5	Upg						36
L35	Institution Spec 8	Upg						36
							240	1152

3.3 Turnover Extension Programme

Turnover concepts, issues and the approach that will be followed during programme expansion in ISSP-2 have been discussed in the previous chapter. In this chapter the organisational setting, implementation scheduling and consulting services will be reviewed.

3.3.1 Organisation

At the central level, the Directorate of Irrigation I (DOI-1) will be the apex agency responsible for the small system turnover programme, providing policy guidance, institutional support and coordination to the provinces. More specifically, the center will set targets and monitor implementation, guide improvement of processes used in turnover, promote policy changes which support turnover, provide special support to new provinces, and provide national workshops and training for trainers.

The primary responsibility for project implementation (planning, training, monitoring, problem solving) will remain with the provincial irrigation service (PRIS), particularly vested in its field sections (cabang dinas pengairan) and lower levels (ranting dinas and sub-ranting). At system level it will be particularly the irrigation inspectors (juru pengairan) who will be the frontline workers of the programme.

The indispensable counterpart and partner in the turnover process from beginning to end is the Water Users Association (WUA). While not a government institution, and themselves very much an object of project action, the WUAs should increasingly be regarded as the corner stone of successful turnover.

3.3.2 Implementation Schedule

The planned geographical expansion of turnover has been reviewed in the previous chapter. Table 3.3.1 shows in more detail how the programme is to be spread over existing and new turnover provinces during the second time s[illegible]e. The table, designed by DOI-1, should be seen as indicative only and not as a final plan of work. A detailed plan cannot be made until after the inventories have been made in each area.

3.3.3 Consulting Services

Given the substantial turnover area expansion being envisaged for ISSP-2 and the compounding conceptual and institutional issues at stake in the development process, consulting services will continue to be required.

First, **social and institutional** consultancy, under ISSP-1 provided by LP3ES, will include training, field consultancy and conceptual development of procedures such as those for inventory, socio-technical profiles and farmer participation in design and construction. Such consultancy should be available to improve the capabilities of Public Works staff in current and new provinces and sections, monitoring implementation and further improving turnover procedures.

Training arrangements are discussed in section 2.8. Generally, they will include

- primary responsibility for training will be assumed by the PRIS. Province based institutional consultants will work with provincial officials in the preparation and implementation of training.

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Table 3.3.1 Turning Over of Small Irrigation Systems to WUA Programme for ISSP – 2

No	PROVINCE	AREA (HA)														
		1991/92			1992/93			1993/94			1994/95			TOTAL		
		INV.	PD	CT	INV.	PD	CT	INV.	PD	CT	INV.	PD	CT	INV.	PD	CT
1	WEST SUMATERA	7,800	6,000	6,000	7,800	6,000	6,000	7,800	6,000	6,000	7,800	6,000	6,000	31,200	24,000	24,000
2	SOUTH SUMATERA	0	0	0	0	0	0	1,300	1,000	0	1,300	1,000	1,000	2,600	2,000	1,000
3	LAMPUNG	0	0	0	1,300	1,000	0	1,300	1,000	1,000	1,300	1,000	1,000	3,900	3,000	2,000
4	WEST JAVA	7,800	6,000	6,000	7,800	6,000	6,000	7,800	6,000	6,000	7,800	6,000	6,000	31,200	24,000	24,000
5	CENTRAL JAVA	11,700	9,000	7,000	13,000	10,000	9,000	13,000	10,000	10,000	13,000	10,000	10,000	50,700	39,000	36,000
6	D.I. YOGYAKARTA	1,300	1,000	1,000	1,300	1,000	1,000	1,300	1,000	1,000	1,300	1,000	1,000	5,200	4,000	4,000
7	EAST JAVA	9,620	7,400	6,000	10,920	8,400	7,400	10,920	8,400	8,400	11,700	9,000	8,400	43,160	33,200	30,200
8	SOUTH SULAWESI	780	600	1,000	780	600	600	780	600	600	0	0	600	2,340	1,800	2,800
	SUB – TOTAL	39,000	30,000	27,000	42,900	33,000	30,000	44,200	34,000	33,000	44,200	34,000	34,000	170,300	131,000	124,000
	JATILUHUR	1,300	1,000	0	2,600	2,000	1,000	3,900	3,000	2,000	3,900	3,000	3,000	11,700	9,000	6,000
	TOTAL	40,300	31,000	27,000	45,500	35,000	31,000	48,100	37,000	35,000	48,100	37,000	37,000	182,000	140,000	130,000

Note :

INV. = Inventory
PD = Profiling and Design of systems improvement
CT = Construction and Turning Over

Source : DOI – 1
(Jakarta, 30 July 1990)

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- Training courses for trainers will be held each year to prepare public works officials for planning and implementing training activities.

- Annual national workshops will be held for officials from each province, to discuss and coordinate implementation of turnover activities.

- The consultant will continue to develop and improve training materials, manuals and other media concerning the turnover process.

Consultancy will comprise the following main features :

- One institutional consultant in each province will work with PU staff at the province, section, subsection and in the field. During the first year when the number of TP4 and irrigation systems is fairly small, field consultancy will be more intensive. In later years, the field coordinator will work more at the section and provincial levels. It may be considered whether institutional consultancy in the province could effectively be combined with similar needs in other ISSP components.

- The consultant will work with the Directorate of Irrigation I and Provincial officials in planning and monitoring turnover activities, analyzing problems in the implementation of turnover, identifying appropriate solutions and improving the process used to prepare for turnover of irrigation systems.

- Strengthening of PU institutional capabilities to work with and develop water users associations, including local participation in the planning and construction of improvements will be the main goal of consultancy activities.

Institutional support activities will include :

- Strengthening the P3A institutional capacity, with particular emphasis on the legal status of P3A. WUA development should be oriented toward improvement of performance in irrigation management. Moreover, attention is to be paid to procedures for WUA self-assessment, and inter-WUA linkages.

- Strengthening the PU institutional capacity with regard to :

  designing and conducting participatory training;

  monitoring and supporting turnover implementation;

  social and organisational skills of field coordinators (TP4); and

  -providing guidance and technical assistance to WUAs after turnover.

Details of the social/institutional consultants inputs are presented in Table 3.3.2.

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Table 3.3.2 Consultancy Inputs for Turnover

	Post	Location	Man months Foreign	Man months Local
	Central Consultants			
	Team Leader/Inst. Specialist	Jakarta		48
	Training Specialist/Sociologist	Jakarta		48
	Sub-Total			96
	Provincial Consultants			
W Sumatera	Prov. Institutional Specialist	Padang		24
W Java	Prov. Institutional Specialist	Bandung		24
C Java	Prov. Institutional Specialist	Semarang		24
DI Yogya	Prov. Institutional Specialist	Yogyakarta		24
E Java	Prov. Institutional Specialist	Surabaya		36
S Sulawesi	Prov. Institutional Specialist	Ujung Pandang		36
S Sumatera	Prov. Institutional Specialist	Palembang		24
Lampung	Prov. Institutional Specialist	B Lampung		36
Jatiluhur	Prov. Institutional Specialist	Subang		48
	Sub-Total			276
	Grand Total			372

3.4 Swamps

3.4.1 Organisation

On-going projects and special maintenance of existing schemes are the responsibility of P3S and P2DR for inland swamp development, currently part of the Directorate of Swamps (DOS) within DGWRD. This implies that consultants and contractors for these activities are assigned through and by the Directorate of Swamps. For the implementation of the projects a Pimpro with adequate financial and technical capable staff are to be assigned.

At present, finished on-going projects and schemes on which SM or upgrading has been completed are being transferred to P2JP. This is an intermediate agency under the Head Of the Regional Office of Public Works (KaKanwil PU), responsible for EOM until such time that this can be taken over by the Provincial Water Resources Subdivision (Subdin Air).

For the introduction of EOM a capable head of the P2JP organisation would be required who would also operate as the Pimpro. The Pimpro requires adequate office facilities and 4 to 5 administrative and supporting staff.

It is evident that the P2JP organisation requires assistance with the recruitment and training of suitable staff, provision of facilities and the development of site specific O&M procedures, the O&M planning and the preparation of needs-based budgets. The provincial authorities (DPUP) and staff as well as the trained trainers should be involved in these activities. Arrangements should be made that the newly recruited P2JP staff is transferred to the provincial authority ultimately responsible for O&M.

In line with the deconcentration policy of GOI it is the intention to place P3S in the future under the directives of the Head of the Regional Office of Public Works. However due to lack of sufficient man power capability in the Kanwil offices, P3S would remain under DOS for the time being. In keeping with decentralisation efforts, the P2JP tasks will be accommodated, as soon as possible, with the Provincial Water Resources Subdivision (SubDinair), eventually as a Swamps O&M Section, and become part of routine Swamps operation. During a transition stage, however, P2JP may be linked through KaSubdinair with KaKanwil and with P3S for coordination and support purposes.

At field level the KUPT (when schemes still in transmigration stage) or Kepala Cabang Dinas (after transfer to local government) will be in charge of the EOM activities. Depending on the geographical project situation it is assumed that the KUPT or KaCabdin would cover some 20,000 ha of EOM. Within the field organisation a number of Pengamats will reside under the KUPT or KaCabdin covering an average of some 5,000 ha. Finally, each Pengamat will have 3 to 4 Jurus, each being responsible for 1,500 ha approximately. It is important that detailed task descriptions will be prepared for each of the above levels in the organisation. The present swamp consultant has done this for the Pengamat and Jurus level already.

The present and proposed organisations are shown in Figure 3.4.1.

3.4.2 Implementation Schedule

Assuming the ISSP-2 Loan can provide retroactive payment as from January 1, 1991 preparatory activities such as Terms of Reference preparation for consultants should start as soon as possible after June 1990. The ISSP-1 consultants could be assigned to assist in these activities. The ISSP-2 consultants for both preparatory work and implementation should be mobilised by April 1, 1991. To review plans, designs and project cost the consultants would need

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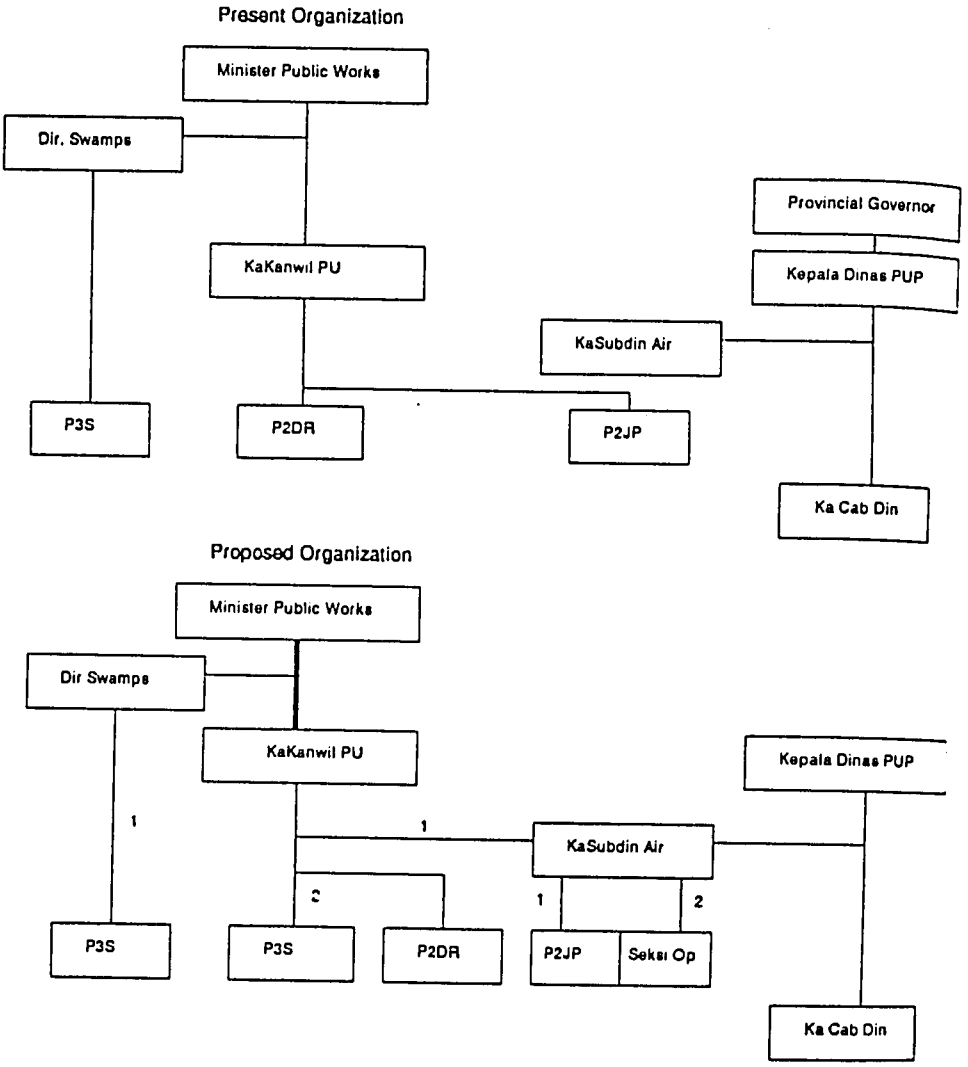
Organisation Swamps

Figure 3.4.1



KAKANWIL	Kepala Kantor Wilayah, Head of Regional Office (Central Government)
KEPALA DINAS PUP	Head Provincial Public Works (Pekerjaan Umum Propinsi) (Provincial Government)
KASUBDIN AIR	Kepala Sub Dinas Pengairan, Head Water Resources Subdivision
P3S	Proyek Pengairan Pasang Surut, Tidal Lands Water Resources Project
P2DR	Proyek Pengembangan Daerah Rawa, Swamps Development Project
P2JP	Proyek Pemeliharaan Jaringan Pengairan, Water Resources Systems Management Project
KA CAB DIN	Kepala Cabang Dinas (Pengairan), Head Water Resources Branch (field office)

1 Initial (transition) stage
2 Ultimate situation

some 6 to 8 months depending on the size of the schemes and the complexity of the technical problems. To save time it is suggested to appoint one firm per scheme or at least per province. Contractors should be able to commence the construction works in early 1992 unless preparatory works can be carried out in FY 90/91. Efficient Operation and Maintenance would follow the construction schedule except for ISSP-1 projects and non ISSP-IBRD projects, which could be included in the first year of the ISSP-2 programme.

A detailed implementation schedule is presented in Figure 3.4.2.

3.4.3 Consulting Services

For the implementation of the ISSP-2 Swamps component consultants will be required for assistance with supervision of construction works on the on-going projects and special maintenance. They will also be required to assist with the introduction of efficient O&M. An experienced international swamps specialist is also required to assist with all aspects of the ISSP-2 swamps project.

The proposed consultant inputs are presented in Table 3.4.1.

Table 3.4.1 Consultants for Swamp Component.

	Foreign		Local	
	no.	**mm**	**no.**	**mm**
Team Leader/Swamps Specialist	1	24	-	-
Construction Adviser	-	-	2	48
O&M Advisers / Training Engineers	1	12	2	48
Total	**2**	**36**	**4**	**96**

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Work Schedule ISSP-2 Swamps

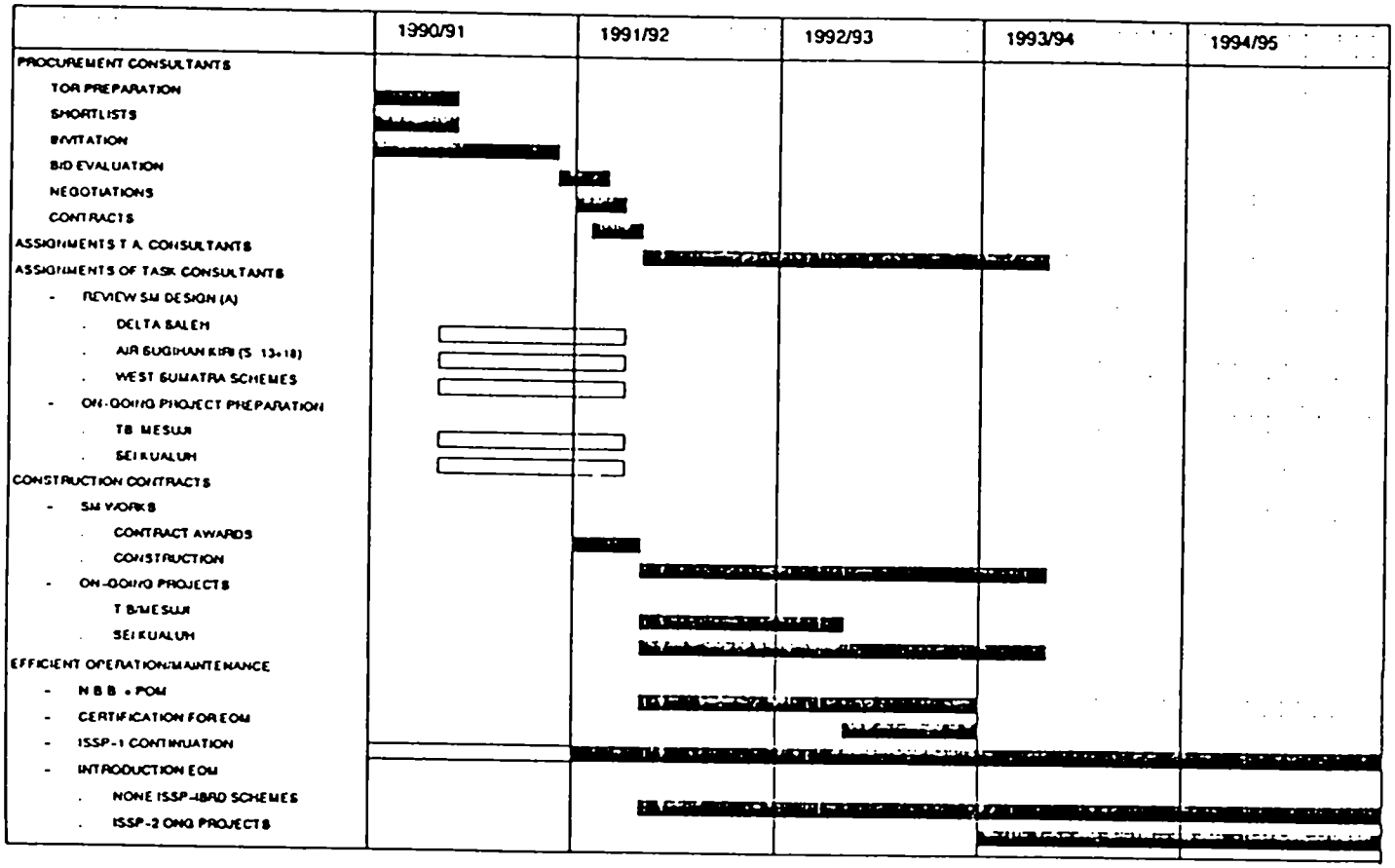


Figure 3.4.2

3.5 Rivers

3.5.1 Organisation

Monitoring of Small River Mouths

The monitoring of SRM's will be implemented by DOR, DGWRD. The Sub- Directorate of O&M (E&P) in DOR will act as the Task Leader. DOR will setup a Monitoring Team (MT) for the SRM from among its staff. The MT will be led by a Task Leader from the Sub-Directorate of E&P.

The field activity of topographic, bathometric and hydrometric surveys will be under immediate direction of the respective DPUP Sub-Dinas Pengairan as represented by the PPS units. The PPS units will carry out the necessary hydrometric, topographic and bathometric survey. The analysis, review and design updating activities of the component will be under the direction of the DOR.

The monitoring work will be assisted by the Rivers Advisor. An organisational chart for undertaking the monitoring activity is presented in Figure 3.5.1.

River Basin Pilot Projects (RBPP)

The organisation for each of the two selected RBPP will be different and are discussed separately in the following paragraphs.

Cisanggarung River Basin Pilot Project : The Cisanggarung River Basin covers the provinces of W. Java and C. Java and thus the management of the water resources must preferably lie with a Central Government agency. Hence, it is proposed to implement Cisanggarung RBPP under the Cimanuk River Basin Development Project in Cirebon. The organisation chart is presented in Figure 3.5.2. Consultants will be attached to the Cimanuk Project but will be stationed in Ciledug.

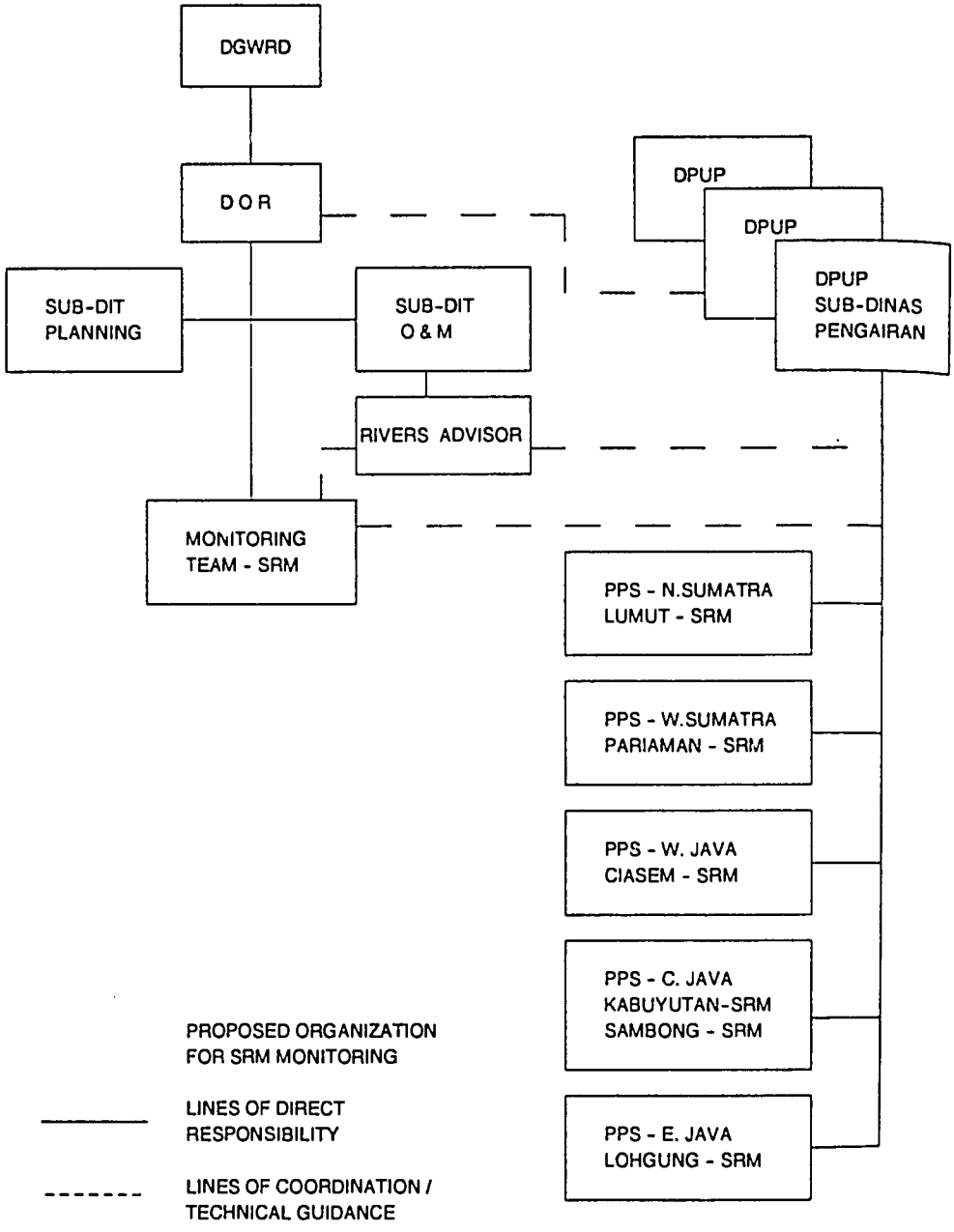
The river works in the Cisanggarung basin is being implemented by the Cisanggarung Sub-Project. Much of the on-going river improvement works will be completed by 1990. It is proposed to utilize this sub-project's facilities and staffing to undertake the majority of the RBPP activities. The sub-project will establish three (3) sections to carryout the O&M and field water management activities.

Currently Cimanuk Project is in the process of establishing a Water Management Center at Cirebon to undertake Cimanuk River Basin water management activity. This center will be responsible for the software work related to river basin water management. It is proposed to use this center to carry out the Cisanggarung river basin water management work. A water management sub-center will be located in the office of the Cisanggarung Sub-Project to coordinate fieldwork.

For water management activity Cimanuk Project will link with PRIS W. Java and C. Java Cabang Dinas Pengairan as shown. Similarly Cisanggarung Sub-Project will coordinate with W. Java and C. Java PPS organisations for river management activity.

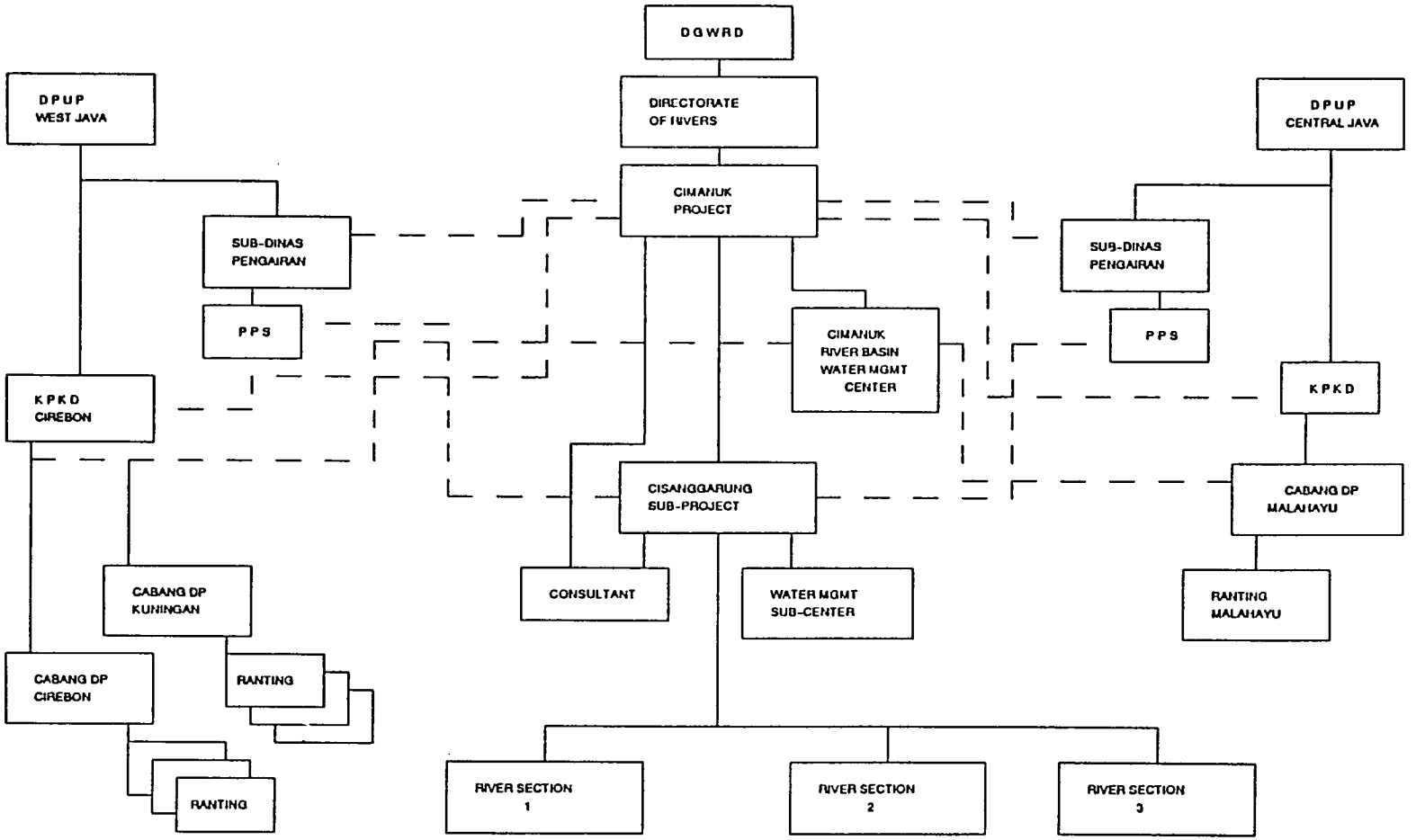
Opak River Basin Pilot Project : The Opak RBPP will be implemented by DI. Yogyakarta - PPS office in Yogyakarta. The organisation for this project is shown on Figure 3.5.3. Consultants will be attached to the PPS office in Yogyakarta. The PPS office will have two sections one for undertaking activities related to river management and the other for river basin water management activities. The PPS office will coordinate with the Cabang Dinas Pengairan

Organisation for Monitoring of SRM in ISSP-2 Figure 3.5.1



Organisation Chart
Cisanggarung River Basin Pilot Project

Figure 3.5.2



NOTE: CHART SHOWS ONLY RELEVANT UNITS IN THE ORGANIZATION

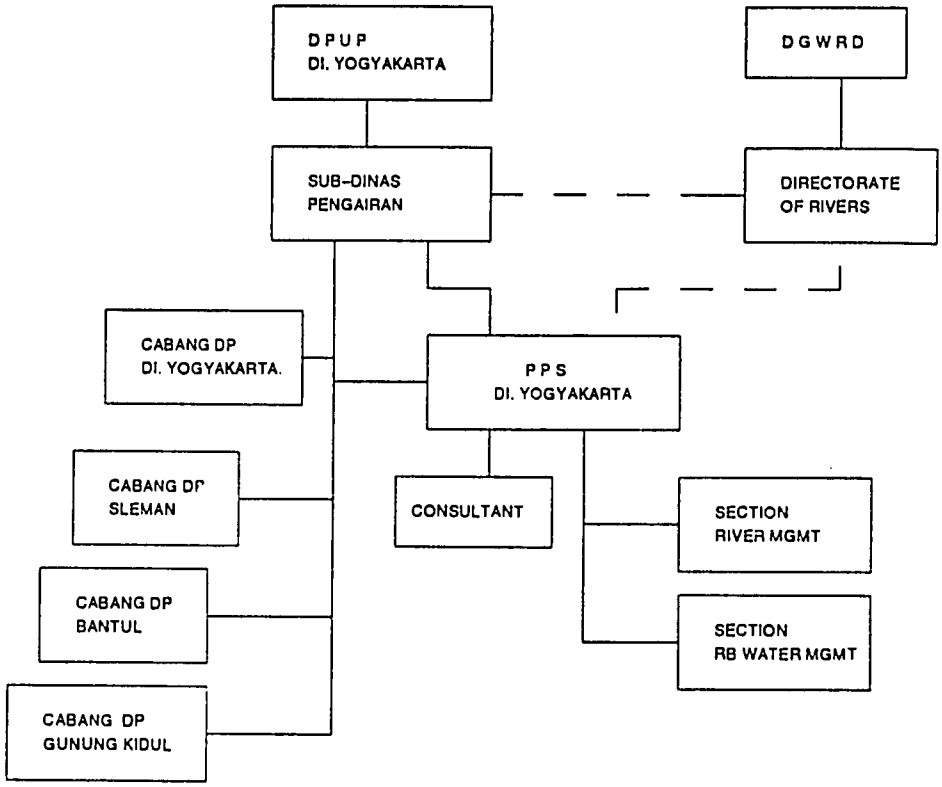
DP: DINAS PENGAIRAN

PROPOSED ORGANIZATION FOR PILOT PROJECT

——— LINES OF DIRECT RESPONSIBILITY

- - - - - - LINES OF COORDINATION / TECHNICAL GUIDANCE

Organisation Chart Opak River Basin Pilot Project Figure 3.5.3



NOTE : CHART SHOWS ONLY RELEVANT UNITS IN THE ORGANIZATION

PROPOSED ORGANIZATION FOR PILOT PROJECT

DP : DINAS PENGAIRAN

——— LINES OF DIRECT RESPONSIBILITY

- - - - - LINES OF COORDINATION / TECHNICAL GUIDANCE

at DI. Yogyakarta, Sleman, Bantul and Gunung Kidul in undertaking water management field activities.

Seluna Basin Water Management Project (Phase-2)

The project will be implemented by Jratunseluna project under Directorate of Irrigation II, Specifically the chief of O&M in the Jratunseluna Project will be responsible for the various activities. The R&D institute IHE in Bandung will provide support by managing the Water Control Center at Kudus. This support will be in the form of providing expert staff and logistic support for software development and maintenance. IHE will have no administrative control over the functioning of the water control center.

The Jratunseluna Project will coordinate with DPUP cabangs having jurisdiction in the Seluna River Basin. The mechanism of coordination will be developed during project implementation. The proposed organisation for Seluna Water Management in presented in Figure 3.5.4.

3.5.2 Implementation Schedule

Monitoring of Small River Mouths

The monitoring activity is a continuing activity from ISSP-1. The activity began in January 1990 and will terminate in March 1994 (four years monitoring). ISSP-1 financing will be available to cover costs of monitoring through to the Loan effective date of ISSP-2, which is tentatively scheduled for June 1991.

A schedule for monitoring program of SRM is presented in Table 3.5.1. Information, survey data, mapping and reports are collected and organised by the DOR SRM Monitoring Team from ISSP-1 work.

Three rounds of field monitoring activity is planned each year. Each monitoring for the five (5) SRM's will take 2 months. In all a total of eight (8) rounds of monitoring will be undertaken as shown on Table 3.5.1. The midterm evaluation will be undertaken over a two month period in late 1991. The final evaluation and revision of the design guidelines for SRM will be done over a three month period in the first quarter of 1994. The reports and their timing is also shown on Table 3.5.1. An implementation schedule listing the major field monitoring and O&M activities is presented in Table 3.5.2.

River Basin Pilot Projects

The RBPP will be a three (3) year project. The implementation schedule is shown on Table 3.5.3. The procurement of consulting services and arrangements for initiating the RBPP's should start in July 1991 so that activities can begin in early 1992. The preparation work is estimated to take 6 to 8 months depending on the pilot project. The implementation activity will cover a period of 28 months. At the end of two years of implementation an evaluation will be carried out over a period of 4 months. Project reviews after project preparation and annually will be undertaken to assess achievement of targets.

Seluna Basin Water Management Project (Phase-2)

This project will start in early 1992 (April 1992) and be implemented over a two (2) year period. The project should cover a minimum of three (3) cropping seasons and terminate in March 1994. Thus, it will cover the two Fiscal Year 1992/93 and 1993/94. A six (6) month period of system setup and trial run will be followed by an eighteen (18) months of field

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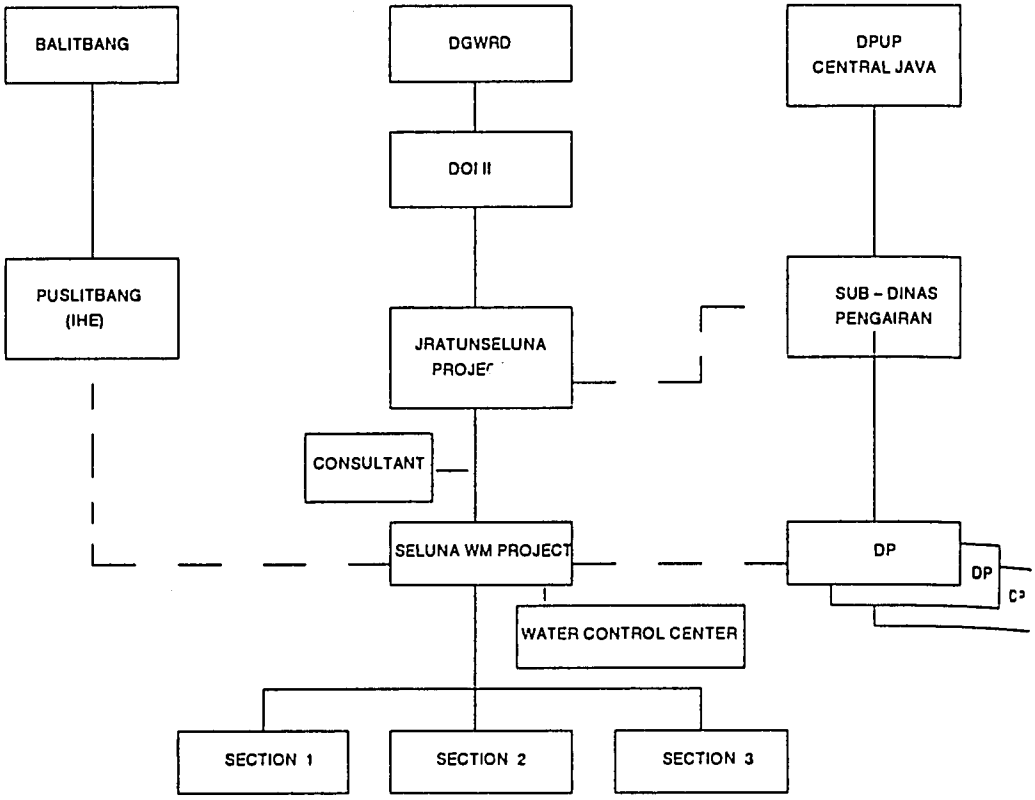
Organisation Chart
Seluna Basin Water Management Project (Phase – 2)

Figure 3.5.4



Note : THE CHART SHOWS ONLY RELEVANT UNITS IN THE ORGANISATION

PROPOSED ORGANISATION FOR PROJECT

——— LINES OF DIRECT RESPONSIBILITY

- - - - - - - - LINES OF COORDINATION / TECHNICAL GUIDANCE

DP DINAS PENGAIRAN

Table 3.5.1 Monitoring Program for SRM ISSP–2

ACTIVITY	1991	1992	1993	1994
1. Field monitoring Activity	2 Mo	2 Mo		
2. Mid-term evaluation	2 Mo			
3. Final evaluation				
4. Revise Design Guidelines				
5. Survey Reports	F	F F F	F F F	F
6. Reports		X		X X

X Reports : Interim Evaluation Report
Final Evaluation Report
Design Guidelines Update Report

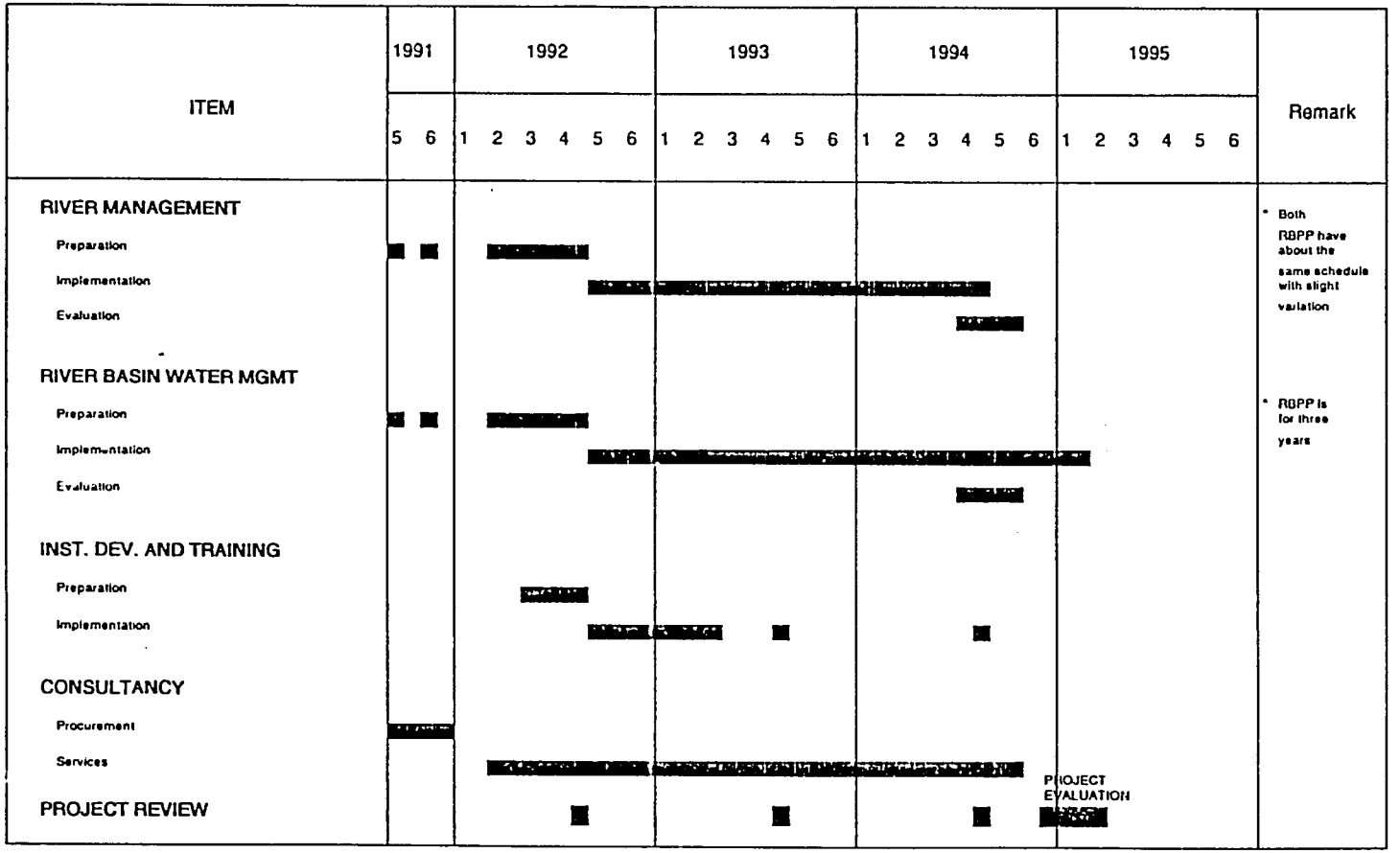
Notes :
- Monitoring work began in ISSP–1 in January 1990
- ISSP–2 Monitoring will begin in June 1991 and be completed by March 1994
- Each field monitoring activity is for two months

Table 3.5.2 Field Monitoring and O&M Activity for SRM ISSP-2

No.	Activity	1991			1992			1993			1994		
1	FIELD MONITORING												
1.1	Topographic/ Hydrographic Survey			1.5 Mo									
1.2	Hydrometric Survey/ Discharge Measurement			5 days									
1.3	Observation of Tide Level and Water Surface Level in river and river mouth												
2	O&M ACTIVITY												
2.1	Training wall, river and gauging network inspection												
2.2	Minor repair to structures and gauges												
2.3	Gabion replacement and refilling				As required								
2.4	Acces road maintenance				As required								

Table 3.5.3

Rivers Basin Pilot Project
Project Implementation Schedule



implementation of water allocation, monitoring and enforcement. The proposed implementation schedule is shown in Table 3.5.4.

3.5.3 GOI Staffing and Facilities

Monitoring of Small River Mouths

The monitoring activity will not require extensive new GOI staffing positions or facilities. Much of the work will be undertaken by existing staff in DOR at Jakarta and the PPS staff at the provincial levels. Monitoring Consultants and the monitoring survey sub-contractor(s) will provide the bulk of the support. No separate office facilities are required.

The following GOI staffing and facilities are proposed ;

Staffing :

1 Full time Engineer to work on the DOR SRM Monitoring Team for 42 months in Jakarta.

5 Full time Site O&M and monitoring coordinators BIE/BSc level for 42 months to work on the six SRM's under respective PPS units.

Facilities : For use by PPS and Monitoring Team

Motor cycles	5 Nos for PPS of the 5 SRM's
Survey Equipment (Theodolite, Level, EDM)	1 set
Automatic Water Level Recorders with Housing	5 Nos
Hydromet Equipment (current meter, sediment sampler, staff gauges etc)	1 set

River Basin Pilot Projects

The RBPP will require adequate GOI staffing to undertake the intended activities. Organisationally the work will be implemented by existing organisations but new staffing positions have to be created in these units. An analysis of the institutional staffing will be undertaken by the respective consultants to determine the level of service and personnel requirement.

For the two RBPP new sections have to be established. Cisanggarung Sub-Project will have some staffing available to staff the sections after they complete the on-going river improvement works in 1990. However, PPS Yogyakarta will require new personnel to staff the sections.

Table 3.5.4 Seluna Basin Water Management Project
Project Implementation Schedule

ITEM	1991	1992	1993	1994
		April		
1. Soft Ware Development				
2. Hydromet Network Testing				
3. Data Collection Testing				
4. Develop Reporting System				
5. Water Allocation Activities				
6. Allocation Monitoring				
7. System Upgrading				
8. Institutional Dev. & Training				

The following GOI staffing is proposed for the two RBPPs' ;

	Cisanggarung	Opak
Senior Engineers (IRs')	4	3
Junior Engineers (BE)	9	6
Supervisors (STM)	12	8
Administrative Staff (SLA / STA)	13	8

A number of facilities are required. These comprise O&M shed, vehicles, motor cycles, boats, hydromet equipment, small O&M equipment, hand tools, material for emergency repairs, computer systems and software, equipment for flood warning system/monitoring and communications equipment.

The following list provides some of the more important facilities required.

	Cisanggarung	Opak
O&M shed (m^2)	225	150
Vehicles	5	3
Motor cycles	6	4
Boats	2	-
Hand compactors	6	4
Grass cutting m/c	9	4
Radio	30	20
AWLR	8	5
Computer system	3	2
Flood warning system	yes	no

Seluna Basin Water Management Project (Phase-2)

This project will require adequate GOI staffing to undertake the proposed activities. organisationally this will be implemented by the O&M division of the Jratunseluna Project. However, all of the staff for the Water Control Center, field activity, monitoring and record keeping will be new. This staffing will be different from the O&M staffing at the Kedung Ombo Dam and the two barrages.

A tentative list of GOI staffing is as follows;

Sr. Water Management Engineers (Ir) - 2
Jr. Water Management Engineers (Ir) - 2
Field Water Management Engineers (Ir or BE) - 3
Water Inspector (STM) - 6
Computer Operator (SLA/STA) - 3
Administrative Staff - 4

Facilities such as buildings, furniture, equipment are to be procured under the IBRD Loan no. 2543/IND under Phase 1. However it is proposed to supplement the equipment and transportation needs through additional funding in Phase 2. The project will need additionally for transportation 1 Jeep, 3 Motor Cycles and 12 Cycles. For the MIS System one set of PC Computer system will be required.

3.5.4 Consulting Services

Monitoring of Small River Mouths

The proposed activity for on-going monitoring of SRM's will not require the services of consultants to undertake the review and monitoring work and sub-contractor(s) to carryout the periodic topographic and hydrometric surveys. The monitoring work will be undertaken by DOR. All necessary field work will be carried out by the respective PPS units. However, the Rivers Advisor who will be attached to the Directorate of Rivers will provide assistance in the monitoring work and in final evaluation of monitoring. He will also assist in the review of design guidelines for SRM's.

A brief Terms of Reference for the Rivers Advisor is presented in Appendix F.

River Basin Pilot Projects

The RBPP will require consultants to undertake project preparation, assist the pilot project in the implementation activities and evaluate the project to assess achievement of goals and recommend changes if necessary. The consultants will also assist GOI and the Bank in the review work. A brief Terms of Reference for RBPP consulting services is presented in Appendix F.

The consultancy services schedule, expertise required and the manmonths are shown in Table 3.5.5. The total duration of the services will be 34 months. This will comprise a preparation phase (6 to 9 months), an implementation phase (24 months) and an evaluation phase (2 months). Both International and Indonesian experts will be required. Each RBPP will require a separate team. However, consolidation of the consultancies into one set of services can be explored.

The man month required are as follows ;

Item	Cisanggarung	Opak
Location	Ciledug (W. Java)	Yogyakarta (DIY)
International (mm)	11	13
Indonesian (mm)	48	8
Total (mm)	59	21

Seluna Basin Water Management Project (Phase-2)

The two years Phase 2 Water Management Project will require consultants to assist Jratunseluna Project along with IHE. The consultant services will be limited to debug and test the system, assist in the software development and maintenance and in the preparation of water allocation schedule. They will also assist in the development of a viable reporting system for water allocation and monitoring.

A total of 26 mm of consulting service is identified. This will consist of an 8 mm International Expert for Water Management and 18 mm of National Expert for Water Management application. The consultancy will begin in April 1992 and run for 2 years.

Table 3.5.5 River Component Consultancy Service Schedule

EXPERTISE	1991			1992						1993						1994						1995						Manmonth	
	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	Intl.	Ind.
RIVERS ADVISOR																													
EXPERT ADVISOR																												18	0
																												18	0
CISANGGARUNG RBPP																													
River O & M Engineer																												3	0
Water Management Expert																												8	0
Hydrologist																												-	-
Institutional Expert																												-	-
MIS Expert																												-	-
O & M Engineer																												-	24
Water Management Eng.																												-	6
																												11	30
OPAK RBPP																													
River O & M Engineer																												2	0
Water Management Expert																												9	0
Water Quality Expert																												2	2
Hydrologist																												-	-
Institutional Expert																												-	-
MIS Expert																												-	-
Water Management/O&M eng.																												-	24
																												13	26
SELUNA BASIN WM PROJECT (PHASE - 2)																													
Water Management Expert																												8	0
Water Quality Expert																												0	18
																												8	18
																						GRAND TOTAL						50	74

3.6 Groundwater Irrigation

3.6.1 Project Organisation

Executing Agencies will be:

- P2AT Jatim in Surabaya for the East Java Project,
- P2AT Sul-Sel in Ujung Pandang for the Sulawesi project,
- P2AT NTB in Mataram for the Lombok project.

Under P2AT Jatim there are four sub-projects called P2AT Madiun in Madiun, P2AT Surabaya in Surabaya, P2AT Besuki in Jember and P2AT Madura in Pamekasan. In the Sulawesi project, P2AT Sul-Teng in Palu will be the sub-project office for the execution of the Central Sulawesi scheme.

3.6.2 Implementation Schedule

Implementation work schedules are shown in Table A.2 and Table A.3 of Appendix A.2.

3.6.3 Staffing and Facilities

Reinforcement of staffing will be required for P2AT Sul-Sel.

New offices will be required in Ujung Pandang for the South Sulawesi scheme and in Poso for the Central Sulawesi scheme. In Poso, a part of the Parigi-Poso project branch office could be utilised.

3.6.4 Consulting Services

For the Lombok project, consultants are available to the end of December 1991.

Proposed assignment schedules for the East Java project and the Sulawesi project are shown in Table A.4 and Table A.5 of Appendix A.2 respectively.

The total assignments envisaged are

- for East Java: Expatriate 7 mm and Indonesian 17 mm,
- for Sulawesi : Expatriate 5 mm and Indonesian 23 mm.

Irrigation Service Fee

l ISF and Government Organisation

ɜnsion of the ISF programme under ISSP-2 will continue to be the responsibility of the PUOD of the Ministry of Home Affairs, through the Directorate for Regional Finance uangan Daerah). Figure 3.7.1 shows the departmental organisation in some detail.

is essentially a provincial programme implemented at the district level. The provincial ɜrnment will therefore bear the ultimate responsibility for project implementation, in ɔing with ministerial guidelines and instructions, cf. Decree of the Minister of Home Affairs i3/1989 and his Instruction no.30/1989. To this effect, in each province where ISF is ɔduced a provincial ISF support ('pembinaan') team will be established. This team, chaired he Governor, comprises the Head of PRIS as executive secretary and member, and senior ·esentatives of other ISF related provincial departments as members.

ıds of administrative districts (Bupati) will continue to be directly responsible for ISF ɔduction, collection implementation and fund administration in their districts. These tasks explicitly delegated to them by the Governor concerned in keeping with the ministerial ɜee. During the introduction stage, a district ISF implementation team ('Team ılementasi'), in composition similar to the provincial ISF support team, will assist the Bupati is tasks.

line with presidential instruction (Inpres) 2/1984 and subsequent legal provisions, the upaten (tingkat II) government has a primary role in organising water users, and this role be emphasized under ISSP-2. Active water users associations (WUA) will be indispensable successful ISF. Hence, O&M and ISF oriented formation, strengthening and training of IAs will be key activities of the ISF programme, and institutional arrangements to this effect have priority.

enda II, the district level revenue agency, will, under supervision of the Bupati, continue to ıinister and implement ISF collection and fund allocation. Initially, Dipenda II staff will ı assist WUAs in new ISF areas in collecting fees from their members. It is important, ɜever, that WUAs will be encouraged, and trained, to carry out this collection task ɜpendently as soon as possible.

ɔther key agency in the ISF programme is the Irrigation Service represented at the central ɜl by DOI-I (DGWRD) and at the provincial level by the provincial irrigation service (PRIS). ; this agency which is responsible for the delivery of the O&M services to the WUAs as ɜed in the service agreement. This responsibility will increasingly be entrusted to the cabang ıs pengairan and ranting dinas pengairan as the PRIS district and subdistrict operational :s for system operation and maintenance. Essentially, ISF is a government policy aiming at ɔvery of irrigation O&M costs on a system basis, with the kabupaten government as the ılementing agency and the cabang dinas as the service supplier performing a crucial role.

ɜr-agency coordination of ISF related activities at the provincial and district levels will be the : of the Governor and the Bupati, respectively, through the appropriate mechanisms already ıblished.

a later stage, this regional coordination framework may be strengthened and consolidated her by setting up multi-purpose Water Resources Committees which would eventually lace the present Irrigation Committees. During ISSP-2, such a concept may, in certain anced provinces, for example in the context of a river basin pilot scheme, be tested for its ɔility.

3.7.2 Implementation schedule

Inview of the close relationship between the SM/EOM programme and the ISF programme, the ISF implementation schedule cannot be planned for the whole project period at this stage.

Further more with regard to the annual area targets, a certain flexibility in ISF expansion will be required, as progress will essentially depend on continued acceptance of ISF by users both in areas already under ISF and those to be brought under ISF. As much as possible 'problem' areas should be kept out of the programme rather than having to face a very low fee level for many years and the risk of increased indifference towards ISF.

Consequently a programme for each year's ISF implementation will be developed annually between October and December as part of the regional planning and budgetary planning process . The ISF programme for 1991/1992 will be finalised in October 1990.

3.7.3 Project Layout and Consulting Services

In order to cope with an expansion programme of the magnitude described in the previous paragraphs, the project set-up needs structural adjustment and additional consulting services.

At the centre a team of foreign consultants will assist the DGPUOD in all aspects of ISF including :

- monitoring ISF inclusion in the budget/DIP cycle (in keeping with the government commitment to supplement the O&M cost required for ISF systems);
- planning the ISF programme and policies;
- assessing any fee collection losses due to low service levels, and communicating with provincial public works about remedial action;
- devising an accurate and efficient communication and information system to timely reach officials, the public and the target groups in prospective ISF areas;
- streamlining collection reporting procedures;
- providing training to DGPUOD and provincial PW staff on budgeting for O&M and preparing annual plans jointly with ISF Area and Unit teams;
- strengthening the working relationships between DGPUOD and the provincial agencies concerned;
- preparing expansion of ISF in new provinces by timely starting up financial procedures in all provinces.

Moreover, through close monitoring of the ISF introduction and implementation process and through timely addressing any possible weaknesses of the programme, the consultants will contribute to establishing an early warning system.

At the regional level foreign and local consultants will monitor, supervise and support ISF introduction and start-up. In order to be within easy reach of the field teams, these specialists will each cover a geographical part of the ISF project area.

he irrigation and O&M specialists on the central consultants team to be assigned to OI-1 will coordinate and provide support to the regional ISF teams.

able 3.7.1 provides a breakdown of the consulting services concerned.

Table 3.7.1 Consultancy Inputs for ISF

Post	Location	Manmonths Foreign	Local
Central Consultants			
Team Leader/Irr. Economist/Mangt. Specialist	F Jakarta	48	
Finance & Budgeting Specialist	F Jakarta	24	
Computer Programming Specialist/MIS	F (Jakarta)	12	
Accounting Specialist	F (Jakarta)	6	
Audio - Visual Specialist	F (Jakarta)	6	
Sub - Total		96	
Regional Consultants			
Institutional Specialists (2)		72	
Service Engineer		48	
Sociologists (6)			216
O&M Engineers (3)			144
Sub - total		120	360
GRAND TOTAL		216	360

8 Rural PBB Tax Valuation and Land Re-classification

8.1 Organisation

ı line with the central government's policy for further decentralisation or co-administration and creased responsibility of the local governments and to increase efficiency, PBB has carried out ı internal re-organisation to this effect.

s central office would have the task of policy making and overall management, while the local ›vernment levels would be in charge of the implementation of these policies.

8.2 Implementation Schedule

ɔr the activities foreseen in the ISSP-2 project, a tentative time schedule is given in ıble 3.8.1.

8.3 GOI Staffing and Facilities

affing

s much as possible PBB will employ its own staff members, mainly from provincial and gional field offices, in the activities to be developed to obtain a continuity in the work to be ecuted within the framework of the project or after its termination.

›ecial attention is to be given to the automation and the land classification and valuation.

ıe land classification and valuation is a task which is and will be executed by PBB staff. The me can be said about the automation, although initially sections of the work to be carried out ay have to be contracted.

ıcilities

›r the PBB offices (Kanwil and KPPBB) the following types of equipment will be needed:

- hardware (PC 386)
- software
- digitiser
- plotter

ı optimise the use of data for processing, maintenance and storage, it is necessary to have fficient office and storage space at each of the offices involved in the re-classification projects.

ıantities of the required equipment are given in Table 3.8.2

Table 3.8.1 Time Schedule Proposed PBB – ISSP-2 Project

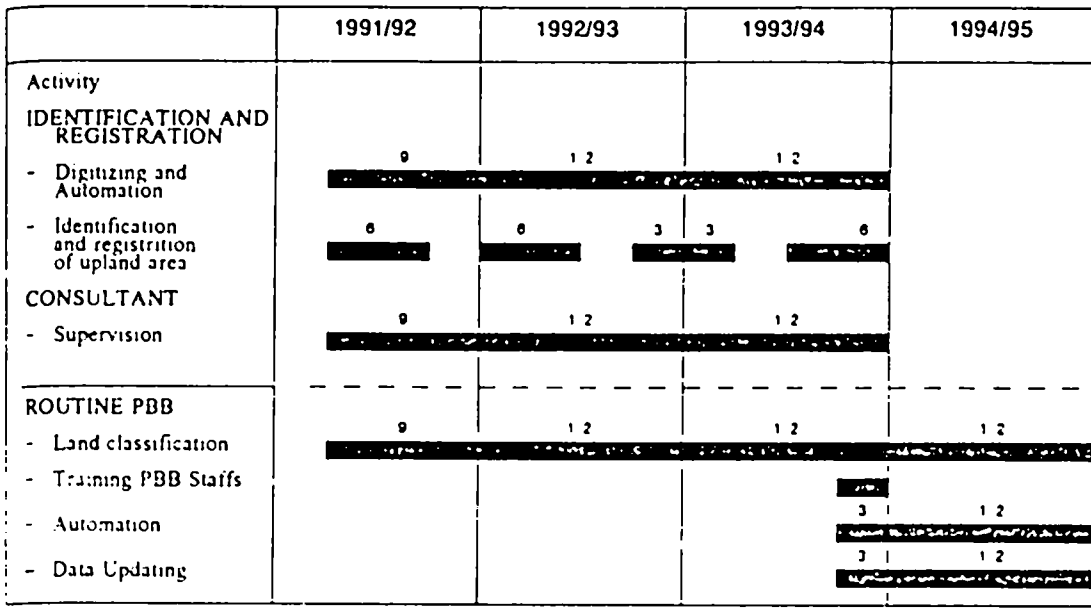


Table 3.8.2: Computer equipment requirement (tentative)

	Kanwil	KPPBB	Total
hardware:			
PC-386			
+co-processor	5	4	9
printer	5	4	9
digitiser	5	4	9
plotter	5	4	9
software:			
dBase	5	17	22
Lotus	5	17	22
WS/WP	5	17	22
Mapinfo	5	17	22
ArcInfo	5	3	8

.4 Consulting Services

st of the identification and registration activities will be contracted to local firms specialised his discipline. These will be supervised by the local consultants.

: proposed local consultants will consist of :

- Computer Analyst
- PBB expert
- Topographer

ı a total of 54 man months

: job of these consultants will be :

- to assist the PBB Directorate in selecting and further developing a standard software package.
- to supervise contractors on the implementation of digitalization, key in and data conversion into standard software
- to supervise the implementation of identification and registration of landholdings of upland areas.

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3.9 Institutional Strengthening and Training

3.9.1 Organisation

The PRIS will essentially be responsible for implementation for all on-the-job training, in keeping with BDP-provided guidelines.

A key functionary in PRIS should be assigned the task of coordinating the various types of training (O&M, WUA, ISF, Turnover).

3.9.2 Implementation Schedule.

The implementation schedule is shown in Figure 3.9.1. Under ISSP-1, considerable momentum has been achieved in the training programmes and it will be important that there is minimal gap between the ISSP-1 and 2 programmes to ensure that this is maintained.

3.9.3 Consulting Services.

The proposed training consulting services are presented in Table 3.2.5. With the reduced technical assistance proposed, only two training specialists (one local, one foreign) will be provided for a maximum of two years to support training in the irrigation component. These specialists will be centrally based and expected to provide support for O&M staff and Water Users Training in 9 provinces and Jatiluhur. They will be part of the Irrigation Component Central Consultants reporting to DOI-1.

Training Implementation Figure 3.9.1

Training Activity	Financial Year				
	ISSP-1	ISSP - 2			
	1990/91	1991/92	1992/93	1993/94	1994/95
1. Irrigation O&M Training					
Modification and preparation of new material					
Planning & design training					
Construction supervision training					
O & M Training					
Follow-up, refreshers, supervision					
2. Water User Training					
Review of WUA Training					
Modification of materials					
WUA Training					
Follow-up, refresher, supervision					

CHAPTER 4

COST ESTIMATES

4.1 Introduction

Costs of the various components of ISSP-2 have been estimated, based on information provided by DGWRD, PRIS and their consultants. In this Chapter the costs of each component (apart from the cost of consultants) are presented separately in Sections 4.3 to 4.10. The costs of consultants and summaries of the costs and disbursement schedules for the overall project are given in Section 4.11, where costs have been presented for convenience in both Rupiah and US dollars. However it should be noted that the basic estimates were made in Rupiah. No breakdown into foreign and local costs has been made, as it is understood that the proportion of the IBRD contribution will not be based on the foreign cost content of the project. It is intended that the detailed financing plan will be evolved as a result of discussions between GOI and IBRD during the planned appraisal mission in September 1990. The outline plan is presented in Table 4.11.7.

4.2 Basic Assumptions

In preparing the cost estimates, all prices have been expressed in constant mid 1990 rupiah. 1989 prices were inflated by 7%, at the request of the IBRD mission to bring them to mid 1990 values. It should be noted that Indonesian cement prices were increased by about 30% in early 1990 and it is not yet possible to estimate the impact of this price rise on construction rates. In estimating future price escalation a rate of 6% per year has been used at the request of the IBRD mission.

The exchange rate used for converting financial costs from rupiah to US dollars is 1 US$ = 1,820 Rp. For economic calculations an exchange rate of 1 US$ = 1,800 Rp was used. This was the exchange rate used for calculating the economics of PIADP project, which was prepared just before ISSP-2. It was felt that it would be confusing to have different economic farmgate prices and crop budgets in the two preparations, which would have been the case if the former exchange rate had been used.

Other assumptions made in estimating project costs are described in the sections below specific to each component.

3 Surface Irrigation

3.1 Special Maintenance

the concept of Special Maintenance (SM) for ISSP-1 it was considered that the average costs construction needed to bring selected areas up to a standard which would allow efficient ıeration and maintenance would be about 100 US$/ha, or about 164,000 Rp/ha.

uring ISSP-1 SM works were designed and partly constructed for 401,732 ha including NTB. ıe engineer's cost estimates for these works totalled about Rp 111.2 billion or, on average, ıout 276,800 Rp/ha. The costs of the works completed by the end of FY 1989/90 amounted about Rp 64.4 billion (Rp. 61.6 billion excluding NTB).

ctually, these costs should be adjusted and expressed in mid-1990 prices. A rough calculation dicates that the costs then would be about Rp 75.1 billion (Rp. 71.9 billion excluding NTB).

ıe funds required to complete SM construction in the 384,184 ha excluding NTB are estimated about Rp. 36.0 billion in mid-1990 prices. Details of items of work proposed still need review ı determine more accurate costs. However, based on this preliminary figure it follows that the ıtal costs of SM construction in these 384,184 ha would be about Rp 107.9 billion, or about 31,000 Rp/ha.

summary per province of the costs of completed construction, funds needed to finish SM and .e total SM construction costs are shown in Table 4.3.1. The average total costs per hectare are so given in this table.

ıventories received from the provinces indicated that designs have been made for about 74,000 ha out of more than 820,000 ha proposed to be included in the ISSP-2 Special laintenance programme. Estimated construction costs quoted in the inventories were estimated ainly on the basis of quantities and unit prices. However in some cases provinces appear to ıve estimated costs by using a unit rate per hectare even on these areas where designs were ıid to exist.

ı the case where designs exist, the construction costs stated in the inventories have been ɔnverted to mid-1990 prices. The construction costs of these areas averages about 50,000 Rp/ha, or about 25% higher than the average ISSP-1 SM construction costs of 37,000 Rp/ha. This appears to be acceptable, considering that these new areas generally are ɔmewhat older and have been rehabilitated earlier and, therefore, require more work.

he ISSP-2 Special Maintenance construction costs have therefore been calculated in the ɔllowing manner:

- The costs of DIs for which designs have been made and construction costs appear to have been estimated on the basis of quantities and unit prices have been entered as stated in the inventories, after conversion to mid-1990 prices where appropriate.

- The costs of DIs for which no designs have been made and/or construction costs appear to have been based on a unit rate per hectare, have been calculated using an overall unit rate of 360,000 Rp/ha.

he design costs of DIs for which designs still have to be made have been estimated using an verall unit rate of 40,000 Rp/ha.

he total costs of Special Maintenance per province and per year are given in Table 4.3.2.

Table 4.3.1 Estimated Costs Special Maintenance SM2 and ISSP-1

Province	SM Constr. Area (ha)	Construction completed by March '90		Additional Special Maintenance Mid-1990 prices		
		Current prices (Rp 1000)	Mid-1990 prices (Rp 1000)	Costs SM2 (Rp 1000)	Total costs (Rp 1000)	Average Costs (Rp/ha)
C Java	68,339	10,650,121	12,428,691	2,135,357	14,564,048	213,115
E Java	65,508	10,442,760	12,186,701	3,350,022	15,536,723	237,173
Jatiluhur	60,192	10,173,532	11,872,512	1,239,455	13,111,967	217,836
Lampung	12,794	2,029,450	2,368,368	1,124,698	3,493,066	273,024
S Sulawesi	64,954	9,488,974	11,073,633	3,650,519	14,724,152	226,686
S Sumatera	16,620	3,691,600	4,308,097	5,824,275	10,132,372	609,649
W Java	63,838	10,190,815	11,892,681	10,917,813	22,810,494	357,318
W Sumatera	14,683	2,372,538	2,768,752	5,743,760	8,512,512	579,753
Yogyakarta	17,256	2,595,080	3,028,458	2,016,611	5,045,069	292,366
Total	384,184	61,634,870	71,927,893	36,002,510	107,930,403	280,934

Table 4.3.2 Special Maintenance Costs by Province and by Year

Province	FY 1991/92				FY 1992/93				FY 1993/94				FY 1994/95				TOTAL			
	Area (ha)	Design (Rp.mills)	Area (ha)	Construction (Rp.mills)	Area (ha)	Design (Rp.mills)	Area (ha)	Construction (Rp.mills)	Area (ha)	Design (Rp.mills)	Area (ha)	Construction (Rp.mills)	Area (ha)	Design (Rp.mills)	Area (ha)	Construction (Rp.mills)	Area (ha)	Design (Rp.mills)	Area (ha)	Construction (Rp.mills)
C Java	28,860	1,154	13,927	5,303	27,950	1,118	30,924	11,132	8,360	334	27,950	10,062			28,908	10,407	65,170	2,606	101,709	36,904
C Sulawesi	10,314	413			3,345	134	10,314	3,713	4,801	192	3,345	1,204	976	39	4,801	1,728	19,436	778	18,460	6,645
E Java	21,885	875	26,523	10,556	31,505	1,260	43,948	15,204	33,985	1,359	41,651	15,588	15,967	639	33,985	12,235	103,342	4,133	146,107	53,583
Jatiluhur	21,894	876	8,510	3,064	25,684	1,027	21,894	7,882	23,168	927	25,684	9,246	14,170	567	23,168	8,340	84,916	3,397	79,256	28,532
Lampung	5,866	235	5,000	1,800	6,333	253	5,866	2,112	6,651	266	6,333	2,280			6,651	2,394	18,850	754	23,850	8,586
S Sulawesi	4,310	172	5,285	2,241	14,390	576	16,656	8,464	15,643	626	14,390	5,180			15,643	5,631	34,343	1,374	51,974	21,516
S Sumatera	1,835	73			4,167	167	834	300			1,835	661			4,167	1,500	6,002	240	6,836	2,461
W Java	29,785	1,191	13,774	4,959	31,886	1,275	29,785	10,723	20,978	839	31,886	11,479			20,978	7,552	82,649	3,305	96,423	34,713
W Sumatera	4,934	197	3,962	1,426	6,565	263	4,934	1,777	3,790	152	6,365	2,183			3,790	1,364	15,289	612	19,251	6,750
Yogyakarta	3,512	140	3,063	1,103	7,060	282	5,512	1,984	7,420	297	7,060	2,542	1,364	55	7,420	2,671	19,356	774	23,055	8,300
Total	133,195	5,326	80,044	30,452	158,885	6,355	170,667	63,291	124,796	4,992	166,699	60,425	32,477	1,300	149,511	53,822	449,353	17,973	566,921	207,990

In addition, an amount of Rp. 3,600 million has been included in the budget for the design of Special Maintenance works for 90,000 ha to be constructed in the first year of a possible ISSP-3 project. A further amount of Rp. 12,480 million has been included in the budget for the area of 249,598 ha requiring PROM.

SM2: Additional SM in ISSP-1 areas

The costs of the works needed to complete Special Maintenance in the ISSP-1 areas have been entered as stated in the inventories received from the provinces, after conversion to mid-1990 prices where appropriate. The costs per province and per year are given in Table 4.3.3.

SM3: Special Maintenance in DEOM areas

The costs of Special Maintenance needed in DEOM areas have been entered as stated in the inventories received from the provinces, after conversion to mid-1990 prices where appropriate. The costs per province and per year are given in Table 4.3.3.

4.3.2 Efficient Operation and Maintenance

Based on previous studies by the Gajah Mada University and generalized estimates in the past in West, Central and East Java, the structure of O&M funding for irrigation areas covered by Efficient Operation and Maintenance (EOM) under ISSP-1 was set at an estimated cost figure of 25,000 Rp/ha at 1987 prices, including routine salaries of O&M provincial staff funded by DIK.

The budget allocations for 1987/88, excluding DIK, are shown below, as well as the allocations for 1990/91 adjusted for inflation at an annual rate of 8% for the years 1988/89 and 1989/90 and 7% for FY 1990/91, in accord with paragraph 21 of the IBRD Follow-Up Preparation Mission's Aide Memoire of March 23, 1990.

	FY 1987/88	FY 1990/91
- Recurrent O&M (ABPN/ABPD+PBB)	8,385 Rp/ha	10,465 Rp/ha
- Incremental expenditures for EOM (including 10% tax)	13,200 Rp/ha	16,474 Rp/ha
Total	**21,585 Rp/ha**	**26,939 Rp/ha**

The Working Group on Irrigation Operation and Maintenance, composed of representatives of DOI-1, DOR, DOS, Bappenas, PUOD/MHA and Prov.Dev./MHA has developed proposals for the preparation of a Needs Based Budget (NBB) for EOM.

Expenditures are divided into Operation costs (which include the cost of administration) and Maintenance costs. Overhead costs at provincial (Sub Dinas)/KPKD and Cabang level are computed separately. Salaries of permanent government staff are not included.

Table 4.3.3 Costs of SM2 and SM3 by Province

	Additional Maintenance (SM2)		SM in DEOM areas (SM3)	
	Area (ha)	Total Construction (Rp Mill.)	Area (ha)	Total Construction (Rp Mill.)
C Java	40,925	2,135	29,802	6,910
E Java	36,945	3,350	24,706	2,053
Jatiluhur	27,176	1,239		
Lampung	12,794	1,125		
S Sulawesi	22,343	3,651		
S Sumatera	16,620	5,824		
W Java	41,451	10,918	102,878	32,665
W Sumatera	14,629	5,744	8,224	4,390
Yogyakarta	10,011	2,017	8,143	835
Total	223,394	36,003	173,753	46,853

ALL SM2 and SM3 to be constructed in 1991/92

The Working Group distinguished two methods to determine the costs of O&M for national budgeting purposes:

(a) based on an inventory of the system components and assuming pro rata costs of maintenance of different categories of canals and structures, and

(b) based on cost estimates of actual maintenance repairs, estimated on the basis of an inspection of the system.

An example of the first type for a Cabang Dinas of 25,000 ha is given in the report issued by the Working group, dated December 1989, and is reproduced below. The computed total costs, excluding routine salaries of permanent staff, are 27,972 Rp/ha (see Table 4.3.4).

At the present time efficient O&M still includes the clearing of back-logs of accumulated maintenance. Regular maintenance costs will be established at a later time. By then, it should be possible to adopt the method mentioned under (b) above, and a more accurate picture of O&M costs will become available.

Meanwhile, a number of (sample) NBBs for EOM for FY 1990/91 have been prepared. The results, which do not include Daftar Isian Kegiatan (DIK), are presented in Table 4.3.5

A review of these budgets shows that both methods mentioned under (a) and (b) above have been used to arrive at these results. Particularly in the latter case the maintenance costs can vary widely, depending on the condition of the systems at the time of inspection. Also, the allocation of costs to, respectively, operation and maintenance is not always consistent.

The total O&M costs given in Table 4.3.5 vary from a minimum of 16,809 to a maximum of 65,838 Rp/ha, with an average of 28,821 Rp/ha. The latter figure is somewhat distorted by two exceptionally high figures for DI Cikeusik (65,838 Rp/ha) and Singomorto (62,084 Rp/ha), due to high maintenance (construction) costs. Excluding these two DIs, the average costs for O&M become 24,931 RP/ha.

Considering the above, it would appear that the funding level established for ISSP-1, adjusted for inflation, is adequate and funding for ISSP-2 could be continued on the same basis.

Calculations to determine the funding for the incremental EOM costs have been made as shown in Table 4.3.6. The incremental EOM costs (6) shown in the lower part of the table have been calculated, starting with an amount of 13,200 Rp/ha in FY 1987/88 adjusted for inflation by 8% for the years 1988/89 and 1989/90, 7% for FY 1990/1991, and 6% for the years thereafter.

EOM areas introduced each year during ISSP-1 and expected to be introduced during ISSP-2 are shown in the shaded boxes.In the year of introduction these areas have been counted fully and in the 4 years thereafter for 80, 60, 40 and 20% successively. The cumulative totals (1) are the real areas under EOM in each consecutive year. The sum of the areas for each year (2) represent the (fictitious) areas to be funded by the World Bank. The differences between these two (3) are the (also fictitious) areas to be funded by GOI. Dividing the areas to be funded by the Bank (2) by the real areas (1) furnishes the percentages of Bank funding (4). Since the incremental costs per hectare (6) include 10% tax which is not funded by the Bank, these percentages have been divided by the factor 1.1 to arrive at the percentages of the incremental EOM costs (5) which the Bank will fund each year.

The total incremental costs (7) are found by multiplying the cumulative total areas (1) by the incremental costs per hectare (6). The total Bank contributions are arrived at by multiplication of the total costs (7) and the percentages (5). The differences between (7) and (8) represent the total GOI contributions.

Table 4.3.4 O & M Costs Estimate
Summary

Basic O&M Costs are computed for a Cabang Dinas using inventory of canals and structures. Administrative costs st District and Provincial Levels are added on :

	Total Cost Rp	Cost/ha Rp
1. Administration Cost		
a) Provincial (500,000 ha)	315,000,000	630
b) District (Wilayah/KPKD) (100,000 ha)	90,000,000	900
c) Administration and operation Cabang Dinas and Ranting Dinas (25,000 ha)	211,788,820	8,472
Sub – Total	616,788,820	10,002
2. Maintenance		
(Cabang Dinas = 25,000 ha)		
a) Routine and periodic maintenance (force account)	174,260,000	6,970
b) Periodic maintenance (mainly by contracts)	255,500,000	10,220
Sub – Total	429,760,000	17,190
3. Other Costs		
a) Survey and design for O&M per Province	40,000,000	80
b) Provision for emergency repairs (flood damage etc)	300,000,000	600
c) Hydrology per Province	50,000,000	100
Sub – Total	390,000,000	780
TOTAL	1,436,548,820	27,972

Source :
O&M Budget Planning and Allocation of Funds
Working Group on Irrigation O&M, December 1989

Table 4.3.5 Sample Needs-Based Budgets

Province KPKD/ Cabang Dinas	Daerah Irigasi	Area (ha)	O & M Costs (Rp 1000) Operation	Mainten.	Total	O&M Costs (Rp/ha)
West Sumatra						
Pariaman	Gunung Nago	3,193	22,835	66,118	88,953	27,859
Payakumbuh	Batang Lampasi	2,013	22,008	45,855	67,863	33,712
West Java						
Cirebon	Jamblang	2,899	42,484	77,490	119,974	41,385
Cirebon	Setupatok	1,943	34,748	59,392	94,140	48,451
Cirebon	Cikeusik *	8,056	97,201	433,193	530,394	65,838
Yogyakarta						
Bantul	Pijenan	2,797	48,448	42,226	90,674	32,418
Central Java						
Pemali Comal/Malahayu	Kabuyutan	4,287	31,000	48,000	79,000	18,428
BTP/Tuntang Hilir	Glapan Timur	8,525	53,000	100,000	153,000	17,947
Serang Lusi/Mria Barat	Logung	3,272	22,000	33,000	55,000	16,809
Serayu Bogowonto/ Luk Ulo	Sempor	10,890	70,000	262,000	332,000	30,487
Serayu Bogowonto/ Serayu Tengah	Tajum	3,236	21,000	90,000	111,000	34,302
Serayu Bogowonto/ Serayu Hulu	Singomerto *	5,863	38,000	326,000	364,000	62,084
East Java						
Banyuwangi/Banyuwangi	Bate	3,892	30,543	54,781	85,324	21,923
Lumajang/Tanggul	Tanggul Timur	2,334	21,565	31,600	53,165	22,778
Bondowoso/Bondowoso	Clangap	3,023	22,295	50,484	72,779	24,075
Bondowoso/Jember	Mayang	9,024	50,395	104,046	154,441	17,114
Madiun/Ponogoro	Cemer Atas	4,117	30,546	52,100	82,646	20,074
Kediri/Nganjuk	Widas	3,651	24,871	40,500	65,371	17,905
Kediri/Tulungagung	Lodoyo	8,611	89,807	115,000	204,807	23,784
Malan/Kepanjen	Molek	3,977	38,609	61,250	99,859	25,109
Jombang/Pare	Srinjing	1,610	23,416	20,770	44,186	27,445
Bojonegoro/Bojonegoro	Pirang	1,411	23,742	41,964	65,706	46,567
Madura/Pamekasan	Samiran	1,320	24,854	27,000	51,854	39,283
South Sulawesi						
I/Sidran	Sadang VI/VII Bulu Genrana	21,093	91,451	354,386	445,837	21,137
II/Bone	Palakka	4,633	26,774	83,844	110,618	23,876
III/Maros	Bantimurung	6,513	42,694	138,749	181,443	27,859
IV/Pangkep	Tabo-Tabo	8,535	38,810	212,788	251,598	29,478
		Average: * including these 2 DIs				28,821
		* excluding these 2 DIs				24,931

Table 4.3.6 EOM Funding
Areas Introduced each year (ISSP- 1 & 2) and Funding (ISSP-2)

a)=Irrigation b)=Swamps

			ISSP-1				ISSP-2			
			1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
ISSP-1	1	a	198,000	158,400	118,800	79,200	39,600			
		b	12,500	10,000	7,500	5,000	2,500			
	2	a		367,000	293,600	220,200	146,800	73,400		
		b		33,600	26,880	20,160	13,440	6,720		
	3	a			280,000	224,000	168,000	112,000	56,000	
		b			53,110	42,488	31,866	21,244	10,622	
	4	a				143,250	114,600	85,950	57,300	28,650
		b				49,650	39,720	29,790	19,860	9,930
ISSP-2	1	a					127,350	102,072	76,554	51,036
		b					14,140	11,312	8,484	5,656
	2	a						133,512	106,810	80,107
		b						15,260	12,208	9,156
	3	a							299,265	239,412
		b							2,375	1,900
	4	a								224,775
		b								0
Cumulative Total Irrigation			198,000	565,000	845,000	988,250	1,115,840	1,249,352	1,548,617	1,773,392
Cumulative Total Swamps			12,500	46,100	99,210	148,860	163,000	178,260	180,635	180,635
(1) Cumulative Total			210,500	611,100	944,210	1,137,110	1,278,840	1,427,612	1,729,252	1,954,027
(2) EOM area for World Bank Funding			210,500	569,000	779,890	783,948	698,256	591,260	649,478	650,622
(2a) Area Funded Only Irrigation			198,000	565,000	845,000	988,250	1,115,840	1,051,352	983,617	928,392
Area Funded Only Swamps			12,500	46,100	99,210	148,860	163,000	165,760	134,535	81,425
Total Area Funded by IBRD			210,500	611,100	944,210	1,137,110	1,278,840	1,217,112	1,118,152	1,009,817
(3) EOM area for GOI funding			0	42,100	164,320	353,162	580,584	836,352	1,079,774	1,303,405
(4) % Bank excl. Tax of Cum Area			100	93	83	69	55	41	38	33
(4a) % Bank excl. Tax of Area Funded			100	93	83	69	55	49	58	64
(5) % Bank incl. Tax			91	85	75	63	50	38	34	30
(5b) % Bank Incl. Tax of Area Funded			91	85	75	63	50	44	53	59
(6) Incremental cost (Rp/ha)							17,463	18,510	19,261	20,798
(7) Incremental Cost (Rp 1000)							22,332,383	26,425,098	33,307,123	40,639,854
(8) Bank contribution (Rp 1000)							11,085,131	9,949,293	11,372,353	12,301,491
(9) GOI contribution (Rp 1000)							11,247,252	16,475,805	21,934,770	28,338,362

The irrigation areas expected to receive the incremental amounts for Efficient O&M, the incremental amounts and the contributions thereto by the Bank and GOI respectively are given below for the consecutive years of ISSP-2.

	1991/92	1992/93	1993/94	1994/95
EOM area (ha)	1,115,840	1,249,352	1,548,617	1,773,392
Incr.cost (Rp/ha)	17,463	18,510	19,261	20,798
% Bank funding	50	38	34	30
Bank contr.(Rp Mln)	9,672	8,707	10,184	11,164
GOI contr. (Rp Mln)	9,814	14,419	19,643	25,719

4.3.3 Equipment for EOM

The Government has requested inclusion of procurement of equipment for Efficient O&M in the ISSP-2 budget. Table 4.3.7 shows per province and for the total the number of the various items procured under ISSP-1, the number requested under ISSP-2, the unit price and total cost per item and the estimated total costs.

The unit prices have been extracted from contracts for similar items signed in the period May to November 1989, converted to mid-1990 prices.

4.3.4 Extension of Turnover Programme

DOI-I envisages for ISSP-2 an extension of the Turnover Programme of 130,000 ha, in eight provinces. Details concerning the turnover programme are given in Section 2.2.4.

The areas proposed to enter the programme annually are shown in Table 4.3.8. Also shown are the estimated unit cost in Rupiahs per hectare for the various activities, and the expected annual expenditures for the FYs 1991/92 to 1994/95.

Table 4.3.7 Equipment for Efficient O&M

Province	Area	Motor Cycle		Portable Grass Cutter		Water Pump		Hand Vibrator		Light Dump Truck		Jeep		Dozer/ Back Hoe/ Ditch Cleaner	
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
W Sumatera	55,600	13	56	42	223	16	0	16	0	8	0	1	6	2	:
S Sumatera	32,900	4	33	42	132	4	8	4	8	2	4	1	4	2	:
Lampung	39,200	18	40	84	157	4	4	4	4	2	2	1	2	2	:
W Java	151,500	32	152	42	606	8	16	8	16	4	8	1	10	1	:
Jatiluhur	125,900	22	126	42	504	20	14	20	14	10	7	4	8	3	:
C Java	164,500	54	165	42	658	38	26	38	26	19	13	4	24	3	:
Yogyakarta	40,200	16	40	42	161	6	4	6	4	3	2	1	3	2	:
E Java	196,600	78	197	42	786	50	22	50	22	25	11	6	23	3	:
C Sulawesi	24,000	0	24	0	96	0	10	0	10	0	5	0	5	0	:
S Sulawesi	69,500	8	70	42	278	10	14	10	14	5	7	2	8	2	:
Total	899,900	245	903	420	3,601	156	118	156	118	78	59	21	93	20	:
Unit price (Rp 1000)		2,200		820		2,000		2,000		29,300		18,100		[illegible]	
Cost (Rp million)		1,987		2,953		236		236		1,729		1,683			:
Total Rp 9,140 million															

Note: (1) Procured under ISSP-1
(2) Requested under ISSP-2

Table 4.3.8 Turnover Project Costs

PROGRAM (Area in ha)	1991/92	1992/93	1993/94	1994/95	Total
Inventory	40,300	45,500	48,100	48,100	182,000
Systems Improvement					
Design	31,000	35,000	37,000	37,000	140,000
Construction	27,000	31,000	35,000	37,000	130,000
Turning over					
Group A&B	-	-	-	-	-
Group C	27,000	31,000	35,000	37,000	130,000

COSTS (Rp 1000)	Unit pric (Rp/ha)	1991/92	1992/93	1993/94	1994/95	Total
OPERATIONAL AND TRAVEL						
Inventory	450	18,135	20,475	21,645	21,645	81,900
Profiling	650	20,150	22,750	24,050	24,050	91,000
WUA Formation & Development	4,800	278,400	316,800	345,600	355,200	1,296,000
Training of TP4 on:						
Inventory	750	30,225	34,125	36,075	36,075	136,500
Profiling and WUA Form&Dev.	1,800	55,800	63,000	66,600	66,600	252,000
Design & Construction	1,800	55,800	63,000	66,600	66,600	252,000
O&M	2,000	54,000	62,000	70,000	74,000	260,000
	Sub-total	512,510	582,150	630,570	644,170	2,369,400
SYSTEMS IMPROVEMENT						
Designs	27,000	837,000	945,000	999,000	999,000	3,780,000
Construction	275,000	7,425,000	8,525,000	9,625,000	10,175,000	35,750,000
	Sub-total	8,262,000	9,470,000	10,624,000	11,174,000	39,530,000
OTHER COSTS						
Adm, Prep. & Turnover	4,000	108,000	124,000	140,000	148,000	520,000
	Total	8,882,510	10,176,150	11,394,570	11,966,170	42,419,400

4.4 Swamps

4.4.1 On-going-projects

As mentioned in Section 2.3.2, two on-going projects have been included in ISSP-1 and are proposed to be completed in ISSP-2:

Province	Project	Area (ha)
Lampung	Mesuji/Tulang Bawang	20,000
N Sumatera	Sei Kualuh	9,375
	Total	**29,375**

The cost estimates of the outstanding works have been updated and expressed in mid-1990 prices. A summary is presented below.

Mesuji/Tulang Bawang

The sunk cost of the physical works prior to ISSP-1 amounted to approximately Rp 4 billion. The total ISSP-1 funds disbursed for these works amount to Rp. 9,270 million. The works proposed for ISSP-2 and their estimated costs (totalling Rp 4,285 million) are shown in Table 4.4.1

Sei Kualuh

The sunk costs of the physical works prior to ISSP-1 amounted to approximately Rp 1,150 million. The total funds disbursed for these works during ISSP-1 amounted to Rp 1,600 million, of which Rp 800 million was provided by ISSP and Rp 800 million by OECF. The works proposed for ISSP-2 and their estimated costs (totalling Rp 7,788 million) are also shown in Table 4.4.1.

The estimated total costs and expected annual expenditures for the on-going projects are shown below:

Fiscal Year :	1991/92	1992/93	1993/94	Total
Project Costs : (Rp mln)	7,091	5,582		12,673

4.4.2 Special Maintenance

During ISSP-1 Special Maintenance works were carried out in 5 provinces. In Lampung all the SM works have been completed. The status of the schemes in the 2 provinces proposed to be included in ISSP-2 and the estimated costs of SM works are shown in Table 4.4.1.

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Table 4.4.1 Costs of On-going and SM Swamp Projects

ON-GOING PROJECTS

	Unit	Number	Unit price (Rp 1000)		Costs (Rp mln)
Mesuji/Tulang Bawang					
Rehab. stoplogs		240	2,500		600
Access roads	km	100	15,000		1,500
Land development	ha	7,049	310		2,185
				Sub-total	4,285
Optional					
deep wells & distribution systems	unit	6	100,000		600
				Total	4,885
Sei Kualah					
Mob/demob		4			169
Primary structures		7	39,710.0		278
Secondary structures		85	2,690.0		229
Primary drains	m	35,819	23.9		856
Secondary drains	m	121,036	8.7		1,053
Tertiary drains	m	235,900	2.5		590
Embankments	m	24,478	15.0		367
Roads	m	32,000	42.0		1,344
Road surfacing	m	32,000	50.0		1,600
External roads	m	2,000	50.0		100
Bridges	m	103	2,116.0		218
O&M facilities					84
				Sub-total	6,888
Optional					
deep wells & distribution systems	unit	9	100,000		900
				Total	7,788

SPECIAL MAINTENANCE

	Status	Area (ha)	Unit price (Rp1000/ha)	Costs (Rp mln)
W Sumatera				
Anai I	partly compl.	2,200	200	440
Anai II	partly compl.	5,000	200	1,000
Silaut	partly compl.	3,200	200	640
Lasi	partly compl.	500	200	100
Lunang	partly compl.	4,500	200	900
	Sub-total	15,400		3,080
S Sumatera				
Delta Saleh	partly compl.	17,290	150	2,594
Sugihan Kiri	partly compl.	14,600	150	2,190
	Sub-total	31,890		4,784
	Total	47,290		7,864

The estimated total costs and expected annual expenditures for Special Maintenance are shown below:

Fiscal Year :	1991/92	1992/93	1993/94	Total
Project Costs : (Rp mln)	1,800	3,600	2,464	7,864

4.4.3 Efficient O&M

The incremental costs per ha for Efficient O&M and the yearly percentages of World Bank funding have been calculated as shown in Table 4.3.7. These figures, the swamp areas expected to receive these incremental amounts and the contributions thereto by the Bank and GOI respectively are given below for the consecutive years of ISSP-2.

	1991/92	1992/92	1993/94	1994/95
EOM area (ha)	163,000	178,260	180,635	180,635
Incr. cost (Rp/ha)	17,463	18,510	19,261	20,798
% Bank funding	50	38	34	30
Bank contr. (Rp Mln)	1,413	1,242	1,188	1,137
GOI contr. (Rp Mln)	1,434	2,057	2,291	2,620

The budget actually required for EOM in swamp areas is higher than the funds allocated. In particular in new swamp areas drains, but also structures built in unconsolidated soils require, particularly in the first years, a high maintenance effort. It is therefore proposed to increase the total EOM funds per hectare in the first two to three years after EOM introduction to a level of Rp 50,000.

4.5. Rivers

The Rivers component comprises of (i) Monitoring of Small River Mouths, (ii) Two Ri basin Pilot Projects and (iii) Seluna Basin Water Management Project (Phase-2). The cost these projects excluding GOI staffing cost and Consultancy cost in million Rupiah is follows :

(i)	Monitoring of SRMs		954
(ii)	River Basin Pilot Projects		3,537
	a. Cisanggarung	2,220	
	b. Opak	1,317	
(iii)	Seluna River Basin Water Mgmt Project		365

Thus, the total cost of the Rivers component in ISSP-2 excluding Consultancy Cost is Rp. 4,8 million. The schedule of expenditure for Fiscal Year 1991/92 to Fiscal Year 1994/95 (4 yea is presented in table 4.5.6.

4.5.1. Monitoring of Small River Mouths

The total cost for monitoring of SRM's for 34 months in ISSP-2 is estimated to Rp. 954 million as shown in Table 4.5.1. The cost for monitoring through to the start of ISSF (July 1992) will be covered under ISSP-1. The project cost consists of costs for perio topographic and hydrometric surveys (8 Nos), equipment cost. and an estimated cost for O& of the SRM's for three years. The O&M cost is expected to be provided through GOI budg

Table 4.5.1. Monitoring of Small River Mouths Cost Estimate

(Unit : Rp. Million)

1.	Topographic and Hydrometric Survey * 8 x Rp. 26 million	208
2.	Equipment 6 Motor cycles at 3 million Survey Equipment - 1 lot at 15 million 6 AWLR at Rp. 10 million Hydromet Equipment - 2 lot x Rp 7.5 million	108
3.	O&M cost to be provided by GOI at 4% per annum of investment cost of SRM's for 3 years Rp. 5318 million x 0.04 x 3	638
	Total	**954**

* Each round of monitor survey is estimated to cost

(i)	Topographic Survey	12 million
(ii)	Hydromet Survey	14 million
	Total	**26 million**

4.5.2 River Basin Pilot Projects

The RBPP estimate includes cost to undertake the various activities at the two river basins discussed in section 2.4.3. It covers a three year period of operation for each of the pilot project. The cost estimate includes cost for equipment, operation, maintenance, management and training. These have been grouped separately under (i) River Management, (ii) River Basin Water Management, and (iii) Institutional Development and Training.

The cost summary for the two RBPP is shown in Table 4.5.2 and the detailed cost estimate for the two RBPP Cisanggarung and Opak are presented in Tables 4.5.3 and 4.5.4 respectively. The total cost for the two RBPP is Rp. 3,537 million. The cost break down for the different components in million Rupiah are as follows :

Component	Cisanggarung	Opak
River Management	1,701	929
River Basin Water Management	359	247
Institutional Development & Training	160	141
Total	**2,220**	**1,317**

4.5.3. Seluna Basin Water Management Project (Phase-2)

The total cost of Phase-2 excluding consultancy is estimated to be Rp. 365 million as shown in Table 4.5.5. The cost includes maintenance cost for hydromet network, consumables for water control center, data collection for two years, monitoring and inventory field work for water allocation, withdrawal and discharge, water quality assessment, MIS system for water management, training and limited transportation.

Much of the cost of the water management project is being provided in Phase 1 under IBRD Loan No. 2543/IND. In Phase-2 Jratunseluna Project and Cabang Pengairan have to provide costs through GOI budget for water management staff. This is not included in the above project cost.

4.5.4. Consulting Services

Monitoring of Small River Mouths

Consultants will not be engaged for monitoring. The Rivers Advisor attached to the Directorate of Rivers will advise and assist in the monitoring, evaluation and changes to design guidelines. It is estimated that this work will need about 5 mm of time of the Rivers Advisor. The brief Terms of Reference of the Rivers Advisor is enclosed in Appendix F.

Table 4.5.2

River Basin Pilot Project
Cost Summary

Unit : Rp Million

	Cisanggarung	Opak
A. RIVER MANAGEMENT		
1. Inventory Data (Lump Sum)	15.00	10.00
2. Inventory and Classification	26.90	19.15
3. Survey of River and Infrastructure Condition	6.30	6.30
4. Flood Warning System	264.24	176.75
5. River Survey and Mapping	150.00	70.00
6. Sediment Survey	51.00	51.00
7. O & M Equipment, Tools and Material	459.64	260.85
8. Inspection and Flood Monitoring	62.10	34.20
9. River Operation and Maintenance	648.00	282.81
10. Flood and Damage Survey	18.00	18.00
Sub - Total	1701.18	929.06
B. RIVER BASIN WATER MANAGEMENT		
1. Inventory of Data	8.00	8.00
2. Upgrade Hydromet Network	234.00	155.70
3. Water management Unit	56.80	33.40
4. Water Management Data Collection	30.60	20.70
5. Inventory of Intake and Discharges	4.73	4.73
6. Monitoring of allocation	9.00	9.00
7. Water Quality Assesment	15.50	15.50
Sub - Total	358.63	247.03
C. INSTITUTIONAL DEVELOPMENT AND TRAINING		
1. MIS System	18.00	18.00
2. Training	85.50	85.50
3. O & M Shed	56.25	37.50
Sub - Total	159.75	141.00
TOTAL PILOT PROJECT	2219.56	1317.09

Table 4.5.3 Cisanggarung River Basin Pilot Project
Detailed Cost Estimate

		Unit :	Rp Million
A. RIVER MANAGEMENT			
1. Inventory Data (Lump Sum)			15.00
2. Inventory and Classification			
. Computer system 1 set		10.00	
. Stationary + drafting supplies		3.50	
. Structural drawing "as built"		5.00	
. Team, Travel & per diem		8.40	
60 D x 4 staff x Rp 25.000			
60 D x 9 Labor x Rp 5.000			
			26.90
3. Survey of River and Infrastructure Conditions			
30 days x 3 x 2 x Rp 25,000		4.50	
30 days x 3 x 4 x Rp 5,000		1.80	
			6.30
4. Flood Warning System			
For 15 fixed Stations with maintenance for 3 yrs			
(note: Cost based on Level I System prepared for Citanduy Project)			
$ 111,000 x 1.15 + 5% x 3 yrs			264.24
5. River Survey and Mapping			
100 km Main river + 50 Km Tributaries			
150 x Rp 1,000,000/km			150.00
6. Sediment Survey			
(i) Sediment Measurement at one station for 3 yrs			
3 x Rp 15,000,000		45.00	
(ii) Sediment Survey for river mouth			
3 x 100 ha x Rp 20,000/ha		6.00	
			51.00
7. O & M Equipment, Tools and Material with Maintenance for 3 yrs			
(i) O & M Equipment & Tools			
Pickup Truck	2 x 16		32.00
4 WD Jeep	3 x 19		57.00
Motor Cycle	6 x 4		24.00
Bicycle	15 x 0.15		2.25
Motor boat	2 x 16		32.00
Generator	6 x 1.5		9.00
Hand Compactor	6 x 4.25		25.50
Grass cutting m/c	9 x 1		9.00
Tools 3 lot	3 x 10		30.00
Safety items 3 lot	3 x 1.5		4.50
Telephone 2	2 x 3		6.00
Fax m/c	1 x 3		3.00
Walkie Talkies	5 x 0.4		2.00
			236.25

(ii) Maintenace for 3 yrs			
Vehicles :			
Driver 5 x 36 mo x Rp 150,000		27.00	
Gas/oil 5 x 36 mo x Rp 122,000		21.96	
6 x 36 mo x Rp 61,000		13.18	
Maintenance 5 x 36 mo x Rp 100,000		18.00	
6 x 36 mo x Rp 25,000		5.40	
		85.54	
Other :			
15 % of cost per year for 3 yrs			
123 x 0.15 x 5		55.35	
(iii) Material for 3 yrs			
Gabion basket, boulder, timber piles Sand bag, pit run gravel, Bamboo Mating, etc (see estimate by Cimanuk Project)			
27.5 x 3 yrs		82.50	
			459.64
8. Inspection and Flood Monitoring			
(i) Inspection for 3 yrs			
3 x 30 days x 6 staff x Rp 25,00		13.50	
3 x 30 days x 12 labor x Rp 5,000		5.40	
(ii) Flood Pickets for 3 yrs			
20 pickets with 2 Watchmen			
3 x 120 days x 2 x 20 x Rp 3,000		43.20	
			62.10
9. River Operation and Maintenance			
(i) River Operation for 3 yrs			
(see estimate by Cimanuk Project)			
3 x 34		102.00	
(ii) Preventive Maintenance for 3 yrs			
(see estimate by Cimanuk project)			
3 x 182		546.00	
			648.00
10. Flood and Damage Survey			
For 3 yrs - 3 times per year			
3 x 3 x 2			18.00
Sub-Total (River Management)			1701.18
B. RIVER BASIN WATER MANAGEMENT			
1. Inventory of Data (Lump Sum)		8.00	
2. Upgrade Hydromet Network			
ARR Repair : 15 No x 2,5 x 25%	9.38		
AWLR New : 8 No x 12.5	100.00		
Repair : 8 No x 12.5 x 25%	25.00		
Climate Station Repair : 3 No x 20 x 25%	15.00		
Radio : 30 No x Rp 400,000	12.00		
	161.38		
Maintenance 15% for 3 yrs	72.62		
		234.00	

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3. Water management Unit		
Computer Unit with digitizer and plotter		
2 Nos x 18	36.00	
Software	10.00	
Consumables for 3 yrs at 10%	10.80	
		56.80
4. Water Management Data Collection		
Part time operator at 34 stations for		
3 yrs : 34 x 36 mo x Rp 25,000		30.60
5. Inventory of Intake and Discharges		
45 days x 3 staff x Rp 25,000	3.38	
45 days x 6 labor x Rp 5,000	1.35	
		4.73
6. Monitoring of allocation		
Once a week for 40 week for 3 yrs		
3 x 40 x 3 staff x Rp 25,000		9.00
7. Water Quality Assesment		
WQ sampling for 3 yrs at 2 stations		
during low-flow for 3 months, 15 samples		
a month to be tested for 8 parameters :		
3 x 2 x 3 x 15 x Rp 50,000	13.50	
Water Sample glassware	2.00	
		15.50
Sub-Total (River Basin Water Manegement)		358.63
C. INSTITUTIONAL DEVELOPMENT AND TRAINING		
1. MIS System		
One Computer System with software :		
1 x 12	12.00	
Consumables	6.00	
		18.00
2. Training		
2 week Training each year for 3 yrs for 15 staff		
(i) River Management		
Travel & perdiem : 3x15x15xRp 50,000	33.75	
Trainer Honorarium: 3x15x2xRp 50,000	4.50	
Training Material : 3x15xRp 100,000	4.50	
	42.75	
(ii) River Basin Water Management	42.75	
		85.50
3. O & M Shed		
Three O & M shed for Sections		
3 x 75 m2 x Rp 250,000		56.25
Sub-Total (Institutional Dev. & Training)		159.75
TOTAL PILOT PROJECT		2219.56

Detailed Cost Estimate

Unit : Rp Million

A. RIVER MANAGEMENT			
1. Inventory Data (Lump Sum)			10.00
2. Inventory and Classification			
Computer system 1 set		10.00	
Stationary + drafting supplies		3.00	
Structural drawing "as built"		3.00	
Team, Travel & per diem			
45 days x 2 staff x Rp 25.000		2.25	
45 days x 4 Labor x Rp 5.000		0.90	
			19.15
3. Survey of River and Infrastructure Conditions			
30 D x 3 x 2 x Rp 25,000		4.50	
30 D x 3 x 4 x Rp 5,000		1.80	
			6.30
4. Flood Warning System			
For 10 fixed Stations with maintenance for 3 yrs			
(note:.Cost based on Level I System prepared for Citanduy Project)			
$ 111,000 x 10/13 + 5% x 3 yrs			176.75
5. River Survey and Mapping			
70 km (Main + Tributary)			
70 x Rp 1,000,000			70.00
6. Sediment Survey			
(i) Sediment Measurement at one station for 3 yrs : 3 x Rp 15,000,000		45.00	
(ii) Sediment Survey for river mouth 3 x 100 ha x Rp 20,000/ha		6.00	
			51.00
7. O & M Equipment, Tools and Material with Maintenance for 3 yrs			
(i) O & M Equipment & Tools			
Pickup Truck	2 x 16	32.00	
4 WD Jeep	1 x 19	19.00	
Motor Cycle	4 x 4	16.00	
Bicycle	6 x 0.15	0.90	
Generator	4 x 1.5	6.00	
Hand Compactor	4 x 4.25	17.00	
Grass cutting m/c	4 x 1	4.00	
Tools 3 lot	2 x 10	20.00	
Safety items 3 lot	2 x 1.5	3.00	
Telephone 2	1 x 3	3.00	
Fax m/c	1 x 3	3.00	
Walkie Talkies	4 x 0.4	1.60	
		125.50	
(ii) Maintenace for 3 yrs			
Vehicles :			
Driver 3 x 36 mo x Rp 150,000		16.20	
Gas/oil 3 x 36 mo x Rp 122,000		13.18	
4 x 36 mo x Rp 61,000		8.78	
Maintenance 3 x 36 mo x Rp 100,000		10.80	
4 x 36 mo x Rp 25,000		3.60	
		52 56	
Other :			
15 % of cost per year for 3 yrs			
58.5 x 0.15 x 3		26.33	
(iii) Material for 3 yrs			
Gabion basket, boulder, timber piles Sand bag, pit run gravel, Bamboo Mating, etc (see estimate by Cimanuk Project)			
Proportional to the length :			
(36/52.6)x27.5x3 yrs		56.48	
			260.85

8. Inspection and Flood Monitoring			
(i) Inspection for 3 yrs			
3 x 30 days x 4 staff x Rp 25,000		9.00	
3 x 30 days x 8 labor x Rp 5,000		3.60	
(ii) Flood Pickets for 3 yrs			
10 pickets with 2 Watchman			
3 x 120 days x 2 x 10 x Rp 3,000		21.60	
			34.20
9. River Operation and Maintenance			
(i) River Operation for 3 yrs			
(see estimate by Cimanuk Project)			
3 x 34 x (36/58)		63.30	
(ii) Preventive Maintenance for 3 yrs			
(see estimate by Cimanuk project)			
3 x 73.17		219.51	
			282.81
Unit cost Break-down:			
Earth dyke: 36kmx(498.9+288.9+835)	=58.42		
BM : 20 unit x (2 + 15)	= 0.34		
Gabion Rev. : 1 km x (60 + 225)	= 0.29		
Climate Sta.:3 No x(340+250+1600)	= 6.57		
ARR : 10 No x (25 + 150)	= 1.75		
AWLR : 10 No x (50 + 100 + 200)	= 3.50		
Warehouse : 2x75 m2 x(0.6+8.4+6.3)	= 2.30		
	73.17		
10. Flood and Damage Survey			
For 3 yrs – 3 times per year			
3 x 3 x 2			18.00
Sub-Total (River Management)			929.06
B. RIVER BASIN WATER MANAGEMENT			
1. Inventory of Data (Lump Sum)			8.00
2. Upgrade Hydromet Network			
ARR Repair . 10 Nox2.5 x 25%		6.25	
AWLR New : 5 No x 12.5		62.50	
Repair : 5 Nox12.5 x 25%		15.63	
Climate Station Repair : 3 No x 20 x 25%		15.00	
Radio : 20 No x Rp 400,000		8.00	
		107.38	
Maintenance 15% for 3 yrs		48.32	
			155.70
3. Water management Unit			
Computer Unit with digitizer and plotter			
1 Nos x 18		18.00	
Software		10.00	
Consumables for 3 yrs at 10%		5.40	
			33.40
4. Water Management Data Collection			20.70
Part time operator at 34 stations for			
3 yrs : 23 x 36 mo x Rp 25,000			
5. Inventory of Intake and Discharges			
45 days x 3 staff x Rp 25,000		3.38	
45 days x 6 labor x Rp 5,000		1.35	
			4.73
6. Monitoring of allocation			
Once a week for 40 week for 3 yrs			
3 x 40 x 3 staff x Rp 25,000			9.00

7. Water Quality Assesment		
WQ sampling for 3 yrs at 2 stations		
during low-flow for 3 months, 15 samples		
a month to be tested for 8 parameters :		
3 x 2 x 3 x 15 x Rp 50,000	13.50	
Water Sample glassware	2.00	
		15.50
Sub-Total (River Basin Water Management)		247.03

C. . INSTITUTIONAL DEVELOPMENT AND TRAINING	Unit :	Rp Million
1. MIS System		
One Computer System with software :		
1 x 12	12.00	
Consumables	6.00	
		18.00
2. Training		
2 week Training each year for 3 yrs for 15 staff		
(i) River Management :		
Travel & perdiem : 3x15x15xRp 50,000	33.75	
Trainer Honorarium: 3x15x2xRp 50,000	4.50	
Training Material : 3x15xRp 100,000	4.50	
	42.75	
(ii) River Basin Water Management	42.75	
		85.50
3. O & M Shed		
Two O & M shed for Sections		
2 x 75 m2 x Rp 250,000		37.50
Sub-Total (Institutional Dev. & Training)		141.00
TOTAL PILOT PROJECT		1317.09

Table 4.5.5

SELUNA WATER MANAGEMENT PROJECT
(PHASE II)
COST SUMMARY

Unit : Rp Million

1.	Inventory of Data	8.00
2.	Upgrade Hydrometric Network (Maintenance)	100.00
3.	Water management Unit (Consumables)	15.00
4.	Water Management Data Collection	37.80
5.	Inventory of Intake and Discharges	14.19
6.	Monitoring of Allocation	27.00
7.	Water Quality Assesment (3 stations)	38.50
8.	MIS System	48.00
9.	Training	42.75
10.	Water Management Equipment-Transportation One Jeep (1), Motor Cycle (3) and Cycles (12)	33.80
		365.04

Table 4.5.6

Schedule of Expenditure
Rivers Component ISSP – 2

No	Project Component	1991/92	1992/93	1993/94	1994/95	TOTAL
1.	MONITORING OF SRM					
	Equipment	108				108
	Monitoring Survey	52	78	78		208
	O & M Cost	212	213	213		638
	Sub - total	372	291	291		954
2.	RIVER BASIN PILOT PROJECT					
a.	CISANGGARUNG RBPP					
	River Management	192	601	573	335	1701
	River Basin WM	65	197	77	20	359
	Inst. Dev. and Training	26	76	29	29	160
	Sub - total	283	874	679	384	2220
b.	OPAK RBPP					
	River Management	142	363	250	174	929
	River Basin WM	8	144	60	35	247
	Inst. Dev. and Services	6	78	28	29	141
	Sub - total	156	585	338	238	1317
3.	SELUNA BASIN WM PROJECT	34	165	166	0	365
	Total	845	1915	1474	622	4856

River Basin Pilot Projects

The two RBPP's will require separate consulting services as discussed in section 3.5.4. The total man months of consulting services is estimated to be 80 mm of which 24 mm will be International and 56 mm National. The costs are presented in Section 4.11. A brief TOR for consultancy is presented in Appendix F.

Seluna Basin Water Management Project (Phase-2)

Limited amount of Consultancy will be required to assist Jratunseluna Project to implement the water management program for a period of two years. The total man months required is estimated to be 26 mm of which 8 mm will be for International expert and 18 mm for National expert. The costs of consultancy services are presented in Section 4.11. A brief TOR for the Consultancy is presented in Appendix F.

Rivers Advisory Services

It is proposed to provide a Rivers Advisor for 18 months to the Directorate of Rivers to (i) assist in monitoring of SRM's, (ii) develop a national strategy for river management (river O&M), (iii) assist on the RBPP implementation, (iv) assist DOR in the formulation of policies and programs for river basin management and (v) advise on institutional arrangements at provincial level for undertaking river management. The advisor will be an International expert. A brief TOR for the advisory services in presented in Appendix F and associated cost in section 4.11.

4.6 Groundwater Irrigation

Detailed cost estimates are given in Appendix A2 chapter 4.

The cost estimates for construction/installation works have been based on unit costs of 1990, quoted from the engineer's estimate of February 1990 and from the ICB-2 procurement contracted in July 1989 with 7% price escalation.

For the Lombok Project, only the costs of procurement of materials and equipment are required under ISSP-2.

A summary of the project costs for the years 1991/92 and 1992/93 per cost item and per province is shown in Table 4.6.1.

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Table 4.6.1 Groundwater Irrigation Project Costs

(Rp million)

Item / Province	1991/92	1992/93	Total
Construction			
East Java	2,519	0	2,519
Sulawesi	869	0	869
Sub - Total	3,388	0	3,388
Equipment			
East Java	483	500	983
Sulawesi	109	139	248
Lombok	110	0	
Sub - Total	702	639	1,231
Facilities			
East Java	0	0	0
Sulawesi	170	0	170
Sub - Total	170	0	170
Land Compensation			
East Java	1	0	1
Sulawesi	0	0	0
Sub - Total	1	0	1
SUMMARY			
East Java	3,003	500	3,503
Sulawesi	1,148	139	1,287
Lombok	110	0	110
Total	4,261	639	4,900

Note : Total excludes costs of consultants, administration and PPN tax

4.7 Irrigation Service Fee

The estimated operational costs of ISF are as follows :

(Unit : Rp. Million)

-	Motivators and trainers 6,500 mm @ Rp. 1 mln	6,500
-	Transport 1,008 carmonths @ Rp. 1 mln 150 motorbikes and bikes @ Rp. 0.36 mln	 1,008 54
-	Offices/operation/Reporting/Training 660 months @ Rp. 6.7 mln	4,422
	Total	11,984

4.8 Rural PBB Tax Valuation and Land Re-classification

Cost estimates for the development and the execution of the project have been made, differentiating the following categories :

- contracted work
- equipment

These cost estimates, which exclude tax (PPN) are given in Table 4.8.1, totalling Rp 4,349 million for the 4 year duration of the project. The expected annual expenditures excluding the cost of consultants, administration and taxes are shown below :

Fiscal Year :	1991/92	1992/93	1993/94	1994/95	Total (Rp. M)
Project Costs : (Rp mln)	2,282	938	1,023	106	4,349

Details of consultants costs are given in Section 4.11.

Table 4.8.1 PBB PROJECT COSTS

	Unit	Unit Price (Rp)	Total (Rp. 1000)
IDENTIFICATION AND PBB REGISTRATION			
- Digitizing and Automation	400,000 Ha	870	348,000
- Identification and Registration of Upland areas	180,000 Ha	17,000	3,060,000
		Sub Total	3,408,000
EQUIPMENT			
- Hardware (PC)	9 Pc	18,500	166,500
- Software			499,500
- Plotter	9 Pc	18,500	166,500
- Digitizer	9 Pc	12,025	108,225
		Sub Total	940,725
		TOTAL	4,348,725

4.9 Training Costs

The training costs are presented in Table 4.9.1. For each type of training, costs are presented for the actual training as well as the necessary support facilities. As far as possible costs have been based on the actual costs incurred for ISSP-1, but there was considerable variation from province to province, and an overall estimate has had to be made of unit costs.

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1. Staff Training, Irrigation, Operation and Maintenance

a) Training

Course	Total number of participants	Course Duration	Cost/participant day Rp. 1000		Total Cost million Rp
Planning & Programing					
PD - 1	96	12	50		58
PD - 1(RF)	123	12	50		74
PD - 2	686	6	50		206
PD - 3	29	18	50		26
PD - 3(RF)	16	6	45		4
				Sub Total	363
Construction Supervision					
CS - 1	33	18	50		30
CS - 1(RF)	67	6	45		18
CS - 2	75	12	45		41
CS - 3	43	12	50		26
CS -2/3(RF)	763	3	45		103
				Sub Total	218
Operation and Maintenance					
OP - 1	22	18	50		20
OP - 1(RF)	127	6	45		34
OP - 2	245	6	45		66
OP - 3a	1086	6	40		261
OP - 3b	3339	2	25		167
OP - 4	321	12	65		250
OP -2/3(RF)	1455	3	35		153
OP - 3b(RF)	497	1	30		15
				Sub Total	966
Education tours	650	5	100		325
Workshop	2200	1	100		220
				Sub Total	545

Note : Unit costs based on updated ISSP - 1 costs (all inclusive)
All participants members must be considered provisional

b) Support Facilities

Equipment	Nr	Unit Cost million Rp		Total cost million Rp
Audio visual	20	7		140
Non-Audio visual	10	6		60
Videos	10	10		100
			Sub Total	300
			TOTAL	2,392

2. Water User Training

a) Training

Course	number of participants	Course unit cost trainee thousand Rp	Total cost million Rp
i) WUTP			
Group A	1,320	275	363
Instructor	304	1,250	380
Group B + KPL	6,500	200	1,300
WUA Motivator	540	1,000	540
Group C	8,120	200	1,624
Follow-up	8,120	200	1,624
Officials	40	625	25
		Sub Total	5,856
ii) Turnover			
Training of Instructor	20	Costs included in Table 4.3.8	
TP4 training	560		

b) Support Facilities

i) WUTP

Item	Nr	Unit Cost million Rp	Total Cost million Rp
a) Transport			
Mobile training units	10	60	600
Motorcycles	40	4	160
b) Media and Training Materials Development	Lump Sum	-	260
		Sub Total	1,020
		TOTAL	6,876
		GRAND TOTAL	9,268

Notes
1. Each training centre/office = 1000 m2
2. Equipment includes OHP projector, video and TV, film projector, Slide projector, photocopier etc
3. Provide one unit in each Kabupaten, Cost includes posters, boards, WUA data, training media and farmer incentives for ISSP-2 period

ii) Turnover
Support facilities provided from PRIS offices

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4.10 Management Information System

The costs of continuing support for the management information system (MIS) depend on the progress achieved during 1990/91 and will be confirmed after a review of the current situation at the start of ISSP-2. (see Section 2.9). Provisional costs for training and computer consumables in 9 provinces have been included. It has been assumed at this stage that no further local consultants will be required for application development and MIS improvement. The cost of the review itself will be covered by the budget for the irrigation component's Central Consultants. The costs are summarised in Table 4.10.1 below.

Table 4.10.1 Cost Estimates for Continued MIS Support for Training and Computer Consumables

Province	Years	Amount (Rp.M)
W Sumatera	2	41
S Sumatera	2	41
W Java	2	41
Yogyakarta	2	41
E Java	2	41
S Sulawesi	2	41
Lampung	2	41
C Java	2	41
C Sulawesi	3	68
Total (million Rupiah)		**396**

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4.11 Summary of Consulting Services and Project Costs

The consulting services required for each component have been described in Sections 4.3 to 4.10. The inputs required are summarised in Table 4.11.1 which also gives the total costs in million rupiah. The total manmonths proposed by GOI for local consultants is 1,824 and for foreign consultants 602 (25% of the total manmonths). The overall cost of foreign consultants has been based on a rate of Rp. 33 million (about US$ 18,000) per manmonth, and the total cost of local consultants on a rate of Rp 7.1 million (about US$ 3,900) per manmonth. These rates are similar to those used for estimating the ADB supported IISP project, and also similar to the average all in rates for recent similar projects. The total cost of consultants is estimated to be Rp 31,436 million, of which Rp 19,866 million is for foreign consultants and Rp 11,570 million is for local consultants. The breakdown of man months and expenditure in each year is given in Table 4.11.2.

The total base cost of the project, excluding incremental EOM costs and including consulting services and administrative costs (2%) is estimated to be Rp 474,116 million in mid 1990 constant values. Adding 10% for physical contingencies and price escalation at 6% per year, the total project cost (excluding incremental EOM costs) comes to Rp 585,557 million. A summary of the overall costs and the cost of each component in million rupiah and in US dollars is given in Table 4.11.3. The breakdown of this expenditure in each year is given in millon rupiah in Table 4.11.4 and in US dollars in Table 4.11.5.

The costs of incremental EOM for irrigation and swamps are given in million rupiah and in US dollars in Table 4.11.6. The total cost is estimated to be Rp. 122,704 million, of which GOI contributes Rp 77,996 million and IBRD Rp 44,708 million. The grand total of the project is therefore Rp 708,261 million or US$ 389 million.

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Table 4.11.1 Estimated Cost of Consultants

CONSULTANCY SERVICES FOR ISSP-2	FOREIGN				LOCAL				TOTAL
	No	mm	Rate (Rp M)	Amount (Rp M)	No	mm	Rate (Rp M)	Amount (Rp M)	Amount (Rp M)
GENERAL COORDINATION									
Team Leader/Planning Specialist	1	24	33	792	-	-	7.1	-	792
Programming Budgeting, Accounts Spec	-	-	33	-	1	48	7.1	341	341
Institutional Adviser	1	24	33	792	-	-	7.1	-	792
Total	2	48		1,584	1	48		341	1,925
IRRIGATION COMPONENT incl. TURNOVER									
Central Consultants									
Team Leader/Irrigation Specialist	1	36	33	1,188	-	-	7.1	-	1,188
Senior O&M Specialist	-	-	33	-	1	48	7.1	341	341
Operations/AOU Adviser	1	12	33	396	-	-	7.1	-	396
Quality Assurance Specialist	1	36	33	1,188	1	36	7.1	256	1,444
Systems Analyst/Inventory Specialist	-	-	33	-	1	12	7.1	85	85
O&M Training/WUA Specialist	1	12	33	396	-	-	7.1	-	396
O&M Training Engineer	-	-	33	-	1	24	7.1	170	170
WUA Extension Specialist	-	-	33	-	1	48	7.1	341	341
Institutional Specialist	-	-	33	-	1	48	4.6	221	221
Training Specialist/Sociologist	-	-	33	-	1	48	4.6	221	221
Subtotal	4	96		3,168	7	264		1,634	4,802
Regional Consultants									
Regional Leader/Irrigation Specialist	5	120	33	3,960	-	-	7.1	-	3,960
Senior O&M Engineer	2	24	33	792	-	-	7.1	-	792
O&M Engineer	-	-	33	-	10	360	7.1	2,556	2,556
Operations/AOU Adviser	-	-	33	-	4	72	7.1	511	511
									-
Turnover Engineer	-	-	33	-	5	180	4.6	828	828
Provincial Institutional Specialist	-	-	33	-	9	276	4.6	1,270	1,270
Subtotal	7	144		4,752	28	888		5,165	9,917
Total	11	240		7,920	35	1,152		6,799	14,719
SWAMPS COMPONENT									
Team Leader/Swamps Specialist	1	24	33	792	-	-	7.1	-	792
Construction Advisers	-	-	33	-	2	48	7.1	341	341
O&M Advisers/Training Engineers	1	12	33	396	2	48	7.1	341	737
Total	2	36		1,188	4	96		682	1,870

Table 4.11.1 Estimated Cost of Consultants

CONSULTANCY SERVICES FOR ISSP-2	FOREIGN				LOCAL				TOTAL
	No	mm	Rate (Rp M)	Amount (Rp M)	No	mm	Rate (Rp M)	Amount (Rp M)	Amount (Rp M)
IVERS COMPONENT									
ivers Adviser	1	18	33	594	-	-	7.1	-	594
iver O&M Engineers	2	5	33	165	-	-	7.1	-	165
Vater Management Experts/Engineers	3	25	33	825	3	48	7.1	341	1,166
Vater Quality Engineer	1	2	33	66	1	2	7.1	14	80
)&M Engineers	-	-	33	-	1	24	7.1	170	170
otal	7	50		1,650	5	74		525	2,175
BB COMPONENT									
BB Specialist/Supervisors	-	-	33	-	3	54	7.1	383	383
otal	-	-		-	3	54		383	383
F COMPONENT									
entral Consultants									
am leader	1	48	33	1,584	-	-	7.1	-	1,584
inance Specialist	1	24	33	792	-	-	7.1	-	792
omputer programmer/MIS	1	12	33	396	-	-	7.1	-	396
ccounting Specialist	1	6	33	198	-	-	7.1	-	198
udio Visual Specialist	1	6	33	198	-	-	7.1	-	198
Subtotal	5	96		3,168	-	-		-	3,168
egional Consultants									
stitutional Specialists	2	72	33	2,376	-	-	7.1	-	2,376
ervice Engineer	1	48	33	1,584	-	-	7.1	-	1,584
ociologists	-	-	33	-	6	216	7.1	1,534	1,534
&M Engineer	-	-	33	-	3	144	7.1	1,022	1,022
Subtotal	3	120		3,960	9	360		2,556	6,516
tal	8	216		7,128	9	360		2,556	9,684
ROUNDWATER COMPONENT									
am Leader	-	-	33	-	2	24	7.1	170	170
oundwater Engineer	1	7	33	231	-	-	7.1	-	231
gation Design Engineer	-	-	33	-	2	10	7.1	71	71
riculture/Water Management Expert	1	5	33	165	-	-	7.1	-	165
chanical/Electrical Engineer	-	-	33	-	1	6	7.1	43	43
al	2	12		396	5	40		284	680
rall Total	32	602		19,866	62	1,824		11,570	31,436

Table 4.11.2 Annual Man months and Costs of Consultants

ISSP-2	Man months										Costs (Rp million)										Total
	Foreign					Local					Foreign					Local					
CONSULTANT	91/92	92/93	93/94	94/95	Total	91/92	92/93	93/94	94/95	Total	91/92	92/93	93/94	94/95	Total	91/92	92/93	93/94	94/95	Total	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Rate:	33	Rp M per month			Rate:	7.1	Rp M per month LCs			
																	4.6	Rp M per month Other			
GENERAL COORDINATION																					
T.L./Planning Spec.	12	12			24						396	396			792						
Programming Budgeting, Accounts Spec.						12	12	12	12	48						85	85	85	85	341	
Institutional Adviser	12	12			24						396	396			792						
Total	24	24			48	12	12	12	12	48	792	792			1,584	85	85	85	85	341	
IRRIGATION COMPONENT incl. TURNOVER																					
Central Consultants																					
T.L./Irrigation Spec.	12	12	12		36						396	396	396		1,188						
Senior O&M Specialist						12	12	12	12	48						85	85	85	85	341	
Operations/AOU Adviser	12				12						396				396						
Quality Assurance Spec.	12	12	12		36	12	12	12		36	396	396	396		1,188	85	85	85		256	
Systems Analys/Inventory Specialist						12				12						85				85	
O&M Training/WUA Spec	12				12						396				396						
O&M Training Engineer						12	12			24						85	85			170	
WUA Extension Spec.						12	12	12	12	48						85	85	85	85	341	
Institutional Specialist						12	12	12	12	48						55	55	55	55	221	
Training Specialist/Sociologist						12	12	12	12	48						55	55	55	55	221	
Subtotal	48	24	24		96	84	72	60	48	264	1,584	792	792		3,168	538	461	366	281	1,634	
Regional Consultants																					
Regional Leader/Irr. Spec	60	60			120						1,980	1,980			3,960						
Senior O&M Engineer	24				24						792				792						
O&M Engineer						120	120	120		360						852	852	852		2,556	
Operations/AOU Adviser						48	24			72						341	170			511	
Turnover Engineer						60	60	36	12	168						276	276	166	55	773	
Provincial Institutional Specialist						84	108	60	36	288						386	497	276	166	1,325	
Subtotal	84	60			144	312	312	216	48	888	2,772	1,980			4,752	1,855	1,796	1,294	221	5,165	
Total	132	84	24		240	396	384	276	96	1,152	4,356	2,772	792		7,920	2,392	2,246	1,660	502	6,799	
SWAMPS COMPONENT																					
T.L./Swamps Spec.	6	12	6		24						198	396	198		792						
Construction Advisers							24	24		48							170	170		341	
O&M Advisers/Training Eng		12			12	6	24	18		48		396			396	43	170	128		341	
Total	6	24	6		36	6	48	42		96	198	792	198		1,188	43	341	298		682	
RIVERS COMPONENT																					
Rivers Adviser		6	12		18							198	396		594						
River O&M Engineers		5			5							166			166						
Water Mngt Experts/Eng.		18	3	4	25		21	24	3	48		594	99	132	825		149	170	21	341	
Water Quality Engineer			2		2		2			2			66		66		14			14	
O&M Engineers							6	12	6	24							43	85	43	170	
Total		29	17	4	50		29	36	9	74		957	561	132	1,650		206	256	64	526	
PBB COMPONENT																					
PBB Specialist/Supervisors						18	36			54						128	256			383	
ISF COMPONENT																					
Central Consultants																					
Team leader	12	12	12	12	48						396	396	396	396	1,584						
Finance Specialist	6	12	6		24						198	396	198		792						
Computer prog./MIS	6	6			12						198	198			396						
Accounting Specialist	6				6						198				198						
Audio Visual Specialist	6				6						198				198						
Subtotal	36	30	18	12	96						1,188	990	594	396	3,168						
Regional Consultants																					
Institutional Specialists	24	24	24		72						792	792	792		2,376						
Service Engineer	12	12	12	12	48						396	396	396	396	1,584						
Sociologists						72	72	72		216						611	611	611		1,834	
O&M Engineer						36	36	36	36	144						256	256	256	256	1,023	
Subtotal	36	36	36	12	120	108	108	108	36	360	1,188	1,188	1,188	396	3,960	767	767	767	256	2,558	
Total	72	66	54	24	216	108	108	108	36	360	2,376	2,178	1,782	792	7,128	767	767	767	256	2,558	
GROUNDWATER COMPONENT																					
Team Leader						24				24						170				170	
Groundwater Engineer	7				7						231				231						
Irrigation Design Engineer						10				10						71				71	
Agriculture/Water Mngt E	5				5						165				165						
Mechanical/Electrical Engineer						6				6						43				43	
Total	12				12	40				40	396				396	284				284	
Overall Total	246	227	101	28	602	580	617	474	153	1,824	8,118	7,491	3,333	924	19,866	3,696	3,901	3,066	906	11,570	

Table 4.11.3 ISSP-2 Estimated Costs

		Cost (Million RP)		Cost (US$ 1000)	
SURFACE IRRIGATION					
SM	Design	17,973		9,875	
	Construction	207,990		114,280	
	Sub-total		225,963		124,155
SM2	Construction		36,003		19,782
SM3	Construction		46,853		25,743
PROM/DEOM			12,480		6,857
Design ISSP-3			3,600		1,978
Turnover			42,419		23,307
Equipment			9,140		5,022
Total			376,458		206,845
SWAMPS					
On-going projects	Construction		12,673		6,963
SM	Construction		7,864		4,321
Total			20,537		11,284
RIVERS					
River Basin Pilot Projects			3,537		1,943
Seluna Basin WM			365		201
Monitoring			954		524
Total			4,856		2,668
GROUNDWATER			4,900		2,692
ISF			11,984		6,585
PBB			4,349		2,390
TRAINING			9,268		5,092
MANAGEMENT INFORMATION SYSTEM			396		218
ENVIRONMENTAL			637		350
CONSULTING SERVICES			31,436		17,273
Base Costs			464,821		255,396
Administrative costs (2%)			9,296		5,108
Total Base Cost			474,117		260,504
Physical Contingencies (10%)			46,482		25,540
Price Contingencies (6%/yr)			64,960		35,692
GRAND TOTAL (Excluding EOM)			585,560		321,736
Incremental EOM			122,704		67,420
GRAND TOTAL (Including EOM)			708,264		389,156

Table 4.11.4 Project Costs – (Rp Million)

	1991/92	1992/93	1993/94	1994/95	TOTAL
SURFACE IRRIGATION					
Special Maintenance					
design	5,326	6,355	4,992	1,299	17,972
construction	30,450	63,291	60,425	53,824	207,990
90,000 ha design ISSP-3				3,600	3,600
Additional Maint (SM2)					
construction	36,003				36,003
Spec. Maint. DEOM (SM3)					
construction	46,853				46,853
PROM/DEOM	5,373	1,320	4,399	1,388	12,480
Equipment	9,140				9,140
Turnover	8,883	10,176	11,394	11,966	42,419
Sub-total	142,028	81,142	81,210	72,077	376,457
SWAMPS					
On-going projects	7,091	5,582			12,673
Special Maintenance	1,800	3,600	2,464		7,864
Sub-total	8,891	9,182	2,464	0	20,537
RIVERS					
River Basin Pilot Projects					
Cisanggarung	283	874	679	384	2,221
Opak	156	585	338	238	1,317
Seluna Basin WM	34	165	166		365
Monitoring Small River Mouths	372	291	291		954
Sub-total	845	1,915	1,474	622	4,855
GROUNDWATER IRRIGATION	4,261	639			4,9[illegible]
IRRIGATION SERVICE FEE	2,996	2,996	2,996	2,996	11,984
PBB TAX VALUATION	2,282	938	1,023	106	4,34[illegible]
TRAINING	3,000	3,000	3,000	268	9,26[illegible]
MANAGEMENT INFORMATION SYSTEM	190	184	22		3[illegible]
ENVIRONMENTAL	273	364			6[illegible]
CONSULTING SERVICES	11,816	11,392	6,398	1,830	31,4[illegible]
Base Costs	176,582	111,752	98,587	77,899	464,[illegible]
Administrative costs (2%)	3,532	2,235	1,972	1,558	9,2[illegible]
Total Base Cost	180,114	113,987	100,559	79,457	474,[illegible]
Physical contingencies (10%)	17,658	11,175	9,859	7,790	46,4[illegible]
Expected price increases (6%/yr)	10,807	14,089	19,208	20,856	64,[illegible]
GRAND TOTAL (Excluding EOM)	208,579	139,251	129,626	108,103	585,5[illegible]
Incremental EOM	22,332	26,425	33,307	40,640	122,[illegible]
GRAND TOTAL (Including EOM)	230,911	165,676	162,933	148,743	708,2[illegible]

Table 4.11.5

Project Costs – (US$ 1,000)

	1991/92	1992/93	1993/94	1994/95	TOTAL
SURFACE IRRIGATION					
Special Maintenance					
design	2,926	3,492	2,743	714	9,875
construction	16,731	34,775	33,201	29,574	114,280
90,000 ha design ISSP-3	0	0	0	1,978	1,978
Additional Maint (SM2)	0	0	0	0	
construction	19,782	0	0	0	19,782
Spec. Maint. DEOM (SM3)	0	0	0	0	
construction	25,743	0	0	0	25,743
PROM/DEOM	2,952	725	2,417	763	6,857
Equipment	5,022	0	0	0	5,022
Turnover	4,881	5,591	6,260	6,575	23,307
Sub-total	78,037	44,584	44,621	39,603	206,845
SWAMPS					
On-going projects	3,896	3,067	0	0	6,963
Special Maintenance	989	1,978	1,354	0	4,321
Sub-total	4,885	5,045	1,354	0	11,284
RIVERS					
River Basin Pilot Projects					
Cisanggarung	155	480	373	211	1,220
Opak	86	321	186	131	724
Seluna Basin WM	19	91	91	0	201
Monitoring Small River Mouths	204	160	160	0	524
Sub-total	464	1,052	810	342	2,668
GROUNDWATER IRRIGATION	2,341	351			2,692
IRRIGATION SERVICE FEE	1,646	1,646	1,646	1,646	6,585
PBB TAX VALUATION	1,254	515	562	58	2,390
TRAINING	1,648	1,648	1,648	147	5,092
ENVIRONMENTAL	150	200			350
MANAGEMENT INFORMATION SYSTEM	104	101	12	0	218
CONSULTING SERVICES	6,492	6,259	3,515	1,005	17,273
Base Costs	97,023	61,402	54,169	42,802	255,396
Administrative costs (2%)	1,940	1,228	1,083	856	5,108
Total Base Cost	98,964	62,630	55,252	43,658	260,504
Physical contingencies (10%)	9,702	6,140	5,417	4,280	25,540
Expected price increases (6%/yr)	5,938	7,741	10,554	11,459	35,692
GRAND TOTAL (Excluding EOM)	114,604	76,512	71,223	59,397	321,735
Incremental EOM	12,270	14,519	18,301	22,330	67,420
GRAND TOTAL (Including EOM)	126,874	91,031	89,523	81,727	389,155

Table 4.11.6 Incremental Costs of Efficient O&M

a) Incremental Costs in Million Rp.

	1991/92	1992/93	1993/94	1994/95	Total
EOM Irrigation					
Bank contribution	9,672	8,707	10,184	11,164	39,728
GOI contribution	9,814	14,419	19,643	25,719	69,594
Sub - Total	19,486	23,126	29,828	36,883	109,322
EOM Swamps					
Bank contribution	1,413	1,242	1,188	1,137	4,980
GOI contribution	1,434	2,057	2,291	2,620	8,402
Sub - Total	2,846	3,300	3,479	3,757	13,382
EOM TOTAL					
Bank contribution	11,085	9,949	11,372	12,301	44,708
GOI contribution	11,247	16,476	21,935	28,338	77,996
TOTAL	22,332	26,425	33,307	40,640	122,704

b) Incremental Costs in 1,000 US $

	1991/92	1992/93	1993/94	1994/95	Total
EOM IRRIGATION					
Bank contribution	5,314	4,784	5,596	6,134	21,829
GOI contribution	5,392	7,922	10,793	14,131	38,239
Sub - Total	10,707	12,706	16,389	20,265	60,067
EOM SWAMPS					
Bank contribution	776	683	653	625	2,736
GOI contribution	788	1,130	1,259	1,439	4,616
Sub - Total	1,564	1,813	1,912	2,064	7,353
EOM TOTAL					
Bank contribution	6,091	5,467	6,249	6,759	24,565
GOI contribution	6,180	9,053	12,052	15,571	42,855
TOTAL	12,271	14,519	18,301	22,330	67,420

Table 4.11.7 ISSP - 2 FINANCING PLAN

	Amount (Rp billion)	Amount (US$ million)
Project Cost	708.26	389.16
GOI Financing		
Incremental O&M (GOI Portion)	78.00	42.86
Additional Special Maintenance (SM3)	46.85	25.74
Small River Mounths O&M	0.95	0.52
Land Development (Mesuji Swamp Scheme)	2.19	1.20
Drinking Water Supplies (Swamp Schemes)	1.50	0.82
Administration	9.30	5.11
Taxes and Duties(10%)	58.56	32.17
Total GOI Financing	197.35 1)	108.42 1)
IBRD Financing	409.50	225.00
Financing Gap(Co-Financing/GOI)	101.41	55.74

Notes :

1) In Addition, GOI will maintain the 1990/91 level of recurrent O&M funding in real terms for all government controlled schemes; and maintain the efficient level of O&M funding, in line with the needs-based budgets, on EOM areas going out of the IBRD-supported program after 5 years. This funding would be made available from national budget, provincial revenues and irrigation service fees

CHAPTER 5

PROJECT ECONOMIC EVALUATION

5.1 Introduction and Basic Assumptions

5.1.1 Introduction

The economic analysis of proposals for funding under ISSP-2 fall into the following categories :

a) Surface irrigation which comprises, special maintenance and efficient operation and maintenance (EOM).

b) One river project (Babak flood protection)

c) three swamp projects plus special maintenance and EOM on swamp projects.

d) groundwater

Within these categories, only the swamps and river projects are sufficiently well defined for a standard analysis based on specific areas, costs and potential benefits to be applied. No construction on the River Babak Project has been financed by ISSP-1 and sunk costs are not considered. In contrast construction programmes for the swamp projects have been funded by ISSP-1 and other government sources for the last three years. The result is that considerable care must be taken to distinguish between benefits which can be fairly allocated to the proposed investment and those which are also sunk, in the sense that they will occur whether or not the additional funds are spent. In the case where only minimal works are required to obtain the potential benefits, such benefits have been identified and excluded, with their minimal costs, from the main analysis.

Special maintenance, and EOM projects are less well documented in the sense that their programme for implementation is the sum of a large number of proposals for many schemes in nine provinces and Jatiluhur which it is neither possible nor practical to analyse individually. In these circumstances, an alternative approach based on generalised models and an assessment of risks is developed which tries to show that there is a high probability of the investments generating acceptable returns rather than calculating rates of return. For the sake of completeness, an analysis estimating IRRS is included but because it stands or falls with its underlying assumptions which are not easily substantiated it is not felt to be sufficient on its own.

Groundwater proposals are rather similar in that command areas and costs per hectare are only really known when the yield of a well is measured. In this instance, however, the programme is already well defined and an analysis has been carried out for proposals in both Java and Sulawesi.

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5.1.2 Basic Assumptions

Agricultural Production : the calculation of economic prices

a) Rice, Maize, Soybeans and Groundnuts

Table 5.1.1 presents crop balances past and future for Indonesia

Table 5.1.1
Crop Balances Past and Future
(Indonesia) - thousand tonnes

	1985	1990	1995	2000
Rice (milled)	-126	+720	+480	+ 82
Maize	- 1	- 271	- 78	+ 25
Soybeans	-302	- 493	- 562	- 623
Groundnuts	- 16	- 2	- 4	- 2

Note : (-) denotes import requirements
(+) denotes potential exports or reserves

Source : Supply and demand for food crops in Indonesia, 1988 Dit Gen Foodcrops Economics.

On the basis of the table and other considerations, it has been decided to price rice, maize and groundnuts as if Indonesia were self-sufficient (in the long term) and soyabeans as an import substitute.

b) Copra

Copra is priced as an export crop.

c) Fertiliser and Pesticides

Indonesia exports substantial quantities of urea. Phosphate and potassic fertiliser are either imported or manufactured from imported raw materials. Except in Kalimantan, lime is generally widely available and is usually obtained locally. Economic pesticide prices have been obtained from PT. Pertani's list of pesticides which also include provincial subsidised and unsubsidised prices.

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d) Labour and Oxen (for land preparation)

Labour is priced at 80% of the market rate for unskilled labour (men and women), in line with usual Bank practice outside Java, Bali and Lombok. A market rate of Rp. 2,750 per day (average for men and women), has been assumed in Sulawesi and Kalimantan and Rp. 2,500/day for Sumatera. The Sumatera rate is affected by its proximity and access to Java.

Wages rates in Java and Lombok are considerably lower with an average market rate of Rp. 1,600/day. In common with standard Bank practice labour in Lombok and Java is priced at 65% of the market rate. Oxen are priced at the market rate of Rp. 5,000/team/day in Sulawesi and Sumatera and Rp. 4,500/day in Java and Lombok.

e) Exchange Rate

An exchange rate of US$ 1.0 = Rp. 1,800 has been used. This rate was adopted for the Provincial Integrated Agricultural Development Project (PIADP) in January 1990 since when the exchange rate has moved to around US$ 1 = Rp. 1,830. As many of the crop budgets developed for PIADP have been incorporated into this study, it was not felt necessary to recalculate them to incorporate a 1.7% movement.

f) Economic Prices

These are presented in Appendix E, Tables E.1 and E.2

g) Benefits and Yields

The assessment of incremental yields is based on estimating the difference between the agricultural production in the future with - and without - project situations. Yield assumptions are discussed in more detail in each of the sections below.

h) Crop Budgets

Crop budgets are presented in Appendix E, Tables E.3, E.4, E.5 and E.6. Substantial reductions in returns to rice cultivation have been incorporated into the budgets since ISSP-1 was appraised. This is mainly due to a decline in long term rice price projections (15% since 1987) and increased fertiliser requirements for rice cultivation in Sumatera and Sulawesi over the yield range 3.8 to 4.3 tonnes/ha.

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Costs

a) Prices

The following ratios are used to convert financial prices to economic prices after excluding tax.

		Java/Lombok	Sumatera/Sulawesi
Civil works	Design	1.0	1.0
	Construction	0.8	0.9
Annual O&M	Operation	1.0	1.0
	Maintenance	0.8	0.9
Special Maintenance	Design	1.0	1.0
	Construction	0.8	0.9

Ratios used in the groundwater analysis have been taken from the 1986 feasibility study for East Java and adjusted upwards in Sulawesi (see section 5.5.1 for reference).

5.2 Surface Irrigation

5.2.1 Introduction

Proposed works under ISSP-2 Surface irrigation component fall into four categories :

a) Special maintenance on over 500,000 ha of irrigation systems in 9 provinces and Jatiluhur

b) Preparation and design of EOM on 250,000 ha on newly completed projects in 9 provinces and Jatiluhur

c) Extension of the EOM network into about 800,000 hectares in 9 provinces and Jatiluhur.

The economic viability of items a) and c) are discussed later in this section unlike item b) for which no analyses have been undertaken. Category b), preparation and design for O&M, is not an activity which can be evaluated individually.

5.2.2 Methodology

An evaluation of Special Maintenance and EOM is problematical because both activities cost so little that the incremental benefits required to justify them are often smaller than inter-annual variations in harvested yield or intensity. Consequently they are statistically difficult to detect, at least in the short term. In addition the EOM programme has only been in existence for just over two years and is still in an active state of development both institutionally and technically. A rigorous assessment of its performance is unfortunately impossible. The objectives of the analysis presented below are to investigate the risks of either special maintenance or EOM not producing reasonable returns and to illustrate useful ways of looking at both activities in ways which are easily understood, and which can be used to determine whether individual irrigation systems are suitable candidates for the programme. A final section presents a traditional analysis based on the best assumptions which can be made in the circumstances.

5.2.3. Efficient Operation and Maintenance

The objectives of efficient operation and maintenance are to operate the scheme in order to make the best use of its capabilities and to maintain it in a sufficient condition to do so. The benefits of EOM may include higher intensities and yields, but at the very least should postpone or avoid the negative benefits which can be associated with the rapid deterioration of irrigation systems which are poorly operated and maintained. The difficulty is that the size and extent of neither is known. A more reliable approach is to focus on the maintenance function of EOM which has the clear long term objective of postponing the need for rehabilitation, and is much more readily quantified. Nevertheless because the impact of EOM on postponing rehabilitation is also not known, it is necessary to include a large number of options which hopefully cover most of the possible alternatives. Analysis is based on testing the impact of differing assumptions on how long EOM may be expected to postpone rehabilitation of an irrigation system as compared with what might be termed ordinary O&M in Indonesia (expenditure of Rp. 10,000 to Rp 15,000 per hectare with over 50% of funds spent on operation). Three levels of rehabilitation cost are tested, Rp. 1.5, 2 and 3 million per hectare. In each case the value of postponing rehabilitation is calculated using a discount rate of 12%. The results are presented in Table 5.2.1 which lists the annual equivalents of postponing rehabilitation. Thus in Table 5.2.1 (a) it can be seen that the value of postponing rehabilitation from year 10 to year 20 is Rp. 51,686/ha/year. Given that the incremental cost of EOM is expected to be approximately

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Table 5.2.1(a) Value of Postponing Rehabilitation(Rp 1.5Mn/ha) through EOM

Year in which rehabilitation occurs

	7	8	9	10	11	12	13	14	15	16	17	18	19	20	25	30
6	32005	49043	68110	78449	87305	94915	101470	107134	116995	120249	123155	125750	128066	130135	137590	141155
7		17037	36105	46443	55300	62909	69465	75129	84989	88244	91150	93744	96061	98129	105585	109150
8			19067	29406	38263	45872	52428	58092	67952	71207	74113	76707	79024	81092	88548	92112
9				10339	19196	26805	33361	39024	48885	52140	55045	57640	59956	62025	69481	73045
10					8857	16466	23022	28685	38546	41801	44706	47301	49617	51686	59142	62706
11						7609	14165	19829	29689	32944	35850	38444	40761	42829	50285	53850
12							6556	12220	22080	25335	28241	30835	33152	35220	42676	46240
13								5664	15524	18779	21685	24279	26596	28664	36120	39685
14									9861	13115	16021	18615	20932	23000	30456	34021
15										3255	6160	8755	11071	13140	20596	24160
16											2906	5500	7817	9885	17341	20906
17												2595	4911	6979	14435	18000
18													2317	4385	11841	15405
19														2068	9524	13089
20															7456	11021
25																3565

Rehabilitation Cost=Rp 1.5 million per ha

Discount rate=12%

Incremental costs of EOM assumed to be Rp 20000/ha

Table 5.2.1(b) Value of Postponing Rehabilitation(Rp 2Mn/ha) through EOM

Year in which rehabilitation occurs

	7	8	9	10	11	12	13	14	15	16	17	18	19	20	25	30
6	42674	65390	90813	104598	116407	126553	135294	142846	155993	160332	164207	167666	170755	173513	183454	188207
7		22717	48139	61925	73734	83879	92620	100172	113319	117659	121533	124993	128081	130839	140780	145533
8			25423	39208	51017	61163	69904	77455	90603	94942	98817	102276	105365	108122	118064	122817
9				13785	25594	35740	44481	52033	65180	69519	73394	76853	79942	82700	92641	97394
10					11809	21954	30696	38247	51395	55734	59609	63068	66157	68914	78856	83608
11						10146	18887	26438	39586	43925	47800	51259	54348	57105	67047	71800
12							8741	16293	29440	33780	37654	41113	44202	46960	56901	61654
13								7552	20699	25038	28913	32372	35461	38219	48160	52913
14									13147	17487	21361	24821	27909	30667	40608	45361
15										4339	8214	11673	14762	17520	27461	32214
16											3874	7334	10422	13180	23121	27874
17												3459	6548	9306	19247	24000
18													3089	5846	15788	20541
19														2758	12699	17452
20															9941	14694
25																4753

Rehabilitation Cost=Rp 2 million per ha
Discount rate=12%
Incremental costs of EOM assumed to be Rp 20000/ha

Table 5.2.1(c) Value of Postponing Rehabilitation(Rp 3Mn/ha) through EOM

Year in which rehabilitation occurs

	7	8	9	10	11	12	13	14	15	16	17	18	19	20	25	30
6	64011	98085	136220	156897	174611	189829	202941	214268	233990	240499	246310	251499	256132	260269	275181	282310
7		34075	72209	92887	110600	125819	138930	150258	169979	176488	182300	187489	192122	196258	211170	218300
8			38134	58812	76526	91744	104856	116183	135904	142413	148225	153414	158047	162184	177095	184225
9				20678	38391	53610	66721	78049	97770	104279	110091	115280	119913	124049	138961	146091
10					17713	32932	46043	57371	77092	83601	89413	94602	99235	103372	118283	125413
11						15218	28330	39658	59379	65888	71700	76889	81522	85658	100570	107699
12							13112	24439	44160	50669	56481	61670	66303	70440	85352	92481
13								11327	31049	37558	43369	48558	53191	57328	72240	79369
14									19721	26230	32042	37231	41864	46001	60912	68042
15										6509	12321	17510	22143	26279	41191	48321
16											5812	11001	15634	19770	34682	41811
17												5189	9822	13959	28870	36000
18													4633	8770	23681	30811
19														4137	19048	26178
20															14912	22041
25																7129

Rehabilitation Cost=Rp 3 million per ha

Discount rate=12%

Incremental costs of EOM assumed to be Rp 20000/ha

Rp. 20,000 per hectare per year it evident that provided EOM postpones rehabilitation by five years from whatever it might have been under "ordinary" O&M it will always be worthwhile within a 30 year timeframe, for a rehabilitation cost of Rp. 3 million. For rehabilitation costs of Rp. 1.5 or 2 million, it is generally worthwhile within a 15 year timeframe, but not thereafter. However because what little evidence there is suggests that under the "ordinary" O&M regime many schemes require rehabilitation within 15 years of construction, it can be concluded that the risk of EOM not producing a worthwhile return is slight particularly if it manages to postpone rehabilitation for over 20 years. Combine these assumptions with any other benefits (increased yields, intensities, slower degradation) and the potential value of EOM becomes apparent. Needless to say, if the funds for EOM are badly spent or concentrated too specifically on operation, the investment would not be worthwhile, at least in terms of postponing rehabilitation.

5.2.4 Special Maintenance

Average costs for special maintenance have been estimated at Rp. 400,000 per hectare (Rp 360,000 for construction and Rp 40,000 for design) and are intended to upgrade a scheme to the point where it has the physical infrastructure to be operated properly and no immediate requirements for further maintenance.

Unlike EOM, the funds invested in special maintenance can only be justified by an improvement in the performance of the system which gives rise to increases in either yields or intensities. On most schemes an increase in cropping intensity of the second rice crop is the most likely result (should there be no potential for such an increase the need for special maintenance is questionable). In the wet season the majority of schemes have sufficient water, even where they are inefficient and no benefits arising from special maintenance have been assigned to the first rice crop. Water shortages are more common during the second crop, and the more efficient use of water (decreased losses, better distribution) can be expected to encourage either more successful or more intensive farming or both.

Table 5.2.2 presents an estimate of the size of benefits in terms of yield or intensity from the second rice crop which are required for the investment in Special Maintenance to produce a return of 12%. Economic costs are converted into annual equivalents for the project life (20 or 30 years) which in turn are converted into kilogram equivalents of rice (gabah). These are then adjusted to include an allowance for the cost of production, obtained from the crop budgets, and expressed over a range of crop yields. Finally these are presented as either intensity or yield percentage increases (as only one crop is being considered the percentage yield or intensity increases are identical). Given that these are the average increases expected over the project life, they would appear to be very moderate, especially in the cases of Java and Lombok. Where special maintenance has facilitated the introduction of a polowijo crop after the second rice crop as for example in the Jatiluhur Advanced Operation Unit, the percentage increases required from the second rice crop are reduced to insignificant proportions. Another advantage of Table 5.2.2 is that it can be used to assess the likely viability of proposed special maintenance programmes prior to implementation. Given that water availability is known, theoretical cropping patterns can be estimated and compared with actual cropping patterns (which are generally rather more reliable than yield data as well as being a great deal easier to determine) and the potential for improvement established. Where the potential exceeds the percentage requirements listed in the Table, it can be assumed that the proposals are worthwhile, other things being equal.

Table 5.2.2 Special Maintenance Illustrative Analysis(Java and Lombok)

Capital cost(Rupiah/ha) of special maintenance (financial)	(economic)	Assumed Life of Special Maintenance Project in years 20	30	Project life(years) 20	30
		Annual equivalent(Rp/ha)		Expressed in Kg rice(gabah) at Rp 224/kg	
300000	248000	33202	30788	148	137
350000	288000	38557	35753	172	160
400000	328000	43912	40719	196	182
450000	368000	49267	45685	220	204
500000	408000	54623	50651	244	226
700000	568000	76043	70514	339	315
900000	728000	97464	90377	435	403

Expressed in Kg rice(gabah) at Rp 224/kg and allowing for the cost of production

		Project life in years 20	30	20	30	20	30
		Base Yield(kg/ha) 3000		Base Yield(kg/ha) 3500		Base Yield(kg/ha) 4000	
(financial)	(economic)						
300000	248000	279	259	286	265	291	270
350000	288000	324	300	332	308	338	314
400000	328000	369	342	379	351	385	357
450000	368000	414	384	425	394	432	401
500000	408000	459	426	471	437	479	444
700000	568000	639	593	656	608	667	619
900000	728000	819	759	840	779	855	793
		Base Yield(kg/ha) 4500		Base Yield(kg/ha) 5000		Base Yield(kg/ha) 5500	
(financial)	(economic)						
300000	248000	291	270	286	265	264	244
350000	288000	338	314	332	308	306	284
400000	328000	385	357	379	351	349	[illegible]
450000	368000	432	401	425	394	391	[illegible]
500000	408000	479	444	471	437	434	[illegible]
700000	568000	667	619	656	608	604	[illegible]
900000	728000	855	793	840	779	774	[illegible]

Expressed as % increase in intensity or yield per ha in second rice crop required to produce 12% return

		Project life in years 20	30	20	30	20	30
		Base Yield(kg/ha) 3000		Base Yield(kg/ha) 3500		Base Yield(kg/ha) 4000	
(financial)	(economic)						
300000	248000	9.3	8.6	8.2	7.6	7.3	[illegible]
350000	288000	10.8	10.0	9.5	8.8	8.5	[illegible]
400000	328000	12.3	11.4	10.8	10.0	9.6	[illegible]
450000	368000	13.8	12.8	12.1	11.3	10.8	[illegible]
500000	408000	15.3	14.2	13.5	12.5	12.0	[illegible]
700000	568000	21.3	19.8	18.7	17.4	16.7	[illegible]
900000	728000	27.3	25.3	24.0	22.3	21.4	[illegible]
		Base Yield(kg/ha) 4500		Base Yield(kg/ha) 5000		Base Yield(kg/ha) 5500	
(financial)	(economic)						
300000	248000	6.5	6.0	5.7	5.3	4.8	[illegible]
350000	288000	7.5	7.0	6.6	6.2	5.6	[illegible]
400000	328000	8.6	7.9	7.6	7.0	6.3	[illegible]
450000	368000	9.6	8.9	8.5	7.9	7.1	[illegible]
500000	408000	10.6	9.9	9.4	8.7	7.9	[illegible]
700000	568000	14.8	13.7	13.1	12.2	11.0	[illegible]
900000	728000	19.0	17.6	16.8	15.6	14.1	[illegible]

Table 5.2.2 Special Maintenance Illustrative Analysis(Sumatera)

Capital cost(Rupiah/ha) of special maintenance (financial)	(economic)	Assumed Life of Special Maintenance Project in years 20	30	Project life(years) 20	30
		Annual equivalent(Rp/ha)		Expressed in Kg rice(gabah) at Rp 224/kg	
300000	274000	36683	34015	164	152
350000	319000	42707	39602	191	177
400000	364000	48732	45188	218	202
450000	409000	54758	50775	244	227
500000	454000	60781	56361	271	252
700000	634000	84879	78707	379	351
900000	814000	108977	101053	487	451

Expressed in Kg rice(gabah) at Rp 224/kg and allowing for the cost of production

		Project life in years 20	30	20	30	20	30
		Base Yield(kg/ha) 3000		Base Yield(kg/ha) 3500		Base Yield(kg/ha) 4000	
(financial)	(economic)						
300000	274000	582	540	524	486	548	508
350000	319000	678	629	610	566	637	591
400000	364000	774	717	696	646	727	674
450000	409000	869	806	782	725	817	758
500000	454000	965	895	868	805	907	841
700000	634000	1347	1249	1213	1124	1267	1175
900000	814000	1730	1604	1557	1444	1627	1508
		Base Yield(kg/ha) 4500		Base Yield(kg/ha) 5000		Base Yield(kg/ha) 5500	
(financial)	(economic)						
300000	274000	464	431	447	415	403	374
350000	319000	541	501	521	483	469	435
400000	364000	617	572	594	551	536	497
450000	409000	693	643	668	619	602	558
500000	454000	769	713	741	687	668	619
700000	634000	1074	996	1035	960	933	865
900000	814000	1379	1279	1329	1232	1198	1110

Expressed as % increase in intensity or yield per ha in second rice crop required to produce 12% return

		Project life in years 20	30	20	30	20	30
		Base Yield(kg/ha) 3000		Base Yield(kg/ha) 3500		Base Yield(kg/ha) 4000	
(financial)	(economic)						
300000	274000	19.4	18.0	15.0	13.9	13.7	12.7
350000	319000	22.6	21.0	17.4	16.2	15.9	14.8
400000	364000	25.8	23.9	19.9	18.4	18.2	16.9
450000	409000	29.0	26.9	22.3	20.7	20.4	18.9
500000	454000	32.2	29.8	24.8	23.0	22.7	21.0
700000	634000	44.9	41.6	34.6	32.1	31.7	29.4
900000	814000	57.7	53.5	44.5	41.2	40.7	37.7
		Base Yield(kg/ha) 4500		Base Yield(kg/ha) 5000		Base Yield(kg/ha) 5500	
financial)	(economic)						
300000	248000	10.3	9.6	8.9	8.3	7.3	6.8
350000	288000	12.0	11.1	10.4	9.7	8.5	7.9
400000	328000	13.7	12.7	11.9	11.0	9.7	9.0
450000	368000	15.4	14.3	13.4	12.4	10.9	10.1
500000	408000	17.1	15.9	14.8	13.7	12.1	11.3
700000	568000	23.9	22.1	20.7	19.2	17.0	15.7
900000	728000	30.7	28.4	26.6	24.6	21.8	20.2

Assumptions : Sumatera and Sulawesi

a) Annual cropping intensity of the second rice crop will decline by 10% over 15 years, reducing from 0.7 to 0.6 with "ordinary" O&M.

b) Annual cropping intensity of the second rice crop will increase from 0.7 to 1.0 with special maintenance and EOM over 10 years.

c) Yields of rice with "ordinary" O&M will decline by 500 Kg/ha when the cropping intensity drops to 0.65 (year 10) in the without project situation as competition for water (and poor distribution) becomes more intense. To some extent this can be seen as a very conservative proxy for the need to rehabilitate the scheme.

d) no yield increase for special maintenance and EOM are included

e) no rehabilitation costs are included

Other assumptions are presented below :

Costs per hectare	financial	economic cost
Special Maintenance	400,000	364,000
EOM	30,000	28,000
Ordinary 'O&M'	10,000	9,600
Gross Margin (4.5 tonnes, Sumatera)	352,000	
(4.5 tonnes, Sulawesi)	315,000	

Based on these assumptions a typical special maintenance and EOM project should produce an IRR of 16% in Sumatera and 15% in Sulawesi. The substantial variance between the two examples is caused almost entirely by different financial and economic wage rates inside and outside Java (and Lombok), which have a substantial impact on gross margins. The argument for not penalising Java with a yield penalty in the without project situation is that it is widely accepted that "ordinary" O&M standards in Java are higher than in Sulawesi or Sumatera where many projects are remotely located, distances are greater and the problems of supervising O&M correspondingly more difficult.

It will be noted that costs of Rp 700,000 - 900,000/ha are included, not because special maintenance is ever expected to cost this much but as a guide to the level of improvements required to justify upgrading.

Suggested categories	Action
"Clearly worthwhile"	no further analysis required, investment to proceed
"Marginal"	further evaluation required
"Clearly not worthwhile"	abandon or reformulate proposals.

5.2.5 Estimates of rates of return

None of the above gives an estimate of what rate of return special maintenance and EOM are likely to produce. This section attempts to estimate an IRR given that there is little evidence to justify the assumptions.

Assumptions : Java and Lombok

a) Annual cropping intensity of the second rice crop will decline by 10% over 30 years with "ordinary" O&M, starting from 0.8.

b) The intensity of the second rice crop will increase by 20% over a 10 year period following special maintenance from 0.8 to 1.0.

c) no yield increases through EOM or special maintenance are included.

d) no rehabilitation costs are included.

Other assumptions are summarised below :

Costs per hectare	financial prices	economic prices
Special Maintenance	400,000	328,000
Ordinary O&M	10,000	9,200
EOM	30,000	26,000
Gross Margin (yield 5 tonnes)	na	605,500

Based on these conservative assumptions a typical special maintenance and EOM project would produce an IRR of 18%.

Assumptions : Sumatera and Sulawesi

a) Annual cropping intensity of the second rice crop will decline by 10% over 15 years, reducing from 0.7 to 0.6 with "ordinary" O&M.

b) Annual cropping intensity of the second rice crop will increase from 0.7 to 1.0 with special maintenance and EOM over 10 years.

c) Yields of rice with "ordinary" O&M will decline by 500 Kg/ha when the cropping intensity drops to 0.65 (year 10) in the without project situation as competition for water (and poor distribution) becomes more intense. To some extent this can be seen as a very conservative proxy for the need to rehabilitate the scheme.

d) no yield increase for special maintenance and EOM are included

e) no rehabilitation costs are included

Other assumptions are presented below :

Costs per hectare	financial	economic cost
Special Maintenance	400,000	364,000
EOM	30,000	28,000
Ordinary 'O&M'	10,000	9,600
Gross Margin (4.5 tonnes, Sumatera)	352,000	
(4.5 tonnes, Sulawesi)	315,000	

Based on these assumptions a typical special maintenance and EOM project should produce an IRR of 16% in Sumatera and 15% in Sulawesi. The substantial variance between the two examples is caused almost entirely by different financial and economic wage rates inside and outside Java (and Lombok), which have a substantial impact on gross margins. The argument for not penalising Java with a yield penalty in the without project situation is that it is widely accepted that "ordinary" O&M standards in Java are higher than in Sulawesi or Sumatera where many projects are remotely located, distances are greater and the problems of supervising O&M correspondingly more difficult.

5.3 Swamps

5.3.1 Introduction

The components orginally proposed for funding under ISSP-2 are listed below :

a) Completion of the civil works for the Sei Kualuh Project in N. Sumatera.

b) Completion of the civil works for the Mesuji - Tulang Bawah Project in Lampung.

c) Additional work for the Peninjauan/Penago Project in Bengkulu.

d) Completion of Special Maintenance Projects deferred from the ISSP-1 programme.

e) The introduction of EOM on 148,860 ha in six provinces

5.3.2 Sei Kualuh Project, N. Sumatera.

On completion, the Sei Kualuh Project should consist of a net farmed area of 8,375 ha (gross 9,375 ha) with 1,200 ha of coconuts on land not suitable for sawah development and 7,175 ha of rainfed sawah. Funds expended by ISSP-1 and OECF are expected to total Rp. 8,795 million by end of the ISSP-1 programme by which time 4600 ha of sawah and 800 ha of coconuts will be developed. The costs of completion of the remaining 2,975 ha (net) are presented in Table 5.3.1.

Table 5.3.1 Programme for Completion of Sei Kualuh Project.

	Rp. Million	Costs charged to new area	
Mobilisation/demobilisation	169	169	
Primary Structures	278	278	
Secondary Structures	229	229	
Secondary drains	856	856	
Tertiary drains	1,053	1,053	
Tertiary drains	590	590	
Roads	3,044		}
			}2380
Bridges	218		}
O&M facilities	84	84	
	6,521	5,639	

All these items with the exception of roads and bridges apply to the new area to be developed. Cost per hectare developed with ISSP-1 and OECF funds is less than Rp. 2 million (at current prices) as compared with Rp 2.2 million for the extension. This suggests that rather than adding back additional sunk costs to the proposed development it would be fairer to spread the costs of roads and bridges (estimated at Rp 0.92 million/ha, including contingencies and at current prices) equitably over the whole project. The result is also presented in Table 5.3.1. Land development is expected to be undertaken by the farmers themselves as has been the case

on the remainder of the project.

Benefits arising from the development of the new area accrue to the conversion of unproductive land into sawah (2,575 ha) and coconut groves (400 ha). The cropping pattern for the sawah is expected to consist of one rice crop and one rather poor polowijo crop (maize yielding 0.8 tonnes/ha). Coconuts are expected to yield one tonne of copra at full production (15 years after planting). Rice yields are projected to start at 2.5 tonnes/ha and eventually reach 5 tonnes/ha ten years after a field is first planted. The justification for such a high yield is that yields of 4 tonnes/ha are already achieved on parts of the developed area and the fact that spontaneous transmigrants are buying uncleared land for up to Rp. 2 million per hectare which suggests that they have few doubts as to its potential productivity.

An explanation of these higher yields includes the extended growing season of the varieties grown (6 months) and local conditions which enable farmers to make the best use of the rainfall. In particular, farmers make use of their fields' topography by planting nurseries on the higher ground and transplanting twice into progressively lower areas which accumulate water through natural drainage. It does mean, of course, that the cropping intensity on each farm is always less than one. As the scheme develops, it is anticipated that farmers will become more proficient at coping with fluctuating water levels and will succeed in levelling their fields (or at least splitting them into bunded sections). As a consequence, it is envisaged that they will be able to stop transplanting twice and to crop all of their land.

In the economic analysis cropping intensities of 0.75 are assumed for the first six years of any newly developed field. Development rates of 515 ha per year are assumed for sawah, starting from year 3 of the project. Coconuts are planted at the rate of 100 ha per year starting in year 4 which means that full benefits for the project are not achieved until year 19.

An analysis based on these assumptions is presented in Table 5.3.2, which shows that the project produces an IRR of over 10%. It is much lower than the 1987 analysis because of a decline in the price of rice, an increase in the cost of most inputs and a 35% increase in per hectare development costs (approximately 5% in real terms). Compared with many other swamp projects it is an attractive proposition.

5.3.3 Mesuji - Tulang Bawang Project, Lampung

The Mesuji - Tulang Bawang Project is a transmigration project of 7,049 families who prior to resettlement, were squatting in the catchments of major rivers in Lampung and deforesting those areas. The objectives are resettlement and development of the swamp into an economically viable agricultural project which in turn will allow the damaged catchment areas to be replanted. Project statistics are presented below :

Sub-project	Listed Area Gross	Listed Area Net	Developed Area	Settlers
Mesuji-TB Unit II	6,400	6,010 ha	4,971 ha	2,306 KK
Mesuji-TB Unit I	6,000	6,067 ha	4,932 ha	2,294 KK
Mesuji-TB Unit IV	7,600	7,000 ha	5,807 ha	2,449 KK
Total	20,000	19,077 ha	15,710 ha	7,049 KK

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Table 5.3.2 SEI KUALUH PROJECT, North Sumatera

LAND DEVELOPMENT Total : 8,375 ha. This Project 2,875 ha

AGRICULTURAL BENEFITS

YEAR	Areas Rice	Maize	Coconut
1			
2			
3	515	515	
4	1030	1030	100
5	1545	1545	200
6	2060	2060	300
7	2575	2575	400

CAPITAL COSTS (Million Rp)	Amount
CIVIL WORKS	
– financial cost**	5,386.0
– economic cost	5,574.5
OTHER COST	
– Engineering	
– Land Development	
– Equipment	169.0
– O&M facilities	84.0
– Administration	
Sub-total (other cost)	253.0
ECONOMIC CAPITAL COST	5,827.5
ANNUAL O&M COST	75.0

** excluding minor items & contingencies

BUILD UP OF BENEFITS (Million Rp)

Benefit Stream	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
							(Year)											
Rice			60	134	220	319	439	545	650	753	854	945	991	1025	1048	1060	1060	1060
Maize			14	29	46	67	91	113	134	154	170	182	182	182	182	182	182	182
Coconuts				–31	–45	–59	–68	–47	–44	–29	–17	–0	21	36	58	84	106	123
Total			74	131	221	327	461	612	740	877	1007	1128	1194	1244	1284	1313	1330	1347

CASH FLOW (Million Rp)

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	20+
Inc Capital Cost	1,116	2,675	2,037															
Inc O&M Cost		35	150	150	150	75	75	75	75	75	75	75	75	75	75	75	75	75
Inc. Benefit			74	131	221	327	461	612	740	877	1,007	1,128	1,194	1,244	1,288	1,326	1,347	1,373
Inc. Net Benefit	(1,116)	(2,710)	(2,113)	(19)	71	252	386	537	665	802	932	1,053	1,119	1,169	1,213	1,251	1,272	1,298

Economic Internal Rate of return	10.5%
Net Present Value (at 10% discount rate)	303 million Rp.
Net Benefit/Investment Ratio (at 10% d.r)	1.06

SENSITIVITY ANALYSIS

	Variation in Construction Cost			Variation in Project Benefits		
	Down 10%	Up 25%	Up 50%	Up 10%	Down 10%	Down 20%
Economic Internal Rate of return	11.37%	8.74%	7.37%	11.40%	9.53%	8.47%
Net Present Value (at 10% d.r)	779	(885)	(2,074)	885	(278)	(860)

Land use

Development of land follows the settlement schedule. The situation at the end of ISSP-1 is presented below :

	UNIT-I	UNIT-II	UNIT-IV
Settlers	2,294 KK (100%)	2,306 KK (100%)	2,449 KK (100%)
Homeyards	573 ha (100%)	576 ha (100%)	612 ha (100%)
First holding	1,720 ha (75%)	1,730 ha (100%)	750 ha (100%)
Second holding	-- (0%)	-- (0%)	-- (0%)
Total	2,293 ha (46%)	2,306 ha (46%)	1,362 ha (23%)

It is likely that a land clearing programme to be undertaken by the Ministry of Transmigration will have cleared the remaining 2,850 ha of lahan 1 by the time ISSP-2 starts as funds for the programme are already allocated.

Proposals for funding under ISSP-2 are given below :

	Unit	Number	Unit price (Rp 1000)	Costs (Rp mln)
Rehab. stoplogs		240	2,500	600
Access roads	Km	100	15,000	1,500
Land development	ha	7,049	310	2,185
Sub Total				4,285
Optional deep wells & distribution systems unit		6	100,000	600

	91/92	92/93	93/94	Total (Rp. mln)
Rehabilitation structures	100	500	-	600
Roads	250	1,000	250	1,500
Land development (first holding)	750	750	685	2,185

Total completion cost Rp 4,285 million

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Sunk costs for the project (actual) are also given below :

Structural works

	Costs (Rp. mln)
229 culverts	1,853
8 sliding gates	80
93 flat gates	901
452 stoplog structures	1,672
16 suspension bridges	336
3 concrete	336
4 timber bridges	28
13 timber bridges	23
Total	5,229

Drainage and Flood control

Navigation	40,600 m at Rp	112,500 = Rp	4,569
Primary	10,900 m at Rp	112,500 = Rp	1,226
Secondary	72,250 m at Rp	29,700 = Rp	2,146
Collector	63,000 m at Rp	10,000 = Rp	630
Tertiary	746,000 m at Rp	2,700 = Rp	2,014
Flood Protection dike	64,600 m at Rp	14,850 = Rp	959
Total		Rp	11,543

It can be seen that the civil works apart from roads are complete. The justification for constructing access roads is normally included within the analysis of the whole project for the very good reason that access roads are widely accepted as a necessary requirement for the achievement of benefits even though it is not known what their impact will be or how they can be separately justified. The same argument holds for nearly all irrigation development where none of the contributions from water, improved seeds, fertiliser, farm chemicals, extension or markets are individually known because the interactions between them are extremely difficult to disentangle. Virtually all of the studies attempting to attribute yield increases to specific variables are open to criticism (ref 11, Varley, Irrigation Issues and Policy in Indonesia 1968 - 1988). Given the data base for Mesuji which has never been the subject of a feasibility study, no attempt has been made to justify the road building programme other than to point out that the yield forecasts used in the 1987 Review Report have already been exceeded in many areas and are now expected to reach 4 t/ha, provided that all of the project requirements including roads are supplied.

The remaining works proposed for funding under ISSP-2 are the rehabilitation of just over half the stop log structures and for land development (bunding and levelling as opposed to clearing) of all the lahan 1 areas, although it is understood that this activity will probably not be funded by ISSP-2. The costs of these activities, at economic prices, after including 15% for minor items and contingencies for structures and 5% contingencies for land development come to Rp 381,000 per hectare (lahan 1 only). The impact of rehabilitating the stoplog structures cannot be realistically quantified but that of the land development is easier to predict. It should increase the rate of development of remaining areas and improve yields because each of the fields will be flat with the same water level throughout. Flat fields are particularly important when high water tables restrict drainage. In these circumstances it is not unreasonable to expect yields to rise by 0.5 tonnes/hectare (0.3 tonnes due to an increase in harvested area, 0.2 tonnes due to yield) which will produce an IRR of over 15% (land development and rehabilitation).

Given that the yields used in the Review Report (1987) were 2.5 tonnes/ha at full production, it is presumably not unreasonable to claim some of the additional yields to justify the proposed expenditure.

5.3.4 Peninjauan - Penago, Bengkulu

This project was briefly reviewed in early 1988 as a late entry into the second list of ongoing projects for inclusion in the ISSP-1 funding programme. A number of assumptions were made during the review, some of which were of fundamental importance but have since turned out to be overly optimistic. In particular it was assumed that :

1) The average depth of peat was 0.6 metres and that an arable farming model was applicable to the whole area.

2) There were no toxic clays underlying the peat.

Since then the situation has, if anything, become more uncertain for the reasons given in section 2.3.2, and summarised below :

1) Two mutually contradictory soil surveys have been undertaken.

2) The status of much of the land is in doubt with competing claims by both DOS and private companies.

3) Development models cannot be realistically formulated until agreement is reached on both peat depths and whether or not the underlying soils contain acid sulphates.

4) An integrated development plan is agreed by DOS, DGFCA, Transmigration and the Provincial Irrigation service.

In these circumstances it is not felt that there is a sufficient basis on which to evaluate proposals for further work. The most crucial lack of data relates to soils without which it is not possible to decide whether development should be based on arable crops or plantations. At this stage it appears that treecrops, especially oil palm and coconuts are far better suited to the area than arable crops which will probably have to be restricted to about 30% of the project. In this context, it is relevant that the majority of settlers on Penago 1 have, until the recent collapse of the coffee price earned their livelihood labouring on neighbouring plantations rather than

developing their own holdings. Therefore it is concluded that the project requires additional study, and has been dropped from ISSP-2.

5.3.5 Special Maintenance

A description of the problems and shortcomings of special maintenance programmes on swamp development projects is presented in section 2.3.3, where it is suggested that the original concept, namely that special maintenance on swamp projects is governed by similar principles to special maintenance on irrigation schemes was misconceived.

It is argued that :

1) Most swamp schemes are at an early stage of development in which many different problems such as potentially acid clays, soil subsidence, tidal regimes and salinity intrusion may have a bearing on water management strategies. The inference is that swamp schemes are often more complicated than irrigation schemes and that standard solutions are inapplicable. Accordingly it is recommended that more time and effort is required to design special maintenance programmes for swamps and that they should be reviewed in some depth before implementation.

2) The levels of agricultural and social welfare support in swamp projects are generally far below those supplied to irrigation schemes, even to the extent that the lack of such supporting infrastructure can negate the improvements in performance which civil works might be expected to generate.

3) Most swamp schemes are scheduled for a major reassessment under the Second Stage Development Programme in which integrated development strategies will be established.

The conclusion of the above is that only areas with specific drainage and/or flooding problems which can be improved by special maintenance are suitable candidates for funding under ISSP-2. Proposals for special maintenance are presented in Table 4.4.1 from where it can be calculated that the cost per hectare for areas not already underway averages Rp 350,000/ha (Rp 315,000 at economic prices).

This means that if the proposals are to be economically worthwhile, average intensities would need to increase by 33% at low yields (2.5 t/ha) or 12% at high yields (4 t/ha), or alternatively by 350 Kg/ha at low yields or less than 100 Kg/ha at high yields.

5.3.6 Efficient Operation and Maintenance (EOM)

The discussion of EOM on irrigation schemes emphasised the importance and value of maintenance in postponing the need for expensive rehabilitation. On swamp schemes, this function is of less significance both because the costs of rehabilitation are much lower (US$ 300 - 500/ha) and because dykes and drains are usually overdesigned so that, once stabilised, they are less vulnerable to poor maintenance.

Operation on other hand is of considerable importance. On schemes where there is danger of saline intrusion or toxification of the soil through poor water management, EOM should always be worthwhile as one mistake may prove extremely expensive. On schemes where the risks are lower, EOM is also likely to be worthwhile because of the critical nature of water table management particularly during the very early stages of crop development. Failure to manage

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the water table with respect to both the crops' requirements and the weather can result in serious yield penalties through reduced plant populations. "Ordinary" operation often fails in this respect because no plan based on a thorough understanding of the scheme's parameters has been prepared and operators have to rely on a policy of trial and error.

Although no figures are available to substantiate these claims, it would be reasonable to assume that EOM would be worthwhile, assuming that shortcomings in extension services, input supplies and markets do not overshadow the improved operating regime. With EOM costs of Rp 50,000 for the first three years and Rp 30,000 thereafter, very small increments in production as compared with the "ordinary" case will make the programme worthwhile (about Rp 25,000/ha/year at economic prices).

5.4 Rivers

5.4.1 Introduction

The only river project orginally proposed for funding under ISSP-2 is the Babak River Project. A description of the scheme is presented in Chapter 2.

Land surrounding and adjacent to the lower reaches of the River Babak is subject to annual flooding of varying intensity during high flows in the wet season. The objective of the project is to provide protection to these areas by constructing levees along some seven kilometres of the river and improving channels especially at the river month.

The project is now proposed for transfer to IISP-2 funded by ADB and is no longer included in ISSP-2. However the economic analysis has not been deleted from the report as it may be useful when IISP-2 is appraised.

5.4.2 Costs

Economic costs are presented below :

	1991/92	1992/93	1993/94	Total (Rp. mln)
Civil Works (1)		1,140	761	1,901
Land Acquisition (2)				
Consultancy Services	69	138	69	276
Vehicles + Equipment	99			99
Government Staff (3)	36	72	36	144
Contingencies		114	76	190
Total	204	1,464	942	2,610

Notes (1) Converted to economic prices by a factor of 0.8, to reflect a substantial unskilled labour element

(2) accounted for in the economic analysis by lost production.

(3) 50% of proposed GOI staffing cost

Operation and Maintenance Costs are charged at 3% of the Civil Works per year or Rp. 57 million/ year.

5.4.3 Benefits

Flood protection benefits have been estimated separately for agricultural land and residential settlements.

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Agricultural Benefits

In an average year, about 850 ha are flooded upstream of Baturiti weir and 200 ha downstream near the sea. The floods near the sea are caused by sedimentation in the river mouth which obstructs high flows in the wet season. The floods seldom last more than 2 or 3 days as the high flows will gradually clear a channel through the obstruction and carry the sediment out to sea. The resultant damage to neighbouring rice crops is slight and is unlikely to exceed a yield loss of more than 0.5 t/ha/year. Damage to the irrigation systems is also small.

Floods upstream of Baturiti weir are more serious and a big flood will cause damage to as much as 1,300 ha of agricultural land. For the purposes of analysis an average figure of 850 ha is assumed of which approximately 600 hectares lie on the flatter right bank and 200 hectares on the more undulating left bank. Apart from residential areas, all of the area on the right bank lie within technically irrigated systems and it is estimated that out of the 600 hectares 300 are not farmed in the wet season whereas the remaining 300 hectares suffer an average annual yield loss of 1.5 tonnes per hectare.

On the left bank there is no technical irrigation and of the 200 hectares affected, it is assumed that 100 hectares are not cropped in the wet season while the remainder also suffer a yield loss of 1.5 t/ha (rainfed rice is more vulnerable than irrigated rice to flood damage).

An additional cost of the flooding is damage to the irrigation systems which generally takes the form of collapsed banks in both secondary and tertiary canals and breached bunds. Damage to masonry structures is usually slight. The costs of repairs to these are not easy to estimate for whereas farmers can be expected to repair bunds and tertiary canals the irrigation service are called on to rehabilitate the secondary canals and on occasion the work is sufficiently delayed to prevent the planting of a second rice crop in the affected areas. For the purpose of analysis the following assumptions are made :

Costs of repairs to irrigation systems

300 ha (severe flooding)	Rp 100,000/ha
300 ha (less severe flooding)	Rp 50,000/ha
200 ha (upstream Baturiti weir)	Rp 10,000/ha

In view of the uncertainty associated with these figures, sensitivity tests on their importance within the analysis are included.

Damage to residential property, roads and local industry

150 ha of residential and commercial property are flooded every year to a depth of 1 m for 3 days or more. As very little field work has been done to establish the extent and cost of flood damage, the following assumptions have been made for the purposes of the economic evaluation. Villages in the district have an average density of housing of 15 per hectare which are of medium quality (brick foundations, wooden or brick walls, tiled roofs). Some of the houses are also commercial properties (shops, rice mills). For a flood of 3 days duration a damage assessment of Rp 35,000/house has been estimated, which gives an overall figure of Rp. 525,000/ha. This has been increased to Rp. 650,000/ha to allow for additional damage to commercial property. The figures are not large but as the flooding is a regular occurrence, residents will be able to reduce the damage by taking appropriate action in advance.

Incremental costs of road repairs, (or additional costs in transportation if they are not repaired) access repairs for the sand collecting industry and other costs for other industries are unlikely to be less than Rp 25 million per year.

Lost agricultural production (infrastructural works)

The infrastructural works will cover about 50 hectares, most of which is cropped in the dry season with polowijo and vegetable crops. At least 80% of this area will cease to be available after construction of the levees incurring a cost through lost production of Rp 8 million per year.

5.4.4 Analysis

The labour market in Lombok is oversupplied and market rates for a day's work are around Rp 1,600. In common with other projects in Java and Bali, this analysis uses an economic wage rate of Rp 1,040/day or 65% of the market rate. Administration (government salary costs) have been halved to reflect the proportion of institutional strengthening anticipated in the implementation of the project.

The results of the analysis are presented in Table 5.4.1 where it can be seen that the project has an IRR of over 14%, and an NPV (10%) of over Rp 850 million. As might be expected, the project is very sensitive to changes in agricultural benefits as they constitute 80% of the total. It is far less sensitive to variations in other benefits which is reassuring given the assumptions underlying their derivation.

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TABLE 5.4.1 ECONOMIC ANALYSIS
BABAK FLOOD CONTROL PROJECT, West Nusa Tenggara

AREA AFFECTED	Present	Future with
	ha	ha
Agricultural	1,050	1,010
Village	150	150
Hamlet		
Works		40
Total area protected	1,200	1,200

AGRICULTURAL BENEFITS	PRESENT SITUATION Area ha	Yield T/ha	Net revenue 1000Rp/ha	Product 1000Rp	FUTURE WITH PROJECT Area ha	Yield T/ha	Net revenue 1000Rp/ha	Product 1000Rp
WET SEASON								
Rice(right bank:a)	300				1,000	5.0	606	606,000
Rice(right bank:b)	300	3.5	406	121,860				
Rice(left bank:a)	100							
Rice(left bank:b)	100	1.5	225	22,500				
Rice(downstream weir:c)	200	4.5	531	106,120				
Polowijo maize								
Sub-total	1,000			250,480	1,000			606,000
IRRIGATION WORKS								
Polowijo/Vegetables	50		200	10,000	10		200	2,000
Sub-total	50		200	10,000	10		200	2,000
Sub-total Agricultural	1,050			260,480	1,010			608,000

a> Not cropped in wet season
b> On average has a reduced yield of 1.5 tons/ha
c> On average has a reduced yield of 0.5 tons/ha

OTHER BENEFITS		FUTURE WITH PROJECT Unit	Price 1000Rp	Damage 1000Rp
Houses **	ha	150	650	97,500
Roads & Industry	sum			25,000
Irrigation Systems	sum right bank			45,000
Irrigation Systems	sum others			2,000
** Include stalls & shops				
Sub-total Other				169,500
TOTAL BENEFITS				777,500

CAPITAL COSTS (Million Rp)	Amount
CIVIL WORKS	
- financial cost***	2,352.60
- economic cost*	2,164.39
OTHER COST	
- engineering	276.00
- administration	144.50
- vehicle	99.00
- building/equipment	
Sub-total (other cost)	519.50
ECONOMIC CAPITAL COST	2,683.89
ANNUAL O&M COST	57

*** excluding contingencies
* Including contingencies

BUILT UP OF BENEFITS (Million Rp)		Assume full benefits in year :			5						
Year	1	2	3	4	5	6	7	8	9	10 30	
Without Project	260	260	260	260	260	260	260	260	260	260	260
With Project	260	260	260	583	778	778	778	778	778	778	778
Incremental Benefits				323	517	517	517	517	517	517	517

CASH FLOW (Million Rp)											
Year	1	2	3	4	5	6	7	8	9	10 30	
Inc Capital Cost	204	1,508	972								
Inc O&M Cost			30	57	57	57	57	57	57	57	57
Inc. Benefit				323	517	517	517	517	517	517	517
Inc. Net Benefit	(204)	(1,508)	(1,002)	266	460	460	460	460	460	460	460

Economic Internal Rate of return	14.2%	
Net Present Value (at 10% discount rate)	875	million Rp.
Net Benefit/Investment Ratio (at 10% d.r)	1.40	

SENSITIVITY ANALYSIS	Variation in Construction Cost Down 10%	Up 25%	Up 50%	Variation in Total Benefits Up 10%	Down 10%	Down 20%	Variation in Other Benefits Up 10%	Down 10%	Down 20%
Economic Internal Rate of return	15.98%	11.64%	9.66%	16.61%	12.04%	9.38%	15.00%	13.98%	13.47%
Net Present Value (at 10% d.r)	1,169	412	(128)	1,490	418	(120)	1,068	838	723

5.5 Groundwater

5.5.1 Introduction

The groundwater component proposed for ISSP-2 is an 18 months to two year programme designed to bridge the gap between the end of ISSP-1 and the start of a free standing groundwater project in early 1992/93. Details of the package are presented in Appendix A.2 and are summarised below :

a) Implementation of schemes for which designs have already been prepared

b) drilling of tubewells to establish yields

c) preparation for the first years implementation under the new groundwater project, ie :

- Procurement of materials and equipment
- Topographic mapping
- Design of Irrigation Systems
- Tender document preparation

An economic analysis was undertaken for the originally planned programme for part a) which consisted of the wells listed below. Since the economic analysis was completed the programme has been changed to the numbers of wells, and hence total irrigated areas shown in parentheses.

E Java	:	21 (18) deep tubewells irrigating 25 ha each 10 (3) intermediate technology wells with sump (ITW) irrigating 8 ha each 20 (20) ITW (without sump) irrigating 8 ha each
S Sulawesi	:	8 (8) ITW (with sump) irrigating 8 ha each 10 (12) ITW (without sump) irrigating 8 ha each
C Sulawesi	:	4 (3) ITW (with sump) irrigating 7 ha each 5 (7) ITW (without sump) irrigating 7 ha each

Total Irrigated Area :	E Java	765 ha (634 ha)
	S Sulawesi	144 ha (160 ha)
	C Sulawesi	63 ha (70 ha)
	Total	972 ha (864 ha)

A feasibility study (East Java Groundwater Development Project, Progress of Project and Feasibility Study Report, Nippon Koei Co. Ltd., April 1986) is available for East Java but as far as is known no feasibility study has even been undertaken in Sulawesi. The analysis for Sulawesi is consequently unsubstantiated.

5.5.2 Costs of Groundwater Development

Costs used in the economic analysis are based on unit rates presented in Appendix A.2 and are estimated for each well type. Total costs presented in Appendix A.2 are misleading because they

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exclude items in stock and include activities which are preparatory to the new groundwater project. Consultancy and administration costs are reduced to 10% and 5% of construction and equipment costs because it is not known what proportion of their input can be legitimately charged to the proposed programme, and would be excessive if allocated by area. Topographic and geodesic surveys as well as irrigation design costs are included as separate items. Operation and maintenance costs (at financial prices) have been obtained from P2AT, Jakarta. Capital costs are presented in Table 5.5.1 and operation and maintenance costs in Table 5.5.2.

5.5.3 Benefits

Groundwater development is expensive to both install and operate and consequently requires much higher cropping intensities and yields to make it worthwhile than are customary on surface irrigation schemes. As tubewells have the facility to provide water on demand throughout the year the only restrictions on cropping intensities are the length of time each crop takes to mature and farmers' willingness to make maximum use of their land. Experience in East Java has shown that cropping intensities of 300% are commonly achieved. In addition the reliability of and access to water encourages farmers to maximise inputs and achieve higher yields than are obtained with other forms of irrigation (with the exception of wet season rice). It also encourages them to grow high value (out of season) vegetables as and when the market dictates.

An important determinant of the economic viability of groundwater development is the "without project situation" and in particular what surface irrigation is available. Obviously groundwater development will be more worthwhile in water short areas with low cropping intensities than in areas which already have reasonably high cropping intensities. For the purposes of the economic analysis the following assumptions have been made (based on the feasibility study in East Java's case).

	Present		Future Without		Future With	
	Area (ha)	Yield (t/ha)	Area (ha)	Yield (t/ha)	Area (ha)	Yield (t/ha)
East Java (1)						
Wet Season Rice(2)	765	3.0	765	4.0	765	5.5
Maize (3)	382.5	2.0	765	2.5	765	5.0
Soyabeans					382.5	1.8
Vegetables					382.5	-
Sulawesi						
Wet Season Rice	207	3.0	207	3.5	207	5.0
Maize			103.5	2.5	207	4.5
Soyabeans					103.5	1.5
Groundnuts					103.5	1.0

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Notes

(1) All yields for future with project projections in Java are taken from the 1986 feasibility study

(2) Assumptions based on limited and unreliable irrigation supplies in present and future without situations.

(3) Maize yields in the future with project are for high yielding hybrids

(4) Vegetable returns are estimated at Rp 600,000/ha

(5) Crop budgets are presented in Appendix E, Table E.6.

5.5.4 Economic Analysis

The results of the economic analysis are presented in Tables 5.5.3 and 5.5.4.

The programme in East Java produces an IRR of 14% and is recommended for implementation. The without project intensity of cropping is fairly high and might be an overestimate. In addition, it is probable that farmers will grow more high value crops than are included in the analysis which would obviously improve returns.

The programme for Sulawesi produces an IRR of only 10% in spite of the inclusion of high yields (for Sulawesi) in the future with project projections. The result should not be interpreted as more than a warning however because the analysis is not based on any documented with and without project yields and cropping intensities and may have misrepresented the actual situation. In view of the fact that all groundwater development will be reviewed in detail prior to the implementation of the new groundwater project, it would not be sensible to curtail the Sulawesi programme for one year on the basis of the marginal returns presented in Table 5.5.4.

Table 5.5.1. COSTS OF GROUNDWATER PROGRAMME (MILLION RUPIAH)

EAST JAVA	FINANCIAL COST							ECONOMIC COST
ITEMS	DTW *)		ITW (SUMP) **)		ITW (NO SUMP) ***)		TOTAL	TOTAL
	PER WELL	21 WELLS	PER WELL	10 WELLS	PER WELL	20 WELLS	PROJECT	PROJECT
Drilling etc.	74.6	1565.8	18.3	182.6	17.4	347.8	2096.2	1781.7
Contingencies (10%)	7.5	156.6	1.8	18.3	1.7	34.8	209.6	178.2
Pumps	22.5	471.5	2.7	27.4	2.7	54.8	553.6	553.6
Materials	11.5	242.4	2.1	20.8	2.1	41.7	304.9	259.2
Subtotal	116.0	2436.2	24.9	249.1	24.0	479.0	3164.3	2772.7
Toposurvey	1.9	39.0	0.6	5.9	0.6	11.9	56.8	56.8
Geodesic survey	2.2	45.6	0.7	6.9	0.7	13.9	66.4	66.4
Irrigation design	1.3	26.3	0.4	4.0	0.4	8.0	38.3	38.3
Administration (5%)	5.8	121.8	1.2	12.5	1.2	24.0	158.2	158.2
Consultants (10%)	11.6	243.6	2.5	24.9	2.4	47.9	316.4	316.4
Subtotal	22.7	476.3	5.4	54.3	5.3	105.6	636.2	636.2
TOTAL COST	138.7	2912.5	30.3	303.3	29.2	584.7	3800.4	3408.8
IRRIGATED AREA (HA)		525.0		80.0		160.0	765.0	765.0
COST PER HA		5.5		3.8		3.7	5.0	4.5

SULAWESI	FINANCIAL COST									ECONOMIC COST
ITEMS	ITW (SUMP)**)		ITW (NO SUMP)***)		ITW (SUMP)**)		ITW (NO SUMP)***)		TOTAL	TOTAL
	PER WELL	8 WELLS	PER WELL	10 WELLS	PER WELL	4 WELLS	PER WELL	5 WELLS	PROJECT	PROJECT
Drilling etc.	19.9	158.9	18.9	189.4	20.2	80.8	19.3	96.4	525.4	0.0
Contingencies (10%)	2.0	15.9	1.9	18.9	2.0	8.1	1.9	9.6	52.5	0.0
Pumps	2.8	22.4	2.8	28.0	2.8	11.2	2.8	14.0	75.7	0.0
Materials	2.2	17.4	2.2	21.7	2.9	11.6	2.9	14.5	65.2	0.0
Subtotal	26.8	214.6	25.8	258.1	27.9	111.7	26.9	134.6	718.9	0.0
Toposurvey	0.9	7.0	0.9	8.8	0.8	3.1	0.8	3.8	22.6	0.0
Geodesic survey	0.9	7.3	0.9	9.1	0.8	3.2	0.8	4.0	23.6	0.0
Irrigation design	0.4	3.2	0.4	4.0	0.4	1.6	0.4	2.0	10.8	0.0
Facilities	0.8	6.4	0.6	8.0	0.1	0.4	0.1	0.5	15.3	0.0
Administration (5%)	1.3	10.7	1.3	12.9	1.4	5.6	1.3	6.7	35.9	0.0
Consultants (10%)	2.7	21.5	2.6	25.8	2.8	11.2	2.7	13.5	71.9	0.0
Subtotal	7.0	56.1	6.9	68.5	6.3	25.0	6.1	30.5	180.2	0.0
TOTAL COST	33.8	270.6	32.7	326.6	34.2	136.7	33.0	165.1	899.1	0.0
IRRIGATED AREA (HA)		64.0		80.0		28.0		35.0	207.0	207.0
COST PER HA		4.2		4.1		4.9		4.7	4.3	0.0

*)Deep tubewell **) Intermediate Tubewell (Sump) ***) Intermediate Tubewell (No Sump)

Table 5.5.2. OPERATION AND MAINTENANCE COST

JAVA

Item	Volume (lt/hr)	Unit Price (Rp.)	Cost per hour (Rp.)	Cost per year (Financial 000 Rp.)	Cost per year (Economic 000 Rp.)
Gas Oil	6	220	1,320	2,640	3,036
Oil	0.05	2,225	111	223	278
Grease		15	15	30	30
Operator		100	100	200	200
HIPPA		150	150	300	300
Maintenance		150	150	300	300
Total cost (40 ha)				3,693	4,144
Total cost (per ha)				92	104

Note : Sulawesi operating costs are lower and are based on fuel consumption of 4 litres/hour

Table 5.5.3. ECONOMIC ANALYSIS OF GROUNDWATER (EAST JAVA)

CROPPING PATTERN	Present (ha)	Future Without (ha)	Future With (ha)
Rice-maize	765	765	0
Rice-maize-soybean			382.5
Rice-maize-vegetables			382.5
Total	765	765	765
Cropping Intensity (%)	150	200	300

CROP YIELD	Present (t/ha)	Future Without (t/ha)	Future With (t/ha)
Wet season:			
Rice	3	4	5.5
Dry season:			
Maize	2	2.5	5
Soybean			1.8
Vegetable			

AGRICULTURAL BENEFITS.	PRESENT SITUATION			FUTURE WITHOUT PROJECT			FUTURE WITH PROJECT		
Crop	Area (ha)	Yield (t/ha)	Net revenue (M Rp.)	Area (ha)	Yield (t/ha)	Net Revenue (M Rp.)	Area (ha)	Yield (t/ha)	Net Revenue (M Rp.)
Wet Season:									
Rice	765	3	272.8	765	4	345.3	765	5.5	526.0
Dry season:									
Maize	382.5	2	71.6	765	2.5	154.9	765	5	390.3
Soybean							382.5	1.8	160.5
Vegetables							382.5		229.5
Total :	1147.5		344.4	1,530.0		500.2	2,295.0		1,306.2

BUILD UP OF BENEFITS (Million Rp.) Assume full benefits in year: 7

Year	1	2	3	4	5	6	7+
Without Project	344	383	422	461	500	500	500
With Project	344	505	665	825	986	1,146	1,306
Incremental Benefit	0	121	243	364	485	646	806

ECONOMIC COSTS AND BENEFITS (Million Rp.) :

Year	1	2	3	4	5	6	7	8	9	10	11	12...25
Inc.Capital Cost	3409											
Inc.Replacement Cost												
Inc.O & M Cost		79	79	79	79	79	79	79	79	79	79	79
Incremental Benefit	0	121	243	364	485	646	806	806	806	806	806	806
Inc. Net Benefit	-3409	42	163	285	406	566	727	727	727	727	727	727

Economic IRR : 13.7%

Net Present Value (10% disc.rate) million Rp. : 1,197.0

Table 5.5.4. ECONOMIC ANALYSIS OF GROUNDWATER(SULAWESI)

CROPPING PATTERN	Present (ha)	Future Without (ha)	Future With (ha)
Rice	207	207	0
Rice-maize-soybean			103 5
Rice-maize-groundnut			103 5
Total	207	207	207
Cropping Intensity (%)	100	150	300

CROP YIELD	Present (t/ha)	Future Without (t/ha)	Future With (t/ha)
Wet season			
Rice	3	3.5	0
Dry season			
Maize	1.8	2.5	4.5
Soybean			1.5
Groundnut			1

AGRICULTURAL BENEFITS: Crop	PRESENT SITUATION Area (ha)	Yield (t/ha)	Net revenue (M Rp.)	FUTURE WITHOUT PROJECT Area (ha)	Yield (t/ha)	Net Revenue (M Rp.)	FUTURE WITH PROJECT Area (ha)	Yield (t/ha)	Net Revenue (M Rp.)
Wet Season:									
Rice	207	3	34 9	207	3.5	39.1	207	0	87.3
Dry season:									
Maize				103.5	2.5	8.1	207	4.5	55 2
Soybean							103 5	1.5	24 6
Groundnut							103 5	1	26.2
Total :	207		34 9	310 5		47.2	621.0		193 4

BUILD UP OF BENEFITS (Million Rp.) Assume full benefits in year: 7

Year	1	2	3	4	5	6	7+
Without Project	35	38	41	44	47	47	47
With Project	35	61	88	114	141	167	193
Incremental Benefit	0	23	47	70	93	120	146

ECONOMIC COSTS AND BENEFITS (Million Rp) :

Year	1	2	3	4	5	6	7	8	9	10	11	12...25
Inc Capital Cost	866											
Inc Replacement Cost												
Inc O & M Cost		16	16	16	16	16	16	16	16	16	16	16
Incremental Benefit	0	23	47	70	93	120	146	146	146	146	146	146
Inc. Net Benefit	-866	7	30	54	77	104	130	130	130	130	130	130

Economic IRR : 9.9%

Net Present Value (10% disc.rate) million Rp. : (7.5)

5.6 Project Risks and Justification

Surface Irrigation (Special Maintenance and EOM)

The principal risk associated with special maintenance is in the identification and selection of schemes. It is always possible to find ways in which to spend money on a scheme and some care must be taken to ensure that only essential improvements are included. In other respects the risks are low, as the work is relatively straightforward and costs per hectare are small, although it is important that contractors are adequately supervised and that the quality of work is kept up to specification.

The risks associated with EOM are institutional in the sense that staff will have to be trained, and motivated and given sufficient independence and responsibility if they are to operate and maintain schemes successfully. The development of needs based budgeting should assist in the process of establishing responsibility for a scheme in its operators, as will the introduction of ISF. Nevertheless institutional change is notoriously difficult to achieve and clearly there is an element of risk in attempting such changes.

The justification of these activities is that they are likely to produce rates of return of over 12% even when very conservative assumptions are used to calculate them. It has been shown in section 5.2 that EOM can be (virtually) justified by its maintenance function alone and that the intensity increases required to justify special maintenance are also very small (often less than 10% in one rice crop). In addition there is the question of what alternative courses of action are available. One possibility is to continue with or even reduce existing O+M budgets and accept that schemes will have to be rehabilitated every 15 to 20 years. This is not an economically attractive alternative however. It wastes resources, is unfair to farmers and may even jeopardise food security.

Swamps

Swamp development in Indonesia is to be the subject of a major re-evaluation prior to the proposed Second Stage Swamp Development Project, which it is understood will emphasise the importance of integrated development strategies. The implication is that swamp development has not been as successful as expected and that nearly all swamp development is characterised by high levels of risk.

Projects

To the extent that the Seikualuh and Mesuji - Tulang Bawah projects are two of the more successful swamp developments, the risks are reduced. In the case of Mesuji - Tulang Bawah the civil works programme is virtually complete, with only road construction and some rehabilitation of stop log structures proposed. The realisation of benefits is far more dependent on the provision of adequate extension and other related services than on the civil works programme. Seikualuh Project has the advantage that it is populated by spontaneous transmigrants who are investing their own funds in housing and land development and are evidently highly motivated. Spontaneous transmigration also has the disadvantage that uncoordinated and delayed development may occur as it is not easily controlled or organised. The justification for the proposed works in both Seikualuh and Mesuji - Tulang Bawah is that they are ongoing projects whose completion should produce reasonable returns (for swamps) and benefit large numbers of transmigrants.

Special Maintenance and EOM

A major risk for Special Maintenance and EOM programmes in swamps is that other factors (poor access to farm inputs for example) are of more importance to increasing production than minor rehabilitation or proper operation. Thus considerable care is required in identifying schemes which are able to benefit from special maintenance, which, until the advent of the Second Stage Development Programme means only those with specific flooding or drainage problems. Special maintenance on these scheme should produce worthwhile returns. EOM on swamp schemes should always be worthwhile but is subject to the same risks as EOM on irrigation schemes.

Rivers

The risks associated with the implementation of the Babak River Project are those normally encountered with any large scale civil engineering scheme, namely cost escalation, delays and quality of construction. The implications for the economics of the project are important as the rates of return are not high enough to incorporate increased costs or delayed benefits, and still produce acceptable returns. There is also a risk that the benefits may have been incorrectly assessed, as little fieldwork has been done to verify them.

The justification of the project is that it should produce an IRR greater than 12% and improve the quality of life and economic well being of the resident community.

Groundwater

The principal risk in groundwater development is in the attainment of benefits, both increased yields and much higher cropping intensities. Experience in Java suggests that such increases can be obtained but there is obviously a risk, especially in Sulawesi, that farmers will not make the best use of the opportunities which access to groundwater provides. Some additional extension, designed specifically for groundwater users, would be worthwhile.

The justification of the groundwater component is that it is a bridging operation from ISSP-1 to a new project. Serious disruption to the programme and substantial shut down / start up costs will be incurred if funds are not made available. In addition the Java component produces worthwhile returns(IRR = 14%) and although the Sulawesi component may produce only marginal returns (IRR = 10%) it is still recommended for funding. The reason for recommending funding of the Sulawesi programme is that the economic analysis is not sufficiently reliable to justify excluding it for one year, after which it will be the subject of a far more rigorous evaluation than could be undertaken here.

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