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**MID-TERM EVALUATION**  
**SMALL SCALE IRRIGATION MANAGEMENT PROJECT,**  
**INDONESIA**

ISPAN Activity No. 652B

ISPAN Report No. 23



**IRRIGATION SUPPORT PROJECT FOR ASIA AND THE NEAR EAST**

Sponsored by the U.S. Agency for International Development



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**MID-TERM EVALUATION  
SMALL SCALE IRRIGATION MANAGEMENT PROJECT, INDONESIA**

**Prepared for the USAID Mission to Indonesia  
under ISPAN Activity No. 652B**

**by**

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## **PREFACE**

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The mid-term evaluation of USAID/Jakarta's Small Scale Irrigation Management Project (SSIMP) took place from July 23 to August 18, 1989. It was conducted for the USAID Mission by the Irrigation Support Project for Asia and the Near East (ISPAN). Members of the evaluation team included:

- Mr. William R. Thomas 3d, management specialist and team leader
- Dr. Sjoftjan Asnawi, economist
- Dr. E. Walter Coward Jr., rural sociologist
- Dr. Jack Keller, agricultural engineer

With the exception of a Team Planning Meeting on July 17 and 18 in Washington, all of the evaluation work was carried out in Indonesia. The team worked in Jakarta and visited all three provinces involved in the project. Almost every site of project activities was visited during these provincial trips. A list of sites visited is shown in Appendix B. Mr. Hisao Tanimoto, Senior Representative of the Overseas Economic Cooperation Fund, Japan accompanied the team to NTT Province.

Standard, empirical evaluation methodology was used in this evaluation. It consisted of a review of background and other project documents, and extensive interviews. Persons interviewed included USAID personnel; central, provincial and local officials; and private individuals involved in, or affected by the project activities. (A partial list of persons contacted during the evaluation is shown in Appendix A.)

It is not possible to identify individually all those who assisted the team during the course of this evaluation. However, we are indebted to the many persons in USAID, on the TA team, and in the Government who so graciously assisted us in this effort. Without their assistance, so freely given, this evaluation would not have been possible. We are also grateful for the extensive hospitality we were shown everywhere we went.

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## ACRONYMS AND TERMS

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AID	Agency for International Development
Bina Program	Directorate of Planning and Programming
<i>bupati</i>	Head of a district ( <i>Kabupaten</i> )
<i>camat</i>	Head of a sub-district ( <i>Kekapatem</i> )
CIDA	Canadian International Development Agency
DGWRD	Directorate General of Water Resources Development
DIP	Annual Operating Budget
DUP	Annual Operating Budget Request
EIRR	Economic Internal Rate of Return
GOI	Government of Indonesia
ha	Hectare
HHS	Household Survey
HPSIS	High Performance Sederhana Irrigation Systems
Irigasi I & II	Directorates of Irrigation I & II
ISSP	World Bank Irrigation Subsector Project
<i>kepala desa</i>	Head of a village
l/s	liters per second
LP3ES	Institute for Economic and Social Research, Education and Information
mcm	Million cubic meter
NGO	Non-governmental Organization
NTB	Nusa Tenggara Barat
NTT	Nusa Tenggara Timur
O&M	Operation and Maintenance
OECD	Overseas Economic Cooperation Fund, Japan
P2AT	Groundwater Development Project
PACD	Project Assistance Completion Date
<i>palawija</i>	Secondary food crop; food crop other than rice
PIL	Project Implementation Letter
PJR	Project Justification Report
PMS	Performance Monitoring System
PP	Project Paper
PRIS	Provincial Irrigation Service
PSC	Personal Services Contract

<b>PU</b>	<b>Ministry/Department of Public Works</b>
<b>Rp.</b>	<b>Rupiah, Indonesia currency (US\$ = Rp. 1,775)</b>
<b>RRIA</b>	<b>Rapid Rural Irrigation Appraisal</b>
<i>sawah</i>	<b>Irrigated or rain-fed rice field</b>
<b>SSIMP</b>	<b>Small Scale Irrigation Management Project</b>
<i>Sulsel</i>	<b>South Sulawesi</b>
<b>TA</b>	<b>Technical Assistance</b>
<b>USAID</b>	<b>United States Agency for International Development/Mission to Indonesia</b>
<b>WUA</b>	<b>Water Users Association</b>
<b>WUAO</b>	<b>Water Users Association Organizer</b>

## EXECUTIVE SUMMARY

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This report presents the results of the mid-term evaluation of USAID/Jakarta's Small Scale Irrigation Management Project (SSIMP)-Project No. 497-0347. The Project Agreement for SSIMP was signed on August 30, 1985, and its completion date (PACD) is September 30, 1993. The total cost is estimated at \$89.7 million. Of this, USAID will provide \$50 million (\$32.4 grant and \$17.6 loan), and the Government of Indonesia will provide \$39.7 million in cash and in kind.

SSIMP is a complicated project. It is based on four irrigation technologies: weirs, reservoirs, groundwater and lift irrigation. Reservoirs and groundwater are relatively new to the three eastern provinces where the project is operating—South Sulawesi, Nusa Tenggara Barat (NTB), and Nusa Tenggara Timur (NTT)—but the technologies are relatively straight forward. The complexity of the project stems from the fact that, despite its name, it is concerned with intermediate scale, as well as small scale, irrigation systems. This difference in scale further complicates the two major institution strengthening themes that are at the heart of the project and give it its importance:

- Decentralization of authority for intermediate scale irrigation projects to the provinces, which is in keeping with the official overall decentralization policy of the Government. The project provides an opportunity to help the Government find ways to make decentralization a reality for intermediate scale projects.
- Involvement of farmer beneficiaries in the subprojects from design through operations and maintenance, which also supports the Government policies of forming strong water user associations (WUAs) and the collection of user fees. This is the first time in Indonesia that trained WUA organizers will facilitate farmer involvement in the design stage of intermediate scale irrigation projects. It is one of the few efforts in the region to involve non-governmental organizations in developing WUAs.

There are also important training and special studies elements in the project. Participant training has been well done. Twenty-seven participants in long-term overseas training programs are now returning and

will provide an infusion of talent. In-country training needs to be better planned and executed. Special studies are intended to support other project activities. A new mechanism for planning and managing them is needed.

Japan is participating in the project through its Overseas Economic Cooperation Fund (OECF). This year, the OECF is providing local currency for groundwater activities in NTB and NTT. The OECF is expected to finance the Tiu Kulit dam project in NTB. These are very positive developments. They provide needed finance, but, more importantly, they will help ensure that the project's institutional aspects will be carried forward in future OECF irrigation activities. Similar participation by other donors should be encouraged, since the budget in the loan and grant agreements is fixed and is not sufficient to complete all aspects of the project.

### Project Accomplishments

The project has been in the implementation phase for four years with the full Technical Assistance team on site for the past two years. Although none of the surface irrigation systems has been constructed yet, substantial progress has been made on the design of these systems. Under the groundwater component, two small irrigation systems have been constructed but coherent plans for achieving the Project Paper objectives are still lacking. Progress has also been achieved in the institutional strengthening aspect of the project.

For the surface water component, an appropriate methodology for designing the irrigation works has been adopted. Table 2 summarizes the progress that has been made for each surface water system. The list of activities provides some idea of the complexity of developing intermediate scale irrigation projects as are being considered under this project. The basic concept that has been adopted appears to follow a logical sequence of events. This sequence commences with basic resource data collection, followed by collection and analysis of socioeconomic data, an environmental assessment, various engineering and land capability studies leading to a Project Justification Report (PJR) including information to establish the feasibility of a project,

final design and, finally, preparation of contract documents for international tendering. Table 2 shows that three projects have now completed prequalification of contractors. These three projects are expected to start construction within the next eighteen months. The design phase is expected to be completed by September 1991, at which time final designs and contract documents will have been prepared for eight projects.

Concerning the groundwater program, a less positive picture emerges. To date, two small groundwater systems have been constructed as demonstration sites. The quality of these systems is excellent and the level of farmer participation is to be commended. Some experience has been gained on appropriate technology for groundwater development. Additionally, studies and analyses have been carried out which have identified potential areas for groundwater irrigation development in NTB and NTT with some degree of confidence. The major need now is to get a combined exploration and development drilling program underway in both provinces. Priority should also be given to preparing a workable action plan leading to the construction of irrigation systems which incorporate the crucial farmer participation element. It is unlikely that the farmer participation level can be replicated on a broad scale unless new means can be found to substitute for the intensive Technical Assistance which is being provided at the initial sites.

#### Project Constraints

The project is behind schedule by as much as two years. However, much has been accomplished, and it is poised to move forward and achieve its objectives if time permits. Given the policy relevance of these objectives and their importance for future irrigation activities in Indonesia, the project deserves continued support and should be carried to completion. To do this, some important changes are needed.

Two major management problems impede implementation of SSIMP:

- the lack of an effective management structure, and
- the lack of management planning and monitoring systems for the project as a whole and its components.

Unless they are resolved, it is unlikely that the project can be successfully implemented, even if it is extended.

The Project Paper proposed ten surface water subprojects.\* Two are probably not technically feasible. Only three others can be completed before the current PACD, and none would have a full year's operation after completion. A two-year extension would allow all of these subprojects to be completed and provide at least a year of operations, which is essential if the WUAs are to be consolidated.

Groundwater activities are just beginning, and provincial groundwater project plans are urgently needed. The Project Paper called for sequential exploration, pilot test activities and expansion. Enough is now known about the aquifers and farmer organization so that these activities can and should be conducted concurrently. As a result, project progress will be expedited and better information will be gained on the water resources available.

#### Recommendations

The report presents recommendations of the evaluation team, including the following key points:

- A no-cost two-year extension of the PACD should be made, and the current TA contract should be extended to September 1991, with a follow-on TA contract let for construction supervision services and O&M support.
- A project management structure with clear assignment of responsibilities should be designated in the Government's Directorate General of Water Resources Development with clear responsibilities assigned to both Irigasi I (the groundwater directorate) and Irigasi II (the surface water directorate). The role of the TA Team Leader in Jakarta should be redefined to include responsibility for overall project planning, monitoring, implementation, providing advice and assistance to the DGWRD.
- Every effort should be made to reduce the detailed management activities of USAID by such actions as the use of umbrella PILs for the groundwater activities.

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\* Some project documents refer to nine sites, because two (Batujai and Surabaya) are located in the same watershed.

- **More comprehensive implementation plans should be developed for the project and its components, and progress should be monitored against those plans.**
- **All surface subprojects should be constructed, except Raja Telaga and the Surabaya lift scheme, and additional foreign funding sources should be explored.**
- **The project should carry out the groundwater exploration, pilot study and expansion program concurrently, rather than in sequence, with the use of site profiles and careful monitoring of the physical and socioeconomic consequences.**
- **In keeping with the overall recommendation on project planning, groundwater programs should be planned for each province as soon as possible; and a TA sub-team should be put in place to support the planning and execution of expanded groundwater activities in all three provinces.**
- **Arrangements should be made to provide water user association organizers to support the groundwater programs in all three provinces.**

## **RINGKASAN EKSEKUTIF: KESIMPULAN DAN REKOMENDASI**

Laporan ini adalah hasil evaluasi mid-term Proyek Pengelolaan Irigasi Berskala Kecil (Small Scale Irrigation manajemen Project (SSIMP)) USAID/Jakarta--No. Proyek 497-0347. Perjanjian Proyek SSIMP telah ditanda tangani pada tanggal 30 Agustus 1985, dan proyek akan selesai pada tanggal 30 September 1993. Total biaya yang diperlukan diperkirakan \$89,7 juta. Dari jumlah ini, USAID akan memberikan \$50 juta (\$32.4 juta dalam bentuk hibah (grant) dan \$17,6 juta dalam bentuk pinjaman (loan)), dan Pemerintah Indonesia akan memberikan \$39,7 juta dalam bentuk uang dan barang.

SSIMP adalah proyek yang rumit. Ia didasarkan atas empat macam teknologi irigasi: bendung (weirs), waduk (reservoirs), air tanah (groundwater) dan irigasi angkat (lift irrigation). Teknologi waduk dan air tanah masih relatif baru bagi ketiga provinsi di bagian timur dimana proyek ini dilaksanakan - Sulawesi Selatan, Nusa Tenggara Barat (NTB), dan Nusa Tenggara Timur (NTT) - tetapi teknologi ini relatif sederhana. Kerumitan proyek ini berakar dari kenyataan bahwa, meskipun namanya, ia menyangkut sistim irigasi berskala menengah (intermediate scale) disamping irigasi berskala kecil. Perbedaan dalam skala ini lebih lanjut mempersulit dua tema utama dalam memperkuat kelembagaan yang merupakan inti dari proyek ini:

- Desentralisasi wewenang proyek-proyek irigasi berskala menengah kepada propinsi yang sesuai dengan seluruh kebijakan desentralisasi pemerintah. Proyek ini memberi kesempatan untuk membantu pemerintah menemukan cara-cara agar desentralisasi menjadi realitas bagi proyek-proyek berskala menengah.
- Keterlibatan petani yang mendapat manfaat pada sub-sub proyek mulai dari design sampai operasi dan pemeliharaan, juga akan mendukung kebijakan pemerintah dalam pembentukan Perkumpulan Petani Pemakai Air (P3A) yang kuat dan dalam pengumpulan iuran air. Untuk pertama kalinya di Indonesia bahwa petugas organizer P3A yang sudah dilatih akan memfasilitasi keterlibatan petani dalam phase design proyek-proyek irigasi berskala menengah. Ini merupakan salah satu dari berbagai usaha untuk melibatkan organisasi-organisasi non-pemerintah di daerah dalam mengembangkan P3A.

Ada juga beberapa komponen training dan studi-studi khusus dalam

proyek ini. Training partisipan sudah terlaksana dengan baik. Dua puluh tujuh partisipan dalam program training luar negeri sekarang ini sedang kembali dan mereka akan memberikan masukan-masukan yang berharga. Training dalam negeri perlu direncanakan dan dilaksanakan lebih baik. Studi-studi khusus dimaksudkan untuk mendukung kegiatan-kegiatan proyek lainnya. Suatu mekanisme baru untuk perencanaan dan pengelolaan kegiatan-kegiatan tersebut diperlukan.

Pemerintah Jepang berperan serta dalam proyek ini melalui Dana Kerjasama Ekonomi Luar Negerinya (Overseas Economic Cooperation Fund (OECF)). Tahun ini, OECF memberi bantuan local currency pada kegiatan proyek air tanah di NTB dan NTT. OECF diharapkan untuk membiayai proyek bendungan Tiu Kulit di NTB. Ini suatu perkembangan yang positif. Mereka akan memberikan biaya yang diperlukan; tetapi lebih penting lagi mereka akan menjamin bahwa proyek-proyek mengenai aspek kelembagaan akan diteruskan oleh kegiatan irigasi OECF dimasa datang. Peran serta yang sama dari berbagai donor perlu didorong, karena dana yang tersedia dalam perjanjian bantuan dan pinjaman sudah tetap dan dana itu tidak cukup untuk menyelesaikan keseluruhan aspek dari proyek.

### **Kal-hal Yang Telah Dicapai Proyek**

Proyek telah berada dalam tahap pelaksanaan untuk empat tahun dengan bantuan penuh tim TA di lokasi sejak dua tahun yang lalu. Meskipun belum ada sistim irigasi permukaan (surface irrigation systems) yang telah dibangun, telah cukup banyak hal yang dilakukan dalam design sistim-sistim tersebut. Dibawah komponen proyek air tanah, telah dibangun dua buah sistim irigasi kecil tetapi rencana-rencana yang terpadu untuk mencapai tujuan yang telah ditetapkan dalam dokumen proyek (Project Paper) masih kurang. Kemajuan juga telah dicapai dalam aspek memperkuat kelembagaan proyek.

Untuk komponen irigasi air permukaan, suatu metodologi yang tepat telah digunakan untuk mendesign bangunan-bangunan irigasi. Tabel 2 menyorikan kemajuan-kemajuan yang telah dicapai untuk setiap sistim irigasi permukaan. Daftar kegiatan itu memberi beberapa ide mengenai kompleksitas pengembangan proyek irigasi berskala menengah yang menjadi perhatian dalam proyek ini. Konsep dasar yang telah digunakan tampaknya mengikuti suatu rentetan kejadian yang logis. Rentetan ini dimulai dengan pengumpulan data dasar dari sumbernya, dilanjutkan dengan pengumpulan dan analisa data sosio-ekonomik, penilaian lingkungan, berbagai studi-studi teknis dan kemampuan tanah yang penting dalam pembuatan Laporan Justifikasi Proyek (Project Justification Report, PJR) meliputi informasi pembuatan kelayakan suatu proyek, design akhir dan, akhirnya, persiapan dokumen kontrak untuk tender internasional. Tiga proyek diharapkan mulai pembangunannya dalam

delapan belas bulan mendatang, dan phase design diharapkan selesai pada bulan September 1991, dimana pada waktu itu final design dan dokumen kontrak telah akan siap untuk delapan proyek.

Mengenai program air tanah, kurang gambaran positif yang muncul. Sampai saat ini, dua sistim air tanah berskala kecil telah dibangun sebagai percontohan. Kualitas dari sistim ini baik sekali dan tingkat peran serta petani patut dipuji. Beberapa pengalaman telah diperoleh mengenai teknologi tepat guna untuk pengembangan air tanah. Sebagai tambahan, studi and analisa telah dilakukan untuk mengidentifikasi daerah-daerah yang potensial untuk pengembangan irigasi air air tanah di NTB dan NTT dengan cukup meyakinkan.

Kebutuhan yang utama sekarang adalah untuk mendapatkan suatu kombinasi eksplorasi dan pengembangan program pemboran yang sedang berlangsung di kedua propinsi itu. Prioritas perlu juga diberikan untuk persiapan suatu rencana kerja yang dapat dilaksanakan (workable) dalam konstruksi sistim irigasi dengan memasukkan elemen peran serta petani. Tidaklah mungkin bahwa tingkat peran serta petani dapat direplikasi dalam skala yang lebih luas kecuali ada suatu cara baru ditemukan untuk menggantikan Bantuan Teknis intensif yang telah diberikan ditempat semula. Banyak sekali harapan yang diharapkan dari tim TA dari pada apa yang sudah diperkirakan sebelumnya.

### **Kendala-kendala Proyek**

Proyek terlambat dua tahun dari jadwal yang telah ditetapkan. Walaupun demikian, banyak hal yang telah dicapai dan akan mencapai tujuannya apabila waktu memungkinkan. Berdasar pada relevansi kebijakan dari tujuan-tujuan tersebut dan pentingnya bagi pembangunan irigasi di masa datang di Indonesia, proyek ini patut dan harus didukung terus untuk penyelesaiannya. Untuk itu, beberapa perubahan penting diperlukan.

Dua masalah manajemen utama yang mengganggu pelaksanaan SSIMP:

- tidak adanya struktur manajemen yang efektif, dan
- tidak adanya sistim perencanaan manajemen dan monitoring bagi proyek secara keseluruhan dan komponen-komponennya.

Kalau masalah ini tidak ditanggulangi, proyek ini tidak akan berhasil mencapai tujuannya walaupun waktunya diperpanjang.

Dalam dokumen proyek diusulkan sepuluh sub proyek irigasi air permukaan (surface water). Dua diantaranya secara teknis tidak mungkin dilaksanakan. Hanya tiga yang lainnya dapat diselesaikan

melalui PACD sekarang, dan tidak ada satupun yang dapat beroperasi secara penuh setahun sesudah selesai. Dua tahun perpanjangan akan memungkinkan semua sub-sub proyek ini dapat diselesaikan dan memberi paling kurang satu tahun operasi yang merupakan hal penting apabila P3A akan dikonsolidasi.

Kegiatan proyek air tanah baru saja dimulai, dan rencana-rencana proyek air tanah pada tingkat propinsi sangat diperlukan. Proyek paper menghendaki eksplorasi bertahap, kegiatan pilot percobaan, dan perluasan. Sekarang sudah cukup diketahui mengenai aquifers dan organisasi petani sehingga kegiatan-kegiatan ini dapat dan harus dilaksanakan berbarengan. Sebagai hasil, perkembangan proyek dapat dipercepat dan informasi yang lebih baik dapat diperoleh mengenai sumberdaya air yang tersedia.

### **Rekomendasi-rekomendasi**

1. Perpanjangan dua tahun PACD tanpa tambahan biaya supaya konstruksi jaringan irigasi air permukaan, operasi awal dan pemeliharaan jaringan-jaringan itu, dan pengembangan program air tanah dapat dilaksanakan secara berhasil dan sesuai dengan tujuan-tujuan proyek.

2. Kontrak TA sekarang ini perlu di perpanjang sampai September 1991 untuk menyelesaikan phase design dari proyek irigasi air permukaan dan melanjutkan program air tanah; dan setelah phase tersebut seharusnya ada kontrak TA baru untuk pelayanan supervisi konstruksi dan bantuan O&M.

3. Struktur manajemen proyek sebaiknya ditempatkan di DGWRD dengan tanggung jawab yang jelas diberikan kepada Direktorat Irigasi I (untuk air permukaan) dan Irigasi II (untuk air tanah) untuk masing-masing komponennya. Selanjutnya, pengelola utama (key managers) dari masing-masing direktorat membentuk suatu kelompok kerja dibawah pimpinan Direktur Jenderal (Dirjen) atau wakilnya. Kelompok kerja ini bertemu setiap kwartal untuk mereview hal-hal yang menghambat rencana yang sudah ditetapkan dan mempertimbangkan cara-cara perbaikannya.

Pertemuan bulanan yang terpisah antara proyek irigasi air permukaan dan air tanah seharusnya diadakan untuk menyelesaikan masalah pelaksanaan yang bersifat spesifik. Pertemuan ini diikuti oleh Pimpinan Proyek USAID, Ketua tim TA, Direktur Bina Program dan Direktur-direktur Irigasi I atau Irigasi II, atau wakil-wakil mereka. Kepala Bagian Logistik harus hadir pada setiap pembicaraan mengenai pengadaan logistik.

Tujuan pertemuan ini adalah untuk menentukan siapa yang bertanggung jawab dan penentuan jadwal untuk penyelesaian masalah, dan untuk pelaporan pada pertemuan berikutnya. Selagi

interaksi pada tingkat antar staf berlangsung, kami berharap agar penyelesaian masalah-masalah yang penting beralih dari tingkat staf ke tingkat pengambil kebijakan. Pertemuan ini juga akan merupakan forum utama untuk mengidentifikasi perubahan-perubahan prosedural yang akan dilimpahkan kepada kelompok kerja.

Usaha pengadaan peralatan harus ditingkatkan jika tujuan proyek ingin dicapai meskipun ada perubahan jadwal seperti yang direkomendasikan dalam laporan ini. Dalam hal ini terutama dalam pengadaan peralatan untuk program air tanah. Meskipun sudah dikeluarkan earmark PIL terhadap peralatan ini pada bulan September 1988, tetapi belum ada yang dilaksanakan sampai saat ini. Ini bukan merupakan contoh yang tersendiri. Pengadaan seluruh macam barang untuk proyek memerlukan waktu rata-rata 2 tahun untuk pengadaannya. Kami percaya bahwa pengadaan peralatan haruslah hal yang diprioritaskan untuk dibicarakan dalam pertemuan bulanan dan pertemuan kwartal yang kami usulkan dibawah ini. Sebagai contoh, pertemuan bulanan mengenai pelaksanaan dapat menetapkan jadwal dan tanggung jawab untuk setiap usaha pengadaan yang spesifik.

4. Peranan pimpinan TA di Jakarta perlu ditinjau kembali sehingga meliputi tanggung jawab yang jelas terhadap keseluruhan perencanaan dan monitoring proyek dan pemberian advis dan bantuan kepada DGWRD dalam pelaksanaan proyek.

Apabila pimpinan TA diharapkan untuk melaksanakan fungsi-fungsi ini secara efektif, maka ia perlu dibebaskan dari pekerjaan-pekerjaan rutin dalam bidang logistik dan operasional. Seorang Asisten Operasi dari Indonesia harus dimasukkan dalam kontrak TA untuk menyelesaikan ini.

5. Setiap usaha harus diarahkan untuk mengurangi kegiatan-kegiatan manajemen USAID yang terperinci dengan usaha seperti pemanfaatan komitmen PIL (umbrella commitment PILs) untuk kegiatan air tanah.

6. USAID perlu meniadakan batasan \$100,000 pada kontrak konsultan lokal tanpa kompetisi internasional.

7. Pemerintah, USAID, dan tim TA perlu mengembangkan dan menyetujui suatu sistim kolaborasi waktu yang tepat terhadap pengajuan Daftar Usulan Proyek (DUP) dan DIP berikutnya untuk menunjang rencana pelaksanaan SSIMP yang telah disetujui.

8. Rencana pelaksanaan yang komprehensif perlu dikembangkan terhadap keseluruhan proyek dan tiap komponennya, dan hal-hal yang menghambat rencana itu perlu dimonitor.

Kami menyarankan suatu proses perencanaan bertingkat tiga untuk dikembangkan, sebagai berikut:

- Suatu perencanaan tahunan proyek secara keseluruhan. Perencanaan ini dapat menjadi landasan perencanaan yang ada dalam Laporan Awal Harza (Harza's Inception Report). Ia akan mencakup dua bagian perencanaan berikut. Perencanaan keseluruhan dibuat bersama antara Pemerintah, USAID dan Pemimpin tim Harza. Perencanaan ini akan direview, disetujui, dan dimonitor oleh kelompok kerja seperti disarankan sebelumnya.
- Suatu perencanaan tahunan tim TA, dibuat oleh pemimpin tim Harza dan disetujui oleh Pemerintah dan USAID. Perencanaan ini akan digunakan oleh pemimpin tim untuk mengatur kegiatan-kegiatan TA, dan digunakan oleh Pemerintah dan USAID untuk memonitor mereka.
- Perencanaan tahunan terpisah untuk irigasi air permukaan dan air tanah untuk tiap propinsi. Perencanaan ini akan dikembangkan masing-masing oleh PU Propinsi dan Proyek Pengembangan Air Tanah (P2AT) yang dibantu oleh tim TA setempat. Perencanaan-perencanaan ini akan disetujui oleh kelompok kerja dan akan menjadi dasar bagi perencanaan keseluruhan dan TA, dan DUP serta DIP tahunan. Propinsi akan menggunakannya untuk mengelola pelaksanaan proyek, dan pusat akan menggunakannya untuk memonitornya.

9. Keputusan-keputusan dari workshop bulan Februari 1988 di Bali berikut ini perlu direview dan dilaksanakan:

- mengidentifikasi orang PU pusat yang akan mempunyai wewenang (signatory powers);
- membuat perjanjian dan/atau rekomendasi-rekomendasi untuk pengadaan barang, pembayaran kembali dan pengeluaran dana; dan
- memberi wewenang (signatory powers) terbatas bagi pimpinan proyek dan sub-proyek.

10. Tim TA perlu diinstruksikan untuk meningkatkan perhatian terhadap training dan alih teknologi, dan mengembangkan suatu rencana komprehensif untuk mencapai hal ini.

11. Design akhir rancangan blok-blok tersier supaya jangan diselesaikan dulu hingga Organizer P3A (WUAOs) selesai bekerja sama dengan kelompok-kelompok tersier untuk mendapatkan masukan bagi keputusan design.

Rekomendasi ini telah dibicarakan dengan staf PU dan tim TA di kedua propinsi, dan mereka pada umumnya mendukung. Hal ini penting meskipun design tersier Tiu Kulit dan Kalimantan II sudah diselesaikan, dan Awo yang masih berlangsung sekarang. Organizer P3A (WUAOs) perlu diberi gambar kasar mengenai layout tersier yang akan dibangun untuk dibicarakan dengan petani. (Rancangan yang menyerupai gambar final akan membuat petani terintimidasi.)

12. Prioritas utama perlu diberikan untuk penyelesaian negosiasi kontrak LP3ES dan penerjunan ke lapang bagi organizer P3A.

Baik di Sulawesi Selatan dan NTB perlu diatur agar staf Bagian O&M dari masing PU propinsi dapat terlibat dalam kegiatan SSMIP, karena tanggung jawab pembinaan P3A berada dibawah bagian ini. Pendekatan conventional ialah membentuk P3A pada saat kegiatan O&M dimulai. Akan tetapi dalam SSIMP ini diharapkan agar P3A dibentuk lebih awal sehingga mereka dapat berperan serta dalam keputusan design tersier dan dalam hal konstruksi. Untuk menjamin kegiatan ini secara efektif dikordinasi oleh PU, staf yang bertanggung jawab harus dilibatkan mulai dari tingkat perencanaan dan pelaksanaan SSIMP dan seterusnya.

Untuk menjamin integrasi efektif dari kegiatan-kegiatan LP3ES, harus ada pula indentifikasi yang jelas antara counterpart staf PU terhadap staf LP3ES dan kerjasama yang erat antara LP3ES dan staf TA.

Di semua lokasi sub-proyek--baik sub-proyek irigasi air permukaan maupun air tanah--SSIMP juga harus memberikan perhatian cukup terhadap hubungan dengan berbagai petugas-petugas pemerintah setempat. Profile daerah menunjukkan bahwa di beberapa daerah irigasi air permukaan, kalau tidak seluruhnya, telah ada lembaga-lembaga adat (customary roles) mengenai pengelolaan irigasi untuk pertanian. Setiap pembentukan organisasi baru, seperti pembentukan P3A, sebaiknya dibentuk diatas lembaga yang sudah ada ini. Dengan bekerjasama dengan petugas-petugas kabupaten yang terkait, suatu pendekatan daerah yang lebih luas dapat diformulasikan.

Contoh yang baik yang dapat dilakukan ialah seperti interaksi antara staf SSIMP dengan pemerintah daerah setempat di daerah sub-proyek Awo di Sulawesi Selatan. Ahli ilmu sosial dalam TA perlu ditugaskan untuk bekerja sama dengan pimpinan sub-proyek

dan dengan staf LP3ES untuk mengembangkan suatu rencana kerja untuk melibatkan aparat pemerintah daerah setempat. Hal ini penting mengingat pentingnya peranan bupati, camat dan kepala desa dalam pengorganisasian kelompok-kelompok P3A.

13. Seluruh sub-proyek perlu dilaksanakan, kecuali proyek di Raja Telaga dan di Surabaya (lift scheme). Tambahan dana dari sumber luar negeri perlu dijajaki kalau diperlukan.

Sub-sub proyek diurut berdasarkan tingkat kepentingan EIRR-nya (Tabel 4). Pengurutan ini sesuai dengan urutan teknis sub-sub proyek. Tiga yang terakhir mempunyai masalah teknis. Ponre-ponre dapat diganggu oleh keadaan alam (natural spring). Catchment area untuk Salomekko dan Selli hanya seluas daerah yang mereka dapat layani, dan Selli-Coppobulu memerlukan pengisian celah (grouting) yang ekstensif.

14. Pengaturan perlu untuk melibatkan unit O&M dari masing-masing Kantor PU Propinsi ke dalam struktur proyek SSIMP di Sulawesi Selatan dan NTB.

15. Perlu pemanfaatan yang lebih besar terhadap informasi yang telah dikumpulkan dari lokasi proyek untuk pembuatan kebijakan awal mengenai keseluruhan layout blok-blok tersier.

Untuk mencapai hal ini, ahli ilmu sosial TA dan staf PU perlu mereview keadaan daerah dari masing-masing sub proyek irigasi air permukaan untuk mengidentifikasi setiap data, seperti sistim desa yang sudah ada dan malar, yang berhubungan dengan rancangan dan pengembangan tersier. Kemudian hal ini didiskusikan dengan pimpinan sub-proyek dan staf TA lainnya sebelum disampaikan kepada kontraktor design tersier dan staf LP3ES yang bekerja di lokasi tiap sub-proyek.

Mereka sebaiknya melakukan review dengan cara yang sama dengan pembuatan keadaan daerah (site profile) untuk mendapatkan gambaran mengenai organisasi lokal yang ada yang mungkin perlu dipertimbangkan oleh staf LP3ES pada saat mereka memulai kegiatan pengorganisasian P3A.

16. Suatu mekanisme baru perlu dibuat untuk perencanaan dan pelaksanaan kegiatan studi-studi khusus untuk irigasi air permukaan dan pemanfaatan sumber-sumber daya lokal dan dari luar untuk pelaksanaannya.

Beberapa topik-topik studi yang potensial adalah:

- Mendokumentasi usaha-usaha yang dapat digunakan untuk melibatkan petani dalam design tersier, dan

evaluasi keefektifan pengalihan tanggung jawab O&M kepada petani;

- Menentukan design yang tepat untuk blok-blok tersier pada daerah yang miring/landai, ditujukan pada kasus khusus dimana kemiringan yang tajam akan menimbulkan masalah khusus untuk sistim tanaman padi dan bukan padi;
- Mendokumentasi penggunaan staf dinas setempat sebagai organisir P3A, dan penggunaan NGO untuk mensupervisi kegiatan ini;
- Mempelajari keefektifan penggabungan peranan-peranan irigasi tradisional, seperti malar, kedalam organisasi P3A yang baru dibentuk;
- Mempelajari keefektifan usaha-usaha alih pengembangan kelembagaan (institutional building) dan teknologi pada tingkat staf PU dan tingkat kontraktor konsultan lokal; dan
- Mendokumentasi nilai dan manfaat dari assesmen profil daerah dan lingkungan yang telah dibuat untuk sistim irigasi air permukaan.

Sebagai tambahan terhadap kegiatan spesial studi diatas, dampak SSIMP mungkin dapat diperluas dengan efektif melalui suatu workshop pada akhir proyek, yang dapat menjadi suatu mekanisme untuk mengemukakan hasil-hasil dari spesial studi kepada staf PU Pengairan pusat dan propinsi serta donor lainnya. Dengan cara ini SSIMP akan memperoleh lebih banyak manfaat melalui pertukaran pengalaman-pengalaman dan pengaruh Pemerintah serta kegiatan bantuan irigasi dari donor di masa datang.

17. Proyek sebaiknya melaksanakan eksplorasi air tanah, pilot studi dan program perluasan secara berbarengan, dari pada berurutan, dengan menggunakan profil daerah dan memonitor secara saksama konsekwensi-konsekwesi fisik dan sosial-ekonomi.

Untuk memperlancar pengeboran/pengembangan sumur-sumur untuk irigasi air tanah, sebaiknya Propinsi tidak meminta mata bor melainkan menyewa dari perusahaan lokal yang mempunyai peralatan bor. Meskipun dengan usaha perluasan, tingkat perkembangan awal proyek akan lambat. Target yang dapat dicapai mungkin hanya 20 - 30 lokasi yang mempunyai luas 10 sampai 15 ha di NTT, 5 sampai 10 ha di Sulawesi Selatan dan 5 sampai 10 ha di NTB pada akhir 1990. Tingkat perluasan ini secara potensil dapat dilipat dua kalikan pada tahun-tahun terakhir proyek.

Tingkat perkembangan ini akan membutuhkan banyak usaha-usaha dan input managerial dari pada apa yang telah dilaksanakan dalam program pengembangan air tanah SSIMP sekarang ini. Dengan tingkat perkembangan yang ada sekarang ini pengembangan air tanah akan masih jauh dari tujuan SSIMP. Dalam PP ditargetkan 5,240 ha irigasi air tanah. Dengan menganggap 10 ha per sumur dan tingkat perkembangan 400 ha pada tahun 1990 dan 800 ha tahun sesudahnya, hanya akan ada 2800 ha irigasi air tanah SSIMP pada akhir proyek.

18. Dengan tetap berpedoman pada keseluruhan rekomendasi kami dalam perencanaan proyek, program air tanah perlu direncanakan untuk tiap propinsi secepat mungkin.

Sub-tim TA sebaiknya diadakan dilokasi untuk menunjang perencanaan dan pelaksanaan kegiatan perluasan program air tanah di ketiga propinsi.

19. Persiapan-persiapan perlu dibuat untuk menunjang organizer P3A bekerja di lokasi dan kegiatan-kegiatan mengorganisir petani dalam program-program air tanah di ketiga propinsi.

20. Tidak ada usaha-usaha SSIMP yang perlu diarahkan untuk studi kelayakan air tanah di Sumba dan Flores, seperti disebutkan dalam PP sebagai suatu kegiatan studi khusus yang potensial, walaupun itu mungkin dapat diambil alih oleh donor lain. Pembiayaan untuk hal ini diperkirakan \$1,200,000 atau sekitar setengah dari seluruh biaya studi-studi khusus. Jadi dengan meniadakannya akan mempunyai implikasi penting bagi program studi khusus SSIMP.

Beberapa topik-topik studi khusus yang disarankan, sebagai berikut:

- menilai peranan sektor swasta dalam pengembangan irigasi air tanah untuk membuat rekomendasi bagi perubahan-perubahan peraturan dan prosedural dan usaha-usaha untuk dukungan sektor swasta
- Mengkodifikasi peraturan-peraturan air tanah yang ada dan merancang suatu peraturan air tanah untuk ketiga propinsi;
- Mendokumentasi pengalaman-pengalaman dari pilot-pilot proyek air tanah dan program-program pengembangan air tanah yang telah dilakukan oleh donor lain di ketiga propinsi;
- Mendokumentasi pengalaman-pengalaman menggunakan organiser P3A dalam proses pemilihan lokasi (site) dan kegiatan-kegiatan O&M;

- Mendokumentasi program pengembangan eksplorasi air tanah dan mengkodifikasi seperangkat prosedur-prosedur untuk program lanjutan memonitoring sumberdaya air tanah di daerah-daerah yang sudah maju; dan
- Mendokumentasi manfaat dari pembuatan profil bagi daerah-daerah pengembangan air tanah dan pentingnya mempertimbangkan sosio-ekonomik dan phisik dalam penempatan sumur.

# 1

## INTRODUCTION

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### 1.1 The Concept

The Small Scale Irrigation Management Project (SSIMP) in Indonesia was approved June 20, 1985. It has a Project Assistance Completion Date (PACD) of September 30, 1993. The Small Scale Irrigation Management Project has a somewhat misleading title because the surface water subprojects are really intermediate scale, as well as small scale. Project irrigation areas range from 970 to 3,500 hectares (ha). This span has important implications for project implementation in terms of increased design standards, analysis, reports, construction contracting, and Technical Assistance (TA) requirements.

The stated project purpose is, "to design and apply irrigation technologies and management systems in support of diversified cropping patterns in selected eastern islands." This statement masks the complexity of the project and emphasizes crop diversification, which is one expected outcome.

The original project design was built around four irrigation technologies:

- surface irrigation from diversion structures and canals (four projects covering 7,222 hectares);
- surface irrigation from storage dams (five projects covering 9,908 hectares);
- groundwater irrigation (covering 5,240 hectares, principally in NTT, which has only groundwater activity); and
- lift irrigation (one project covering 2,400 hectares).

The two types of surface irrigation are by far the dominant activities, projected to require 82 percent of the \$61.5 million in subproject design and construction funds that are included in the project. Of the balance of these funds, \$2.8 million is for the lift irrigation project, and the remainder is for groundwater activities.

The technologies are relatively straightforward, although the provinces have little experience with the design and construction of storage dams. However, implementation of the technologies is complicated by several cross-cutting elements that give the project its importance and potential for having a significant impact on intermediate scale irrigation projects in Indonesia. The most important of these elements are two major institution strengthening themes: decentralization of decision making and beneficiary participation.

#### 1.1.1 Decentralization of Decision Making

Decentralization of decision making is intended to strengthen the capability of the participating provinces to design and construct intermediate scale surface irrigation projects using local consultant contractors for the feasibility and design work. At the time of project design, decentralization of decision making was a pioneering effort. Since then, the Government has adopted an explicit policy of decentralization which reinforces this aspect of the project. The policy is now in effect, and the Government is searching for means of implementing it. Project activities provide an important opportunity to develop and test methods of decentralization in the irrigation sector. So far, this potential has been only partly realized.

Another aspect of decentralization is the project's reliance on local, rather than expatriate, design contractors. This is an important institution strengthening effort, but it has placed demands on the TA contractor (Harza Engineering Company) that were not fully foreseen in the original design.

#### 1.1.2 Beneficiary Participation

Beneficiary participation is also a major project theme with the objective of ensuring effective operation and maintenance (O&M) of the subproject systems. The involvement of the Institute for Economic and Social Research, Education, and

Information (LP3ES), a non-governmental organization (NGO), in the process of creating water user associations is a unique feature. This aspect is directly relevant to the Government's policy of establishing strong water user associations, and its more recently adopted policy of collecting user fees to help defray the O&M costs of irrigation systems. In support of these institution strengthening efforts, the project also has important training and special studies components.

## 1.2 Participating Provinces

SSIMP is being carried out in three provinces: South Sulawesi (SulSel), Nusa Tenggara Barat (NTB) and Nusa Tenggara Timur (NTT). Emphasis is placed on the provinces because a major thrust of SSIMP is to shift responsibility from central to provincial levels to insure sound site selection, design, construction, and post construction management practices. Each province is unique in terms of its environment, experience, and existing capacity to carry out SSIMP activities. The project is deliberately directed to the outer islands, which have been relatively neglected in the past. Together, the three participating provinces provide a representative range of agro-climatic and social conditions typical of those outer islands.

South Sulawesi is the main population and communication center for eastern Indonesia. Physically, the province is dominated by a mountainous cordillera region. The coastal lowlands surrounding this central highland area are the scene of South Sulawesi's agriculture. While the eastern and western coasts of South Sulawesi experience their wet seasons at different times of the year, both experience long and exceptionally dry seasons.

Irrigation development in the agricultural regions is an important priority in the province. In addition to SSIMP, there are a number of foreign-assisted irrigation projects currently underway. These include several World Bank projects, among them the Irrigation Subsector Project and its related Irrigation Service Fee pilot activities.

Nusa Tenggara Barat province consists of the Islands of Lombok and Sumbawa. Most of the population on Lombok, the westernmost island, lives in the central Lombok Plain, which is surrounded by mountains to the north and hills to the south. Wet season rainfall in the central plain is sufficient for most of the land to be used to grow rice. Extensive land terracing has been carried out, and many

irrigation schemes have been constructed to provide supplemental water in the rainy season. On Sumbawa, the island to the east of Lombok, the climate is tropical with well defined rainy and dry seasons. Because of the mountainous topography of the island, the size of individual irrigation schemes is small.

NTB is the only one of the three provinces where there is some previous experience with managing reservoir releases. On Sumbawa a fairly extensive groundwater survey, based on the results of 50 test wells, was conducted in 1981.

Nusa Tenggara Timur is made up of a chain of islands and the western portion of Timor island, at the chain's eastern end. Timor is one of the least developed and least populated areas of Indonesia. It has a tropical monsoon climate dominated by the west-northwest and east-southeast monsoons. SSIMP project sites are located within the Oesao-Pariti plain, 30 to 80 km east of the capital of Kupang, two hours, at most, from the one all-weather road that runs up the middle of the island.

Project activity in NTT is confined to groundwater development. The project area was selected because of its groundwater potential, which was first recognized by the "Timor Island Water Resources Development Study" carried out with CIDA funding.

## 1.3 Financial Status

Table 1 summarizes the originally projected project costs and status of funds as of June 30, 1989. The cost of the project is estimated at \$89,686,000, of which \$50 million was to be provided by USAID (\$7 million grant and \$43 million loan), and the balance by the Government of Indonesia. As of June 1989, loan fund obligations totalled \$17.6 million. All additional USAID obligations will be made in grant funds in accordance with a new agency policy. As a result, if the project funds are fully expended, the ratio of grant-to-loan funds will be 32.4/17.6, rather than the original forecast of 7/43.

## 1.4 Project Status

### 1.4.1 Accomplishments

The project has been in the implementation phase for four years with the full Technical Assistance team on site for the past two years. Although none

Table 1

Status of A.I.D. Funds—SSIMP—June 30, 1989  
(\$000)

ACTIVITY	PP ESTIMATE	OBLIGATIONS	ACCRUED EXPENDITURES	UNLIQUIDATED OBLIGATIONS	UNOBLIGATE BALANCE
Surface Water Construction	22,865	5,835	208	5,627	17,030
Groundwater Construction	5,550	2,000	31	1,969	3,550
Equipment and Commodities	3,333	3,333	327	3,006	0
3 Training	1,400	1,400	790	610	0
Special Studies/Pilot Activities	2,455	1,355	164	1,191	1,100
Technical Assistance	10,445	8,828	3,362	5,466	1,617
Contingency	3,952	1,882	0	1,882	2,070
Grand Total	50,000	24,633	4,882	19,751	25,367

Source: Project Paper & USAID Project Financial Status Report

of the surface irrigation systems has been constructed yet, substantial progress has been made on the design of these systems. Under the groundwater component, two small irrigation systems have been constructed but coherent plans for achieving the Project Paper objectives are still lacking. Progress has also been achieved in the institutional strengthening aspect of the project.

For the surface water component, an appropriate methodology for designing the irrigation works has been adopted. Table 2 summarizes the progress that has been made for each surface water system. The list of activities provides some idea of the complexity of developing intermediate scale irrigation projects as are being considered under this project. The basic concept that has been adopted appears to follow a logical sequence of events. This sequence commences with basic resource data collection, followed by collection and analysis of socioeconomic data, an environmental assessment, various engineering and land capability studies leading to a Project Justification Report (PJR) including information to establish the feasibility of a project, final design and, finally, preparation of contract documents for international tendering. Table 2 shows that three projects have now completed prequalification of contractors. These three projects are expected to start construction within the next eighteen months. The design phase is expected to be completed by September 1991, at which time final designs and contract documents will have been prepared for eight projects.

Concerning the groundwater program, a less positive picture emerges. To date, two small groundwater systems have been constructed as demonstration sites. The quality of these system is excellent and the level of farmer participation is to be commended. Some experience has been gained on appropriate technology for groundwater development. Additionally, studies and analyses have been carried out which have identified potential areas for groundwater irrigation development in NTB and NTT with some degree of confidence. The major need now is to get a combined exploration and development drilling program underway in both provinces. Priority should also be given to preparing a workable action plan leading to the construction of irrigation systems which incorporate the crucial farmer participation element. It is unlikely that the farmer participation level can be replicated on a broad scale unless new means can be found to substitute for the intensive Technical Assistance which is being provided at the initial sites.

## 1.4.2 Constraints

As the financial data indicate, the project is currently significantly behind the schedule contained in the Project Paper. For example, construction of surface systems was scheduled to begin in year two in the PP, and to be completed by the end of year six. However, construction of the first subproject will not begin for at least another nine months (i.e. in year five), and all of the planned subprojects cannot be completed by the PACD. The groundwater program is even further behind schedule. There appear to be four main reasons why the project is so far behind schedule:

- The original schedule was optimistic to the point of being unrealistic. Much of the site data collection and design work for the surface water subprojects were scheduled to be completed before the primary resource, the Technical Assistance contractor's team, was to arrive. The time allotted for pre-construction activities did not take into account the general difficulty of the institution strengthening aspects of the project, either in terms of decentralization to the provinces or the use of local contractors.
- The Technical Assistance contract was delayed a year because of contracting problems. In addition, mobilization of the full TA team did not occur as rapidly as the original schedule envisioned, and necessary personnel changes have resulted in a significant amount of time lost.
- Additional demands were placed on the TA contractor because of the project's reliance on local contractors. Furthermore, this work is also new to DGWRD staff, who need to be involved in the design process at all stages. The available local contractors have been relatively inexperienced in the design of intermediate-scale projects, and almost completely lacking in design experience on reservoirs. This is compounded by the local contractors' substantial reliance on outside, rather than in-house, personnel. It is to Harza's credit that they have adhered to advising and assisting the local contractors, rather than supplanting them, but the result has been much longer design times than originally anticipated.
- Management and monitoring systems have not been adequate to promote timely implementation. This is true of management in USAID, within the Government, within the TA contract and among them.

**Table 2**  
**SSIMP Surface Irrigation Sites**  
**Status of Design Activities**

ACTIVITY	Awo	Salomekko	Ponre -Ponre	Selli Coppulu	Rega Telaga	Tiu Kulit	Kalimontong Capit	Batujai	Surabaya
Rainfall Gauging and Rainfall Station	■	■	■	■	■	■	■	■	■
Hydrologic Data	■	■	■	■		■	■	■	■
Rapid Rural Irrigation Appraisal	■	■	■	■		■	■	■	■
Household Survey	■	■	■	■		■	○	■	■
Environmental Baseline Data	■	■	○	○		■	■		
Environmental Assessment Rep.	draft	○	○	○		final	final		
Consultant Selection (Design Review)	■	■	■	■		■	■	■	
Surveys & Maps	■	■	■	■		■	■	○	
Geographical Data	■	■	○	○		■	■	○	
Land Capability Data	■	○	○	○		■	■	○	
Design Review	■	○	○	○		■	■	○	
Preliminary Design Costs	■	○	○	○		■	■	○	
Project Justification Report	draft	○				draft	○		
Consultant Selection (Final Design)	■	○				■	■	○	
Final Design	○					■	■		
Contract Documents	○					○	○		
Pre-qualification	■					■	■		

■ = Completed  
○ = In Progress

Although the project is behind schedule, much has been accomplished and the project is now in a position to achieve its original objectives, if time permits. This is an important opportunity, given the policy relevance of the project's institution strengthening components and its support for the Mission's sub-goal of increasing the sustainability, productivity and efficiency of agricultural production.

### **1.5 Proposed Extension**

Figure 1 shows the current schedule for construction or further study of the nine SSIMP surface water subprojects. Because of slippage in project implementation, only three can be completed by the current PACD, and none can be completed in time to allow at least one year's operation and maintenance to consolidate the water user organizations.

A two-year extension of the PACD will allow enough time for construction and initial operation to take place. Such an extension would also provide needed time to firmly establish the groundwater programs in the three provinces. The current TA contract is due to end in the middle of the design process. We believe that the team's departure would be very disruptive and would delay the overall project by as much as a year. A preferable course of action would be to extend the current contract through the design phase and to let a new contract for construction supervision services, and operation and maintenance of the systems.

#### **Recommendations**

A no-cost two-year extension of the PACD should be made, to allow construction of the viable surface

schemes, initial operation and maintenance of those schemes, and development of a viable groundwater program.

The current TA contract should be extended to September 1991 to complete the design phase of the surface projects and continue the groundwater program; and a follow-on TA contract should be let for construction supervision services and O&M support.

### **1.6 Japanese Participation**

Recently the Japanese Government has agreed to participate in SSIMP through its Overseas Economic Cooperation Fund (OECF). Under the terms of the agreement, the OECF is expected to finance the construction of the Tiu Kulit dam in NTB and support groundwater activities in NTT. In doing so, Japan has agreed to pursue the project's objectives of strengthening the provincial Ministry of Public Works (PU) staff, and creating water user organizations and involving them in all phases from design through O&M. USAID will fund WUA programs at all sites, including Tiu Kulit. In addition, the OECF is providing local currency support for groundwater activities in NTT and NTB through its Water Resources Sector Loan for 1989/1990.

We view this Japanese involvement as a very positive development. It will provide needed financial support for the project. More importantly, it will involve the OECF directly in the project's institution strengthening will do much to ensure that these aspects are carried forward into subsequent OECF irrigation activities, creating a ripple effect that is essential to the long term success of SSIMP. To this end, similar participation of other donors should be encouraged.

FIGURE 1

IMPLEMENTATION STATUS - SURFACE WATER PROJECTS

PROJECT/ACTIVITY: South Sulawesi

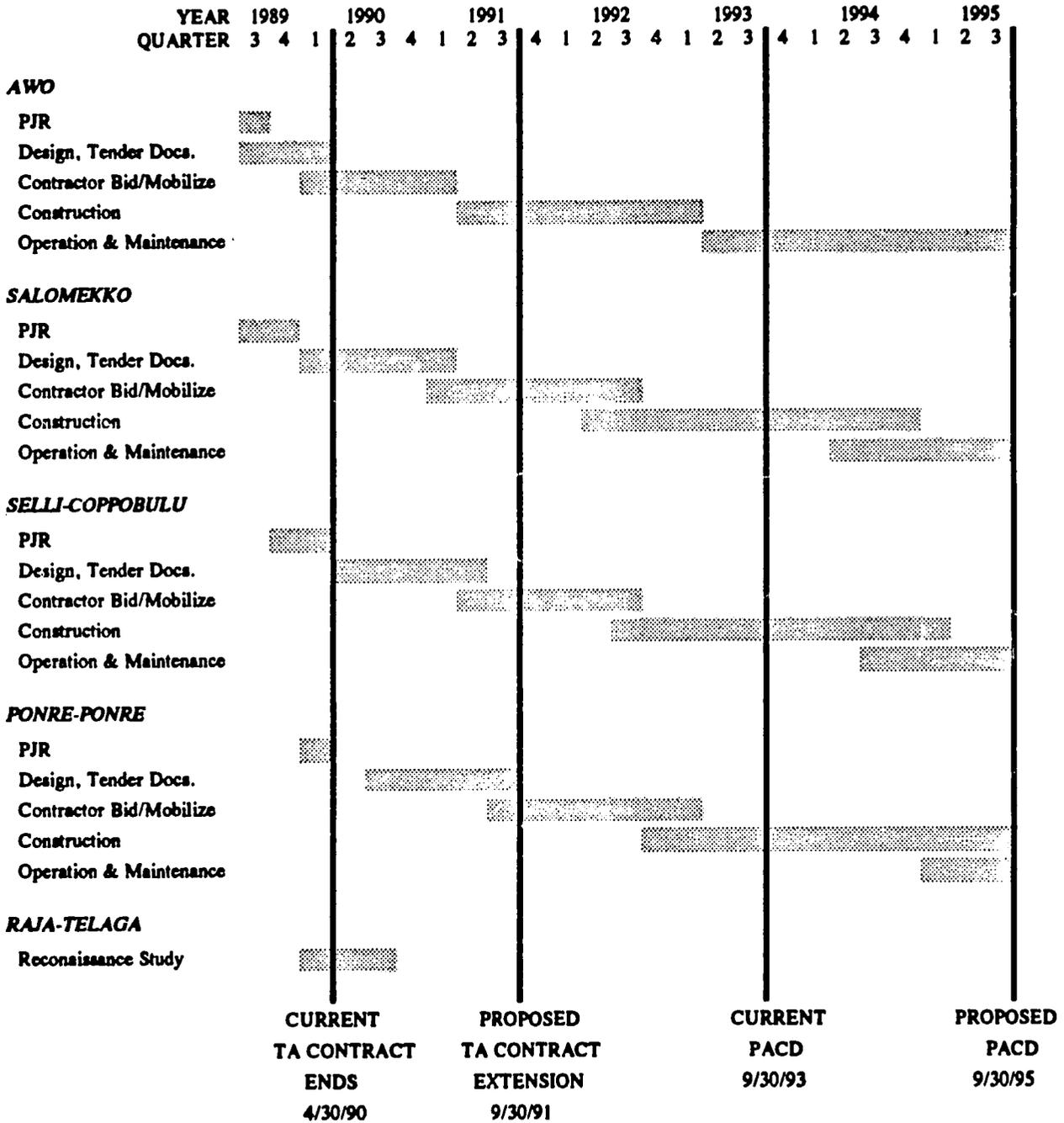
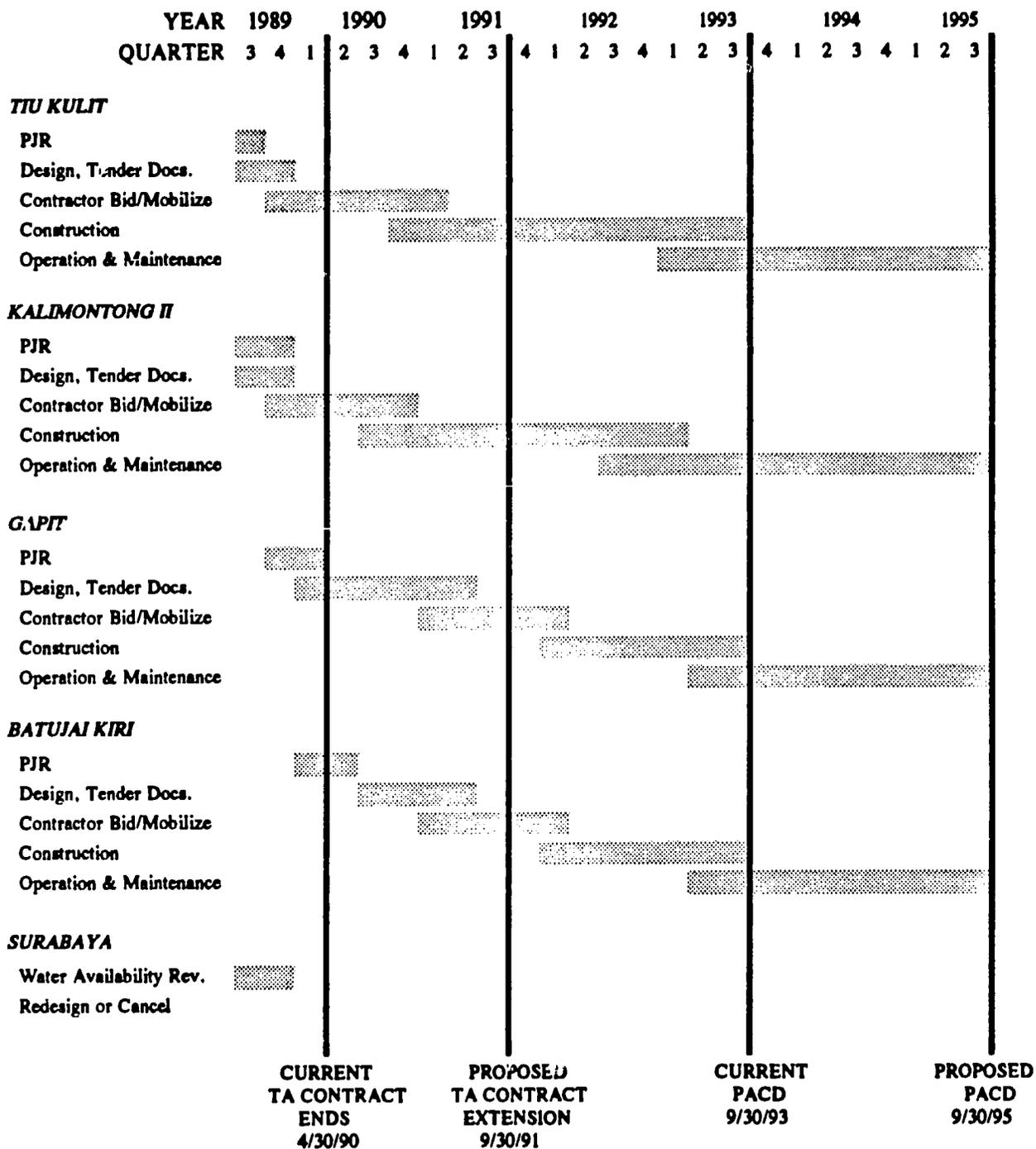


FIGURE 1

IMPLEMENTATION STATUS - SURFACE WATER PROJECTS  
PROJECT/ACTIVITY: NTB



# 2

## PROJECT MANAGEMENT

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Two major management problems are impeding implementation of SSIMP:

- the lack of an effective management structure; and
- the lack of management planning and monitoring systems for the project as a whole and its components.

Unless they are resolved, it is unlikely that the project can be successfully implemented, even if it is extended.

### 2.1 Management Structure

In keeping with its decentralization objectives, SSIMP was designated without a central organizational focus. DGWRD did not designate a full-time project director, and the technical assistance chief of party was to be located in one of the provinces. Although the chief of party was subsequently located in DGWRD's central office, his role was very narrowly defined. As a result, the project lacks a single locus for resolving the myriad implementation problems that inevitably arise, and specific implementation actions take an undue amount of time to be completed.

The need for better central management was a concern at the project start-up workshop held in Bali in February 1988. As an outgrowth of that workshop, the Assistant Director General for Water Resources Development was designated to chair coordination meetings for SSIMP that were to be held monthly. However, he is responsible for overseeing many donor-financed projects and does not have staff assigned to him to coordinate project implementation. Coordination meetings have been held sporadically since then, but their effectiveness apparently has been hampered by an unwieldy size, the lack of a designated staff to follow up, and by an agenda consisting of a long list of specific problems, rather than the overall status of the project. (At the committee's last meeting in May 1989, there were 25

separate action items on the agenda, many of which were unresolved actions from previous meetings.) It appears that, as presently constituted and supported, the coordination meetings do not provide an effective forum for either the resolution of specific problems, or for overall project management.

### Recommendations

A project management structure should be designated in DGWRD with clear responsibilities assigned to both Irigasi I (the surface water directorate) and Irigasi II (the groundwater directorate) for their respective components. In addition, key managers from each directorate ought to form a working group under the chairmanship of the Director General or his representative. The group should meet quarterly with an agenda confined to a review of overall project progress against established implementation plans and consideration of needed procedural improvements.

Separate regular monthly meetings for surface water and groundwater should be held to resolve specific implementation problems. These meetings would include the USAID Project Manager, the TA team leader, the Director of Bina Program and the Directors of Irigasi I or Irigasi II, or their designees. The head of the Logistics Division should attend whenever procurements are on the agenda.

The purpose of these meetings should be to assign responsibility and clear timetables for problem resolution, and to report back at a subsequent meeting. While staff-level interaction would continue, we expect the resolution of significant problems will shift from the staff to the decision-maker level. These meetings would also be the primary forum for identifying procedural changes that should be referred to the working group.

Procurement will have to be improved if the project is to meet even the revised timetable which this report recommends. A case in point is the procurement of essential equipment for the groundwater program. Although an earmark PIL for

this equipment was issued in September 1988, none has been procured to date. This is not an isolated example. Procurement of all types of commodities for the project has taken an average of two years to complete. We believe that equipment procurement should be a priority subject for the monthly and quarterly meetings that we have proposed. For example, the monthly implementation meetings could set timetables and assign responsibility for specific procurement actions.

### **2.1.1 The Technical Assistance Team**

When the technical assistance contract was let with Harza Engineering Company, a position of team leader, based in Jakarta was included. However, the position was very narrowly defined in the scope of work. It included administrative and logistic responsibilities that belong more properly to an administrative officer, liaison work with USAID and the Government on contractual matters, and support and guidance for individual consultants on the team. There is no mention of the two functions that we would consider to be most important to the position of team leader:

- The overall planning and management of contract activities. This function is so obviously necessary to effective contract execution that we do not understand why Harza has not charged the Team Leader with this responsibility, regardless of the scope of work.
- Providing advice and assistance to the DGWRD on the execution of the project and the process of decentralization as well as serving as liaison between the provinces and the center on project problems and activities. This function is apparently of some concern to the DGWRD. The Director General and others have raised the need for the TA contractor to be responsible to the Government, rather than USAID. Apparently they are referring, at least in part, to the desire to have the contractor provide support and assistance to the DGWRD in project implementation—a role performed by contractors on other donor projects.

The absence of such a relationship between the team leader and officials of DGWRD has resulted in the neglect of procedural issues and has placed an undue management burden on USAID.

### **Recommendations**

The role of the TA chief of party in Jakarta should be redefined to include clear responsibility for overall project planning and monitoring and providing advice and assistance to the DGWRD in project implementation.

If the chief of party is to carry out these functions effectively, he will need relief from the more routine logistics and operational work. An Indonesian Operations Assistant should be included in the TA contract to accomplish this.

### **2.1.2 The USAID Role**

In the absence of an effective project management structure within the Government, and lacking strong support from the TA team leader, the burden of project implementation at the center has fallen on the USAID Mission. The SSIMP project officer and his staff are preoccupied with specific implementation problems to the point where overall project management has suffered. In the process, the Mission appears to have become enmeshed in detailed management of the project to an extent that is not consistent with its institution strengthening purposes.

As a case in point, a Project Implementation Letter (PIL) committing \$12,012 for two groundwater sites comprising 30 ha in NTT, based on detailed plans and cost estimates, was required. We believe that a more efficient management approach would be to issue annual umbrella earmark-and-commitment PILs for each province. The concept of umbrella PILs, recommended by the Bali workshop, has never been fully implemented, although they would appear to be particularly relevant to the groundwater program.

These PILs could authorize all of the groundwater subprojects in SSIMP annual plan for the province. As safeguards, approval by the resident TA team would be required for each site plan and cost estimate; and any subproject over a set cost would require specific USAID approval.

Similarly, the Mission has refused to waive the \$100,000 limitation (without international tender) for consultant services. This is not consistent with the project's concept of having the provinces develop the

skills to utilize local consultants, and for these consultants to develop skills to execute intermediate scale irrigation project feasibility studies and designs. As a result, SulSel has broken up its consultant contracts and awarded different elements to different firms. Implementation has suffered and the consultants' capability has been less than if a single consulting firm carried a project through from survey to final design.

It is important to note that USAID cannot reduce its detailed management by itself in all instances. For example, umbrella groundwater PILs will not be effective unless there is consultation among the Government, USAID, and the TA team when the provincial groundwater operating budgets are being prepared. This budget problem affects all aspects of the project. Planned SSIMP activities cannot be carried out unless they are funded in the provincial budgets (the DIP). Collaboration among USAID, the Government, and the TA team to achieve this has not been done systematically, and project activities have suffered as a result. To prevent this in the future, an agreed system for budget collaboration needs to be developed.

### Recommendations

Every effort should be made to reduce the detailed management activities of USAID by such actions as the use of umbrella commitment PILs for the groundwater activities.

USAID should waive the limitation of \$100,000 on local consultant contracts without international competition.

The Government, USAID, and the TA team should develop and agree on a system for timely collaboration on the development of the provincial operating budget requests (the DUP) and the ensuing DIP, in support of agreed SSIMP implementation plans.

### 2.2 Management Systems

We were unable to find at any level in the project coherent plans for project activities. Current overall implementation plans for the project as a whole do not exist, either in the DGWRD or the Mission. The TA contractor does not have an effective plan for the TA team's activities over the remainder of the contract. Nor do such plans exist in the provinces.

SulSel and NTB were able to construct current time-phased schedules for the completion of design and construction of surface subprojects, but these schedules did not exist in up-to-date form when we arrived. None of the three provinces has, or apparently has ever had, a long-term implementation plan for its groundwater activities.

The kind of plans that we were seeking were schedules of activities, at each level and in sufficient detail, to permit identification of interrelationships among them, and thus the activities that are on a critical path in any given sequence; and schedules to measure progress against activity plans. Without such plans it is difficult to see how the project can be effectively managed. Without them, individual problems tend to be dealt with equally and lack an adequate sense of the relative importance of a given problem to the success of the project.

The Project Paper calls for two systems of project monitoring, for irrigation development and institutional strengthening. There is no system in place for monitoring progress in institutional development, in part because action plans do not exist. Aside from two external evaluations, the PP does not specify a system for planning and monitoring project implementation, and we believe this is required if the project is to succeed.

### Recommendation

Comprehensive implementation plans should be developed for the project as a whole and for each component, and progress should be monitored against those plans.

We suggest that a three-tiered planning process be developed, as follows:

- An annual plan for the project as a whole. This plan might take as its point of departure the plan included in Harza's Inception Report. It would encompass the following two subordinate plans. The overall plan should be prepared jointly by the Government, USAID and the Harza team leader. It would be reviewed, approved and monitored by the working group as suggested earlier.
- An annual plan for the TA team, prepared by the Harza team leader and approved by the Government and USAID. It would be used by the team leader to manage TA activities, and by the Government and USAID to monitor them.

- Separate annual surface water and groundwater plans for each province. These plans would be developed by the provincial PU and Groundwater Development Project (P2AT) staffs, respectively, with advice and assistance from the resident TA team. They would be approved by the working group and would form the basis for the TA and overall plans, and the annual DUP and DIP. The provinces would use them to manage implementation, and the center would use them to monitor it.

### 2.3 Procedures for Decentralization

The development of procedures that facilitate decentralization deserves more attention. This was the major focus of the Bali start-up workshop, but the procedural recommendations of the workshop have not been implemented. They are still relevant

and should be carried out. The revised central advisory role of the TA team leader is one important means of identifying and following up on required procedural changes. In addition, procedural changes could form an important part of the agenda for the quarterly working group meetings suggested earlier.

#### Recommendation

The following decisions of the February 1988 Bali workshop be reviewed and implemented:

- identify persons at Public Works Center who should have signatory powers;
- establish agreement and/or recommendations on procurement, reimbursement, and disbursement; and
- authorize limited signatory powers for project and subproject manager.

# 3

## TRAINING AND INSTITUTIONAL DEVELOPMENT

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The Project Paper calls for two types of training in support of the institutional development thrust of the project: participant training abroad and in-country training. The participant training appears to have been well executed, with all the participants sent abroad, and then returning, earlier than planned. Two short-term and 27 long-term participants from both PU and Bappeda were sent overseas for training. The long-term participants are receiving MS degrees in India and the United States. All are scheduled to return by the end of 1989. The team met two of these returnees during its field trip and was impressed by their energy, enthusiasm, and competence. We believe that the returning participants, as a group, will provide a positive infusion of talent at a propitious time for the project.

The PP also provided for substantial in-country training; 24 seminars of two-weeks duration each were planned. Very little of this type of training has taken place to date.

While training has not been adequately addressed in all areas, some attention has been given to it in both NTB and South Sulawesi. The TA economist has run a series of seminars on economic analysis for provincial staff; staff members have been given computer training in local classes; English language classes have been conducted; and training has been an integral part of the site profile activities. For the most part the transfer of knowledge in the engineering areas has been done on a one-on-one basis, although a few of the short-term consultants have conducted brief seminars. While this has merit, it falls short of SSIMP objectives. Furthermore, it does not provide the prospective learner with the basic fundamentals underlying the technical decisions related to a specific site.

The Provincial Staff expressed a desire for more training opportunities, particularly on basis theory.

They commented favorably on the few good training experiences that had taken place with visiting TA consultants.

The evaluation team is impressed with the good working relationship between the TA team and the provincial irrigation staff in NTB. We feel the working relationships are good and SSIMP office is effective. The TA team has been quite effective in meeting SSIMP objective of advising and assisting with the surface irrigation program.

Staffing problems have inhibited both progress and training in South Sulawesi. The TA team leader had to be replaced, and there were unexpected delays in recruiting the TA social scientist. On the GOI side, only recently has a new SSIMP subproject manager been installed and necessary professionals added to the staff.

Overall, this limited training effort falls well short of the TA terms of reference, which call for an assessment of training needs of the provincial staffs and the development of specific training activities to meet those needs. We believe that such a plan is essential. Without it, training will inevitably take a back seat to the day-to-day work. The training of local consultants is more implicit than explicit in the PP, but it is an important and time consuming aspect of the project. It is our observation that the TA team is doing this well and is fully conscious of its responsibility to advise and assist, rather than actually doing the work.

### Recommendation

The TA team should be instructed to increase attention to training and technology transfer, and to develop a comprehensive plan for achieving this.

# 4

## SURFACE IRRIGATION SYSTEMS

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### 4.1 Project Plans

The surface systems were to be used as opportunities for applying improved social, economic, and technical site selection criteria; employing better design standards; introducing management systems for secondary crop production; increasing water user participation in design as well as operation and maintenance; and improved maintenance and cost recovery programs.

#### 4.1.1 South Sulawesi

The Project Paper identified South Sulawesi as a province in which all four irrigation technologies (surface diversion, groundwater, reservoir, and lift) would be utilized. Two surface diversion schemes were identified (Awo and Raja-Telaga), and three reservoir systems (Salomekko, Ponre-Ponre and Selli-Coppobulu). Development of these intermediate scale surface projects was to give attention to two components: the design of smaller, more flexible tertiary blocks and the intensive use of water user association organizers.

The activities with surface lift were to occur in the Awo area where farmers already were involved in some river pumping. Activities to encourage more private sector and commercial involvement in support of expanded surface lift schemes were to be pursued. No such activities have been initiated.

#### 4.1.2 Nusa Tenggara Barat

All four water development technologies envisioned for SSIMP were to be utilized in NTB. Large Public Works lift pumps were to be used for the Batujai-Surabaya scheme on Lombok. The project concept is to use surplus water that is available from the Batujai Reservoir. The water is to serve 970 ha on the left bank of the Batujai System and augment the dry season water supplies for 2800 ha in the Surabaya System. The left bank canal involves the

construction of an aqueduct crossing the Batujai River, and the Surabaya area is to receive water lifted from the reservoir.

All other SSIMP activities in NTB are to take place on the Island of Sumbawa. These include three surface irrigation projects, two with storage dams and one with a weir. The two dam projects, Tiu Kulit and Gapit, are on the drier north side of the island, and the weir project, Kalimantanong II, is on the wetter west end.

### 4.2 Current Activities

The current status and schedules for design and construction of all surface irrigation subprojects were provided in Table 1. The characteristics of these subprojects are summarized in Table 3. Cost estimates and economic indicators are presented in Table 4.

The surface subprojects are clearly diverse, in terms of size, type of project, and cropping patterns. In total, these subprojects were forecast in the Project Paper to irrigate 19,530 ha. They are currently projected to irrigate 15,320 ha, with most of the shortfall occurring in Raja-Telaga and Surabaya, which we recommend not be built.

#### 4.2.1 South Sulawesi

Of the original five surface projects identified for the province, significant preliminary engineering investigation and design work are underway in four locations. Only the Raja-Telaga site is presently not under investigation. This project envisioned a link-canal to supply water to the Raja and Telaga rivers. However, a review of the topography indicates that the scheme is not technically feasible—an uneconomic lift of 40 to 60 meters would be required. The PU staff and TA team will conduct a further reconnaissance study to confirm this.

**Table 3**  
**Characteristics of Surface Water Projects**

CHARACTERISTIC	SOUTH SULEWESI				NTB		KALIMAN- TONG II	GAPIT	BATUJAI KIRI	SURABAY
	AWO	ALOMEKKO	SELLI- COPPOBULU	PONRE- PONRE	RAJA- TELAGA	TIU KULIT				
Type of Project	weir	reservoir	reservoir	reservoir	link canal	reservoir	weir	reservoir	canal	pump lift
Height (Meters)	6	30	30+	40		29	6	21		
Storage (MCM)		10.5	10.0	30.0		10.7		13.1		
Watershed (ha.)	24,000	1,300	1,320	6,800		5,400	34,400	4,100		
Terrain	flat	undulating to steep	undulating	undulating to steep		flat	flat	flat	flat	flat
Irrigated Area (ha)										
Project Paper	1,700	1,400	2,000	4,000	1,700	1,405	2,850	1,103	972	2,400
Proposed	2,500	1,200	1,400	3,500	0	1,800	2,815	1,300	970	???
Cropping Patterns										
Wet Season	paddy	paddy	paddy	paddy		paddy	paddy	paddy	paddy	
First Dry Season	paddy	palawija	palawija	paddy		palawija	paddy	palawija	palawija	
Second Dry Season	palawija	palawija	palawija	palawija		palawija	palawija	palawija	palawija	

Source: TA Team and Evaluation Team Estimates

Unlike the situation in NTB, little usable design work had been done in these locations prior to SSIMP. To implement these activities the PU staff and the TA team are dealing with a large number of local consulting firms, a few of which have not performed well.

The Awo project, in Wajo District, is in the most advanced stage of investigation. The TA team expects that the Project Justification Report (PJR) will be completed in the next few weeks. Approval is pending for the final design contract work (which, in fact, has already begun).

In Awo the PU staff is in close contact with local government authorities including the Bupati and the Bappeda. This is facilitated by the fact that the current head of the Bappeda was sponsored for US training by SSIMP. PU staff also have had on-going contact with the farmer beneficiaries regarding project plans and implementation.

Site profile actions, both the Rapid Rural Irrigation Appraisals (RRIA) and the Household Surveys (HHS), have been completed in all sites, except Raja-Telaga. Analysis of this information will be presented in the subsequent Project Justification Reports (PJR).

#### 4.2.2 Nusa Tenggara Barat

The Tiu Kulit reservoir and the Kalimantan II weir schemes have been given first priority, followed by the Gapit reservoir and the Batujai-Surabaya schemes.

There is a serious question as to availability of sufficient surplus water in the Batujai Reservoir to expand the irrigated areas as originally envisioned. The TA team is planning to conduct water balance studies in the near future to determine the limits for expansion. The expectation is that the Batujai Left Bank extension (970 ha) will prove to be feasible, but the Surabaya Lift scheme will not.

Preliminary designs had been made for all of the surface irrigation projects in NTB. Therefore, instead of the TA team starting by conducting feasibility studies, they carried out "design reviews" that in effect have become feasibility studies.

The preliminary version of the PJR has just been assembled for Tiu Kulit. It is a comprehensive document that provides the information and analyses

necessary to judge viability of the project. The components include engineering, agronomic, social, and economic analyses that are derived from the physical studies and socioeconomic site profiles.

The final version will be used as a model for similar PJR's for the other surface schemes. All of the components for a similar PJR for the Kalimantan II scheme have been developed and the report will be completed in the near future.

By using sequential contracts it was possible to use the same consultants to do all the phases of work on each of the surface irrigation subprojects in NTB. This is quite different from South Sulawesi where several consulting firms are used on each subproject. By using the same consultant for all phases the transfer of knowledge is more complete and the design process more efficient.

### 4.3 Irrigation Technology

#### 4.3.1 General

Indonesians are well-experienced in constructing weirs to divert rivers. However, they have only limited experience with the design, construction, and operation of dams to store water for irrigation during the dry season. Thus SSIMP is envisioned as playing an important role in transferring the knowledge for designing and constructing dams as well as managing the water to permit varied cropping patterns throughout the year.

For surface systems serving mixed cropping programs, additional technical requirements are placed on the delivery systems as compared to serving only paddy. The traditional field-to-field conveyance system used for paddy irrigation needs to be replaced by channels to supply individual fields. This is necessary to handle the various water requirements of the different secondary food or palawija crops, minimize the length of time the fields are flooded, and provide adequate drainage.

To achieve the desired outcome, additional water control structures are needed at the secondary and tertiary canal levels. In order to maximize the options of the water users, SSIMP calls for tertiary command areas that are as small as economically and technically feasible, with an upper limit of 50 ha as the target.

### 4.3.2 Dams and Headworks

The Tiu Kulit dam and headworks design are a good example of the careful guidance the TA team is giving to the major structures. A review of the various evaluation and preliminary reports concerning the earlier Tiu Kulit Dam design shows the need for careful planning and design. The earlier structure would have been less efficient and safe than the present design, because of inadequate foundation analysis and insufficient spillway capacity.

The present design appears to be both efficient and safe. It includes careful attention to hydrological flood analysis, water balance studies, seismic and seepage analysis, safety features, and engineering and economic considerations. We believe the TA team is very capable at advising and assisting with the design of major surface irrigation structures.

The importance of SSIMP in terms of increasing the local capacity for planning and designing efficient and safe storage dams was emphasized by the team's visit to the Muer Reservoir Scheme, which is near Tiu Kulit. It consists of a thirteen meter high dam that stores about 1 million cubic meters and serves about 225 ha. The watershed is almost as large as that of Tiu Kulit, so the runoff is considerably more than the storage capacity, and the potential water resource is inefficiently utilized. Furthermore, there was considerable seepage along the abutment, and the spillway appears undersized. While the dam is probably safe, the seepage may increase and an extreme flood will cause considerable damage to it.

### 4.3.3 Main Delivery Systems

This is the area where the existing PU capacity is best. The evaluation team was impressed with the depth and completeness of the DGWRD's Irrigation Design Standards, a thirteen volume series of manuals that was approved and released in December 1986. The manuals contain both the standards and techniques for designing irrigation systems supplied from weirs. They are particularly comprehensive for the designing of main, secondary and tertiary canals.

From the points of view of technical factors and engineering economics we are confident the main delivery systems will function adequately and efficiently if built according to the design standards. However, we are less confident that the design standards will be adhered to during construction without more careful inspection than is normally

provided. The need for careful construction supervision was apparent at the Muer scheme mentioned earlier. Although this project has only been in operation for a couple of years, the canal structures are already disintegrating.

### 4.3.4 Tertiary Works

The placement of outlets on the main delivery system and the location of both the tertiary canals and their outlets are critical to any scheme's success. The surveys of the areas to be irrigated are based on 1-m contour intervals for steep lands, and 0.5-m intervals for flatter areas. The surveys do not contain information regarding field boundaries and the location of existing small irrigation works, water supply, and drainage channels.

We realize that to obtain more detailed physical information would be costly and time consuming, but it is needed to locate the tertiary canals, field drains and related structures appropriately. In fact, this information is needed more than detailed physical analysis. Although the present level of physical survey data may be sufficient, the final tertiary designs must be developed in collaboration with the beneficiaries to be effective. This will require careful dialogue with the farmers in each tertiary and a willingness on the part of the engineers to make the appropriate adjustments. In fact, this must be done to comply with both the DGWRD Design Standards and SSIMP objectives.

Although SSIMP's target is to hold the tertiary size to 50 ha, we believe it is more important that the tertiary commands fit the existing social boundaries. Furthermore, most of the command areas already have some limited irrigation or water control facilities. Therefore, the new tertiaries should fit into the existing social and physical infrastructure as closely as practical.

### Recommendation

Final design of tertiary block layouts should not be completed until the Water Users Association Organizers (WUAOs) have worked with the tertiary groups to get their input into the design decisions.

This recommendation was discussed with PU staff and TA team in both provinces, and they were generally supportive of it. It is essential even though the tertiary designs have been drawn up for Tiu Kulit and Kalimantanong II, and are well underway for

Awo. The WUAOs should be given copies of simple drawings that show the proposed tertiary layouts to use in discussions with the farmers. (Drawings that look like final engineering plans may intimidate the farmers.)

#### 4.4 Beneficiary Participation

The emphasis on beneficiary (farmer) participation and provisions for achieving it in the SSIMP Project Paper design are extensive and unique. The PP calls for the beneficiaries to be involved from design through operation and maintenance, with farmers fully responsible for O&M at the tertiary level. There are few instances anywhere in the world where farmers have been involved as early as the design stage of projects as large as SSIMP surface subprojects.

Another aspect unique to Indonesia is the use of organizers to facilitate the establishment of WUAs for these intermediate scale systems. While this has been done for smaller projects in Indonesia, it has never been done for ones as large as SSIMP subprojects.

Building on USAID's earlier HPSIS Project, the Project Paper planned for beneficiary participation activities to be supported through a contractual arrangement with LP3ES. LP3ES is an Indonesian NGO experienced in recruiting, training, fielding, and supervising community organizers to assist in the organization of irrigation groups. The availability of an experienced outside organization such as LP3ES is an important asset for Indonesia as a whole, and SSIMP in particular.

LP3ES intends to recruit the WUAOs from the existing provincial field staffs to the greatest extent possible. Recruiting WUAOs from government ranks differs from the approach used in the earlier community organizer activities of LP3ES. This new approach is also being used in the present Turnover Program of the World Bank Irrigation Subsector Project (ISSP). Experience to date in the turnover work indicates that the use of agency staff for this organizing function can be effective.

In all locations where preliminary investigations are underway or completed, the Public Works staffs, with TA assistance, have conducted site profile investigations to gather information from the project beneficiaries on such matters as their current agricultural activities, local organizations and institutions for agriculture and irrigation

management, and detailed facts regarding their farm management practices.

Public Works staff recognize that this attempt to understand conditions in the proposed project area represents an innovative approach to project planning. We generally found them interested in exploring ways to continue farmer participation in subsequent project activities.

Several of the surface systems are nearing the point at which the construction of main system facilities will begin. When this happens, there will be an urgent need for the WUA organizers to begin their work with the farmer groups so that these groups can participate in decisions affecting tertiary network design. LP3ES has submitted a proposal to DGWRD to conduct these proposed activities. Negotiations on the proposal are now being conducted between the DGWRD and LP3ES, but are not yet completed.

#### Recommendations

High priority should be given to completing negotiations on the LP3ES contract and fielding the WUA organizers.

In both South Sulawesi and NTB arrangements should be made to formally involve the O&M division of the respective PU staff in SSIMP activities, since responsibility for WUA activities is assigned to this division. The conventional approach is to form WUAs when O&M activities are about to begin. However, in SSIMP it is intended that WUAs be formed much earlier so that they can participate in tertiary design decisions and in aspects of construction. To ensure that this activity is effectively coordinated with PU, the responsible staff must be included in SSIMP planning and implementation from this stage onward.

To ensure the effective integration of the LP3ES activities, there must also be a clear identification of the PU staff counterpart for the LP3ES staff and a close working relationship between LP3ES and the TA staff.

In all of the subproject locations—both surface water and groundwater subprojects—SSIMP also must give explicit attention to regular contacts with the various local government officials. The site profiles have revealed that in a number of the surface water areas, if not all, some customary roles associated with the management of irrigated agriculture exist. Any new

organizational arrangements, such as the formation of WUAs, should build on these existing institutions. By working with the relevant kabupaten officials, a district-wide approach can be formulated.

A good example of what can be done is the interactions of SSIMP staff with local government officials in the Awo subproject area in South Sulawesi. The TA social scientist should be assigned responsibility to work with each subproject manager and with the LP3ES staff to develop a plan of action for involving local government officials. This is especially important given the nominal role of the bupati, camat and kepala desa for organizing WUA groups.

#### 4.5 Economic Analysis

The estimated costs for design and construction, which were based on limited data and incomplete designs, have increased substantially in the four years since the Project Paper was prepared (Table 4). In the PP, costs for all subprojects, excluding Raja Telaga and Surabaya, totalled \$43.6 million. The current estimate is \$62.1 million. Inflation accounts for a major part of the increase; design changes account for the remainder. However, within the total, there are over and under estimates of costs for individual subprojects.

The only subproject with detailed Economic Internal Rate of Return (EIRR) calculations is Tiu Kulit and are found in the PJR. Those calculations and the related financial analysis (which includes farm budgets and household income estimates) have been thoroughly and carefully done. Data have been selected by reviewing all available secondary and primary sources to select the most accurate information. The methodologies are straightforward and correct.

EIRRs are down substantially from those in the PP for all subprojects except Kalimantan II and Gapit, where EIRRs are marginally increased. Although the EIRRs are lower, all of the projects are economically viable, but Salomekko and Selli Coppobulu are only marginally so.

If Raja Telaga and Surabaya are not constructed, and Tiu Kulit is financed as proposed by Japan's OECF, the total cost of the remaining projects will be \$51.5, \$1 million more than the total originally allocated for surface water subprojects. It should be

possible to make up this difference from shortfalls in the groundwater program. We believe that it is important to carry the subprojects to completion, in order to achieve the institution strengthening goals of the program. We also know that questions have been raised about the Government's ability to meet its commitment to pay half these costs. Alternative sources of funds will need to be found if the ratio is changed and the projects are carried to completion.

#### Recommendation

All subprojects should be constructed, except Raja Telaga and the Surabaya lift scheme. Additional foreign funding sources should be explored, if required.

The subprojects are ranked in descending order of their EIRRs (Table 4). This priority order corresponds to our technical ranking of the subprojects. The last three all have potential technical problems. Ponre-Ponre may disrupt a major natural spring. The catchment areas for Salomekko and Selli-Coppobulu are only as large as their service areas, and the latter may require extensive grouting.

#### 4.6 Operation and Maintenance

The proposed extension of the PACD is essential to allow sufficient experience with operations and maintenance (O&M) of SSIMP surface facilities.

The PP calls for an examination of the cost recovery implications of the projects and the identification of optimum irrigation fees. Work is already underway on users fees under separate pilot projects in South Sulawesi and Sumbawa. Results of these pilot studies will need to be studied carefully. The Government is instituting a national policy to collect users fees for all irrigation systems over 500 ha. Pilot efforts are underway, but it will be some time before SSIMP can benefit from them.

Other O&M activities that need to be pursued include:

- developing effective linkages between the PU staffs and the WUAs for operation and maintenance activities;
- assisting the PU staffs to develop main-system management procedures in support of palawija production; and

Table 4

SSIMP Surface Water Projects: Cost Updates and Indices—Ranked by EIRR

Project	1985	Recent Cost	Irrigation Area	Cost/ha	EIRR ESTIMATES		B/C Ratio @ 10% Cost of Capital
	Project Paper Estimated Cost (\$)	Estimates 1989 (\$)			PP	Current	
Kalimantong II	7,744,000	8,200,000	2,815	2,913	18.0%	23.0%	2.5
Awo	1,614,000	7,870,423	2,500	3,148	47.0%	20.0%	2.2
Gapit	5,014,000	6,300,000	1,300	4,846	11.0%	14.5% <sup>+</sup>	1.55
Tiu Kulit	6,254,000	10,610,000	1,800	5,894	19.0%	12.4%	1.27
Ponre Ponre	7,704,000	15,211,268	3,500	4,346	28.0%	11.0%	1.14
Salomekko	3,713,000	6,760,563	1,200	5,634	28.0%	9.5%	0.95
Selli Coppobulu	7,865,000	7,154,930	1,400	5,111	18.0%	9.0%	0.92
Batujai	3,724,000	2,860,000	972	2,942		--	--
Raja Telaga	4,050,000	--	1,700	--		--	0.7
Surabaya	2,831,000	--	2,800	--		--	--
<b>TOTAL / AVG</b>	<b>50,513,000</b>	<b>64,967,183</b>	<b>19,987</b>	<b>3,780</b>	<b>24.1%</b>	<b>14.2%</b>	<b>1.25</b>
	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Cost/ha</b>	<b>Average by project</b>		

Source: Technical Assistance Team

NOTE: Costs are total development costs including design and land acquisition.

<sup>+</sup> Early, conservative judgement based upon contractor Mettana's preliminary analysis for Gapit Dam.

- assisting the PU staffs to develop reservoir operations and release procedures. There is little experience with this, and it is particularly important to conserve the limited water availability in the reservoirs.

#### Recommendation

Arrangements should be made to include the O&M units of the respective provincial irrigation offices in SSIMP project structure in both South Sulawesi and NTB.

#### 4.7 Site Profiles

As part of the project objective of strengthening the PU staffs the Project Paper identified site profiles as one of several new and improved management tools that were to be developed and used.

These site profiles were intended to expand the procedures then being used by the provincial PU. The existing PU procedures focused on technical design information, whereas the site profiles were intended also to deal with agronomic, institutional and sociocultural data. The Project Paper noted that the information from these Site Profiles was to be used to

- develop the system technical design;
- assess the needs for supporting services such as agricultural extension; and
- develop a system management (O&M) plan.

In the early months of SSIMP there was some confusion regarding the purposes of the profiles and the techniques for their implementation. USAID gave high priority to the social and economic data while the Government emphasized the need for technical and physical information. Ultimately, both were collected.

Work on the site profiles proceeded under the direction of a personal services contract (PSC) employee through February 1989, and it has continued with the assistance of the TA social scientist and economist. During this time a significant number of provincial staff have participated in the planning, field work and data analysis activities. They indicate that this experience

has expanded their understanding of the relevant information to be collected at this stage of project planning.

In practice the profiling work was divided into two major components: a rapid rural irrigation appraisal (RRIA) that utilized existing secondary data and key informant interviews in the proposed service area and a household sample survey (HHS) to collect more precise economic and farm management data. Not included in these components are two other sets of critical data: the technical data on the physical and hydrologic characteristics of the site and the environmental assessment data. The former was initially collected with the assistance of a PSC engineer, and then by the private design consulting firms. The latter is a direct responsibility of the Harza consultants.

The RRIA work and the household surveys have now been completed in nearly all the surface water sites, although analysis of this data is still being completed.

It appears that the site profile reports are an intermediate report to organize information that can be incorporated into sections of the PJR (for example, the chapters on agricultural production, marketing, and social considerations). The PJR is essentially a project feasibility report and will be used by USAID to give final approval for the construction of the individual subprojects, and as the basis for DGWRD to proceed with construction of the project.

These current uses of the site profile information can be compared with the various purposes identified in the Project Paper. The differences are significant:

- A major outcome of this work is the project economics—costs and benefits. This was not explicitly included in the original discussion of the site profiles, but is, of course, an essential element of the PJR.
- Information from the site profiles does provide a more in-depth opportunity to examine the social soundness of the various surface schemes. While the Project Paper mentions that some potential sites were eliminated based on unsound social characteristics discovered in preliminary reconnaissance work, apparently the more in-depth analysis has not revealed any additional sites with such problems.

- It is too soon to verify the use of the site profile information as a baseline for later evaluation and analysis of changes. Certainly, the data collected could be used for such purposes.
- As reported in the PJR, only minimal use of the site profile information has been made to assess the need for supporting services. The Tiu Kulit PJR devotes a single paragraph to this topic, asserting that various agencies (Agriculture, Animal Husbandry and Forestry) will be involved, but provides no plan for organizing such involvement and no budget to support it. If the forecast of economic benefits in SSIMP subprojects are to be realized, agricultural and irrigation management extension will have to be intensified. Better planning for this will be required as the projects approach the O&M stage.
- Based on review of the Tiu Kulit PJR, it appears that minimal use is being made of the site profile information for developing the system technical design, as originally envisioned in the Project Paper.

For example, examination of the proposed organization of the water users associations appears not to take into account the existing local institution of malars, a traditional village role for coordinating collective activities such as fencing and operation and maintenance of village irrigation systems, which is discussed in the PJR chapter on social considerations. The proposed organization could have been designed without expending resources to learn about the indigenous irrigation institutions in this location.

Similarly, no attention was given to designing the layout of the tertiary blocks in a manner consistent with the existing physical layout and supportive institutional system. Thus, we find in the social considerations chapter that nearly 1,600 ha of the proposed 1,790 ha command is already in sawah; 70 percent potentially irrigated by the existing desa (village) irrigation systems. Moreover, we are told that this sawah area already is arranged into sawah blocks (locally called orong), each of which is managed by one or more of the malars mentioned above. The malars are an integral part of the desa government set-up. This existing institutional pattern and experience is a very important local resource, and the tertiary layout of the new system should attempt to build on it. Perhaps it does, but one is unable to discern this from the PJR. One step to this end would be to present a diagram which indicates the boundaries of the existing sawah complexes (the

orong) and the villages to which they belong, along with the proposed tertiary boundaries.

#### Recommendations

Greater use should be made of the information gathered in the site profiles for initial decisions regarding overall layout of the tertiary blocks.

To accomplish this, the TA social scientist and PU staffs should review the site profiles for each surface water subproject to identify any data, such as existing village systems and malars, that relate to tertiary layout and development. These should then be discussed with the subproject managers and other TA staff before being communicated to both the tertiary design contractor and the LP3ES staff working in each subproject location.

They should conduct a similar review of the site profiles to identify features of the existing local organizations that should be considered by LP3ES staff as they begin their WUA organizing activities.

#### 4.8 Special Studies

The PP specified that studies were to be conducted through the life of SSIMP in response to design, implementation, monitoring evaluation, and technology requirements. They were to be applied studies related to project activities, not research. The PP also gives an illustrative list of potential activities. This list includes pilot activities along with the special studies. The proposed budget for these activities is \$2,455,000. About half of this is suggested for feasibility level groundwater studies which are dealt with in Chapter 5.

In reading the PP it is clear the project planners intended that special studies be developed around new areas that are being addressed by SSIMP. These include the site profile, environmental assessments, farmer involvement, institutional development, and privatization activities.

To date these special studies have been quite limited. Besides this mid-term evaluation, which along with the final SSIMP evaluation is included in the special studies list, and the environmental assessments, only one other study has been initiated. The title of the study is "Privatization and Sustainability of Small Scale Irrigation: A Reassessment of Sederhana and HPSIS Systems". It provides at least one example of the type of special study envisioned in the PP.

The study will re-examine a selected number of irrigation systems that were established or rehabilitated under the former USAID Sederhana Project (1974-1985). The study is intended to evaluate the current status of the selected systems in terms of their physical condition; the degree of involvement of water users and other local organizations in systems operation and maintenance; and the nature and intensity of agricultural activities.

The results of the study are expected to have specific application in SSIMP related to the involvement of farmers in the design and construction of irrigation systems, designing sustainable O&M programs, and developing effective community organizer support. At the national level, findings and recommendations from the study may assist the GOI in the development of self-sustaining beneficiary-managed irrigation systems.

Special studies should be an important component of SSIMP, especially since the project is breaking new ground in many areas. Special studies are needed to identify the most useful and workable activities and to provide a mechanism for analyzing and recording the experiences. In other words, they are needed to provide an institutional memory so the innovative and successful SSIMP activities can be transferred to other provinces and donors. However, in view of the experience thus far, it does not appear the TA team has the time and capacity to focus on this important aspect of SSIMP.

#### **Recommendations**

A new mechanism should be established for planning and implementing the special studies activities and for utilizing local and external resources for their implementation.

Some potential special study topics are

- documenting new efforts to involve farmers in tertiary designs, and evaluating the effectiveness of transferring O&M responsibility to the farmers;
- determining an appropriate design for tertiary blocks with sloping lands, aimed at special cases where sharp slopes will create special problems for paddy as well as non-paddy systems.
- documenting the use of agency staff as WUAOs, and the use of an NGO to supervise this activity;
- studying the effectiveness of incorporating traditional irrigation roles, such as the malar, into the new WUA organizational set-up;
- studying the effectiveness of the institution strengthening and technology transfer efforts at the PU staff and local consulting contractor levels; and
- documenting the value and use being made of site profiles and environmental assessments for the surface irrigation systems.

In addition to the special study activities, the impact of SSIMP could be effectively extended by means of an end-of-project workshop, which could serve as a mechanism to present the findings from the special studies to Central and Provincial Irrigation staff, and to other donors. In this way SSIMP might have greater impact through the sharing of experiences and influence Government and donor irrigation assistance activities in the future.

## GROUNDWATER DEVELOPMENT

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### 5.1 Project Plans

The areas selected for groundwater development were chosen to explore a means of expanding the irrigation potential of the provinces. This is a relatively new technology for these areas, and the goal is numerous small-scale groundwater irrigation schemes that are both physically and economically sustainable by the users.

The objective of SSIMP is to assist the Government in developing and using groundwater resources by working with the Government to identify appropriate conveyance, operational, and organizational systems necessary to effectively exploit these resources. The project seeks to strengthen and expand public and private sector roles in groundwater development through experience with farmer-dug and contractor-drilled well development.

Project activities provide an opportunity for training provincial staff in the PU groundwater Development Project (Proyek Pengembangan Air Tanah—P2AT) in new techniques and technologies.

### 5.2 Current Activities

#### South Sulawesi

No groundwater exploration wells have been drilled, and there are no pilot SSIMP groundwater irrigation schemes in South Sulawesi. In fact, the project paper calls for an exploration program prior to any pilot irrigation schemes.

Although it was a condition precedent in the original loan agreement, the P2AT groundwater development team has just been established and the terms of reference for a reconnaissance and pre-feasibility study have been drawn up. Plans are to order a drilling rig using SSIMP funds, but this has not been done yet. An earmark PIL has been issued for groundwater activities, but to date no request for commitment PIL approval has been submitted to USAID. It is the understanding of the P2AT staff in South Sulawesi that a PIL request covering groundwater activities in all three provinces will be submitted by Irrigation II in Jakarta.

Under a World Bank funded project, 20 wells have been drilled in the Jeneponto area for production purposes. The wells are about 60 m deep and the pumping lift is only about 2 m, so centrifugal pumps can be used. The pumps have not been installed yet, but distribution systems of 4-inch buried PVC pipe are in place. Each well will produce about 9 l/s and serve about 7 ha. These wells could be used to provide SSIMP with an early opportunity to study groundwater schemes in the province.

#### Nusa Tenggara Barat

In NTB groundwater development for small-scale irrigation is programmed in five different alluvial plains on Sumbawa. On some of these plains, farmers traditionally use groundwater for intensive dry season agriculture. Funds have been committed for four experimental sites for this fiscal year, and an additional five sites are being planned. There is also a plan for exploratory wells, but drilling equipment is not yet in place. A reconnaissance study of groundwater resources was completed for Sumbawa in 1981. The study was supported by Canadian assistance, but none of the exploratory wells has been developed for irrigation purposes.

There is also a groundwater development program on Lombok that is funded by the World Bank. We were told there are now about 20 small operating schemes with buried PVC distribution systems. It may be useful for SSIMP to examine these operating tubewell schemes.

#### Nusa Tenggara Timur

No new exploratory wells have been drilled under SSIMP in NTT. This is because the necessary peripheral equipment such as drilling mud and pipe has not been available. There are procedural problems in procuring this equipment for the force account staff, who are otherwise prepared to drill wells. As a result, the project has resorted to a contractor to operate one of the PU's drilling rigs.

Several of the test wells which were drilled during the earlier exploratory activities carried out with Canadian assistance have been converted to production wells for irrigation purposes. In addition, farmers are actively digging open shallow wells with some technical assistance from P2AT. It appears there is reasonable scope for expansion using dug wells in the Oesau area.

The evaluation team visited both completed SSIMP pilot schemes in NTT, and they appear technically satisfactory. System capacities are in the neighborhood of 10 l/s. Centrifugal self-priming pumps powered by diesel engines are used. The typical service area is about 10 ha, and a weekly rotational water delivery system is used. One of the units was developed using a well that had been drilled during the earlier exploration program. The second pilot scheme is supplied from an improved dug well.

The evaluation team was particularly impressed with Pariti II which was commissioned last September. The scheme was developed using an existing exploratory well. By chance it happened to be nicely situated for serving the rain-fed paddy lands of a single village. A short section of buried PVC plastic pipe serves three pre-cast concrete flumes to make up the tertiary distribution system. The channels are supported on earthen berms, and the concrete flume sections were cast on site. All the manual labor for building the berms, casting the flume sections, laying them in place and installing the pipe was supplied by the farmers. The work was done by force account with the technical assistance supplied by P2AT and the TA Team.

The first pilot scheme in NTT, Pukdale I, which was designed and built by P2AT without USAID assistance, utilizes cast-in-place masonry and concrete channels. These are technically quite workable, but considerably more expensive than the pre-cast flumes used at Pariti II. This system is also supplied from a tube well that was drilled during the earlier exploration program, but was not so fortuitously located in relation to the ownership patterns.

This was P2AT's first work with groundwater for irrigation in the province. The system was designed with the minimal participation of farmers, who had no previous experience with groundwater irrigation. The resulting organizational problems were mitigated with considerable effort during the start-up phase. During the first two years, P2AT provided some fuel and cash inputs for operation and

extension staff support. The farmers are now on their own, and operational problems are apparent. Longstanding friction among members of the water users groups may jeopardize the continued success of the scheme.

The team visited two other non-SSIMP schemes that were installed on the previously drilled exploration wells. Both of these schemes were similar to the Pukdale I system and appeared technically satisfactory, but were not part of the pilot studies. In one case, Pariti I, the system had hardly been operated because of local ongoing conflicts among landowners. The other scheme which is near Oesau appeared to be organized and working quite well.

The second and latest completed SSIMP pilot scheme in NTT, Lukman Barat, has a buried pipe distribution system and is supplied by an improved concrete-lined dug well. Farmers had previously dug the well and requested SSIMP to help them develop a conveyance system. It has just been put into operation and therefore it is too early to evaluate its performance. However, it appears to be well received by the farmers and technically adequate.

### 5.3 Technological Aspects

While SSIMP planners visualized groundwater exploration as being a logical first phase of the development process, there has been little progress with groundwater exploration since the inception of the project. However, an earlier study of groundwater resources was carried out for the GOI with Canadian assistance in both NTT and NTB.

Pilot groundwater development schemes were to be carried out in parallel with the groundwater exploration activities. The purpose of the pilot schemes is to find promising socio-technical packages to be extended in the expansion program. To date SSIMP has two pilot schemes in operation, and one ready for construction.

The evaluation team believes there is sufficient evidence that the water resources in all proposed SSIMP groundwater project areas can sustain considerable development. Each of them is at least capable of sustaining several hundred hectares of irrigated paddy. For example, the TA team hydrologist believes there is little risk of overtaxing the sustainable yields in the central plain of NTT with as many as 50 wells supplying 10 to 15 ha each in either the Pariti or Oesau areas. However, it is important that the wells be widely spaced to minimize interference between them.

We also feel there is enough experience from the pilot schemes, with viable and reproducible socio-technical packages, to move forward with the expansion phase. Furthermore, there are other groundwater developments in the selected provinces that can be studied to gain additional operational insights.

In view of the above, the evaluation team proposes moving forward with the expansion program in all provinces. The program we propose is what might be called "exploratory groundwater development." That is, to couple the three phases of exploration, pilot schemes, and expansion together.

To do this, site profiles and socio-economic site selection should be the first steps. Wells should be drilled or dug for the dual purpose of both exploration and development. They should be carefully logged, tested, and equipped with monitoring ports, and piezometers should be installed at selected sites.

The original idea was to have 20 to 30 l/s production wells. However, 10 to 15 l/s seem to be better from the socio-technical standpoint. Therefore, the 200 mm diameter wells that were recommended for the exploration program can also serve as production wells.

By monitoring the production wells, groundwater hydrologists can learn more about the capacity of the aquifers than through a purely exploratory program. It is the dynamic nature of the aquifers that is of greatest importance for determining sustainable yields and the economics of lifting water. In fact, the GOI should be encouraged to continuously monitor all aquifers under development. SSIMP can play an important role in laying out and testing such a monitoring program. By carefully monitoring the aquifers, limits can be predicted and expansion stopped before over exploitation.

While the expansion program is gaining momentum, experience with implementing it can get underway. There are the questions of using WUAOs in the site selection process. Who should do the field surveys, P2AT or consultants? Should force account or contractors be used for the installation of the distribution systems? How involved should the farmers be in the construction of their systems? To obtain answers to these questions, some sites should be utilized for pilot studies. Although viable socio-technical packages for site development are already available, the process of improving them should be continued. For example, the question of whether a

pipe or flume distribution system is best from the social, economic and technical aspects has not been answered.

### **Recommendations**

The project should carry out the groundwater exploration, pilot study and expansion program concurrently, rather than in sequence, using site profiles and carefully monitoring the physical and socioeconomic consequences.

To expedite the drilling of exploratory/development wells, those provinces presently without the required drilling rigs should contract with local firms that have drilling equipment. Even with a move to expansion, the initial rate of development will be slow. Reasonable targets might be 20 to 30 completed 10- to 15-ha schemes in NTT, 5 to 10 in South Sulawesi and 5 to 10 in NTB by the end of 1990. Potentially, the rate of expansion could be doubled for the remaining years of the project.

These rates of development will take considerably more effort and managerial input than has been expended on SSIMP groundwater development program to date. Even at these rates the groundwater development will still fall far short of SSIMP goals. In the FP the target is 5,240 ha of groundwater irrigation. Assuming 10 ha per well and the rate of development is 400 ha in 1990 and 800 ha per year thereafter, there will only be 2800 ha of SSIMP groundwater irrigation by the end of the project.

### **5.4 Planning and Technical Assistance**

Execution of the concurrent program that we recommend, and achievement of even the reduced targets discussed above, will require careful planning and an expanded TA sub-team to support the planning and execution of expanded groundwater activities in all three provinces. The planning that is required does not exist now in even rudimentary form in any of the three provinces. None have time-phased groundwater programs. Development of such plans should be a matter of priority.

The Project Paper called for a groundwater hydrologist and a drilling advisor to be stationed in each province. This was later reduced to two hydrologists and an agronomist. Because of the importance of planning and execution, we propose

that, in addition to the current staffing, a local or expatriate development manager with at least some knowledge of groundwater hydrology be assigned to the groundwater program in each province. One of these managers, possibly an expatriate, should be designated as groundwater TA sub-team leader. These development managers would be responsible for providing advice and assistance to their respective provinces on the planning and execution of the groundwater programs. We believe only one fully qualified groundwater hydrologist is needed for all three provinces. The position of agronomist is essential to support the site selection and beneficiary participation activities, for the reasons set out below.

In summary, we propose a five-person groundwater sub-team, which would include three development management advisors, one agronomist and one groundwater hydrologist. Any or all three of the development management advisors could be hydrologists, provided that they have the management skills which are required.

#### **Recommendations**

In keeping with our overall recommendation on project planning, groundwater programs should be planned for each province, as soon as possible.

A TA sub-team should be put in place to support the planning and execution of expanded groundwater activities in all three provinces.

#### **5.5 Beneficiary Participation**

In NTT the farmer participation accomplishments in SSIMP groundwater sites are exemplary. Careful site selection was done based on extensive interactions with local groups. Farmers participated in selected aspects of design and layout decision-making, and were involved in the actual construction of the distribution network. Farmers currently are directly involved in pump operation and water distribution. Leadership for this effort has been provided by the agronomist on the Harza TA team.

The SSIMP model contrasts sharply with the situation in the P2AT sites such as Pukdale I and Pariti I. Neglect of site selection and beneficiary participation at the outset have created serious operational problems at those sites. SSIMP model should continue to be followed in future groundwater development in all three provinces.

In both South Sulawesi and NTB the P2AT staffs who will be involved with the proposed activities currently have an inadequate understanding of the importance of farmer participation. While recognizing the aim of having the farmer group be responsible for operating the network after its construction, as required by national policy, they are less well informed about the importance of sociological factors in site selection and the complexities of actually establishing effective irrigation groups. They presently are assuming that WUAs will be established through the activities of local government officials alone.

The Project Paper left open the matter of using water user association organizers (WUAs) in the groundwater sites, but experience to date indicates that it is now time to make a firm decision in favor of their use.

Although an effective approach for farmer involvement in developing groundwater networks has been implemented in NTT, the present staff is not adequate to handle the increased workload that an expansion program will create. Any expansion in the development of groundwater networks will require specific assistance from WUAs. In the other two provinces, arrangements need to be made to provide WUA organizers to work with the P2AT staff in site selection activities and in formation of the pump irrigation groups.

In both South Sulawesi and NTB, farmer participation on the groundwater activities could be encouraged by expanding the role of LP3ES to include the provision of WUAs for work in the groundwater projects. In NTT, in developing production wells, it will be necessary to contract with some other NGO whose orientation is consistent with the population of that area.

#### **Recommendation**

Arrangements should be made to provide WUAs to work on the siting and farmer organizing activities in the groundwater programs in all three provinces.

#### **5.6 Economic Analysis**

The economic analysis of groundwater irrigation development, comparable to the analyses that have been done for surface water, has not been carried out so far. This is due, in part, to the limited progress in the groundwater programs.

Some limited economic indicators were obtained during the evaluation team's visit to the project area in the Oesao-Pariti plain in NTT. Our interviews with the farmers there indicate that SSIMP groundwater development subprojects have increased the income of the farmers significantly. In Pariti II the yield of paddy increased from 1.6 tons/ha without the subproject to 2.9 tons with the subproject. Cropping intensity also increased from 100 percent without the subproject to 200 percent with the subproject. The incremental return to farmers was Rp.199,495/ha in the wet season, and Rp. 445,027 in the dry season, or about Rp.644,522/ha/year. Since the average O&M cost per year is about Rp.135,000/ha/year (it was estimated at Rp.140,648/ha/year in the Project Paper), the farmers should be readily able to pay the O&M costs, including depreciation, and potentially could contribute at least some of the development costs. If the farmers at Pariti II follow through with their plan to go to a paddy/palawija/palawija rotation next year, their net returns will be substantially higher.

We have not calculated the EIRR for this subproject. However, in the Project Paper, the average EIRR of the groundwater water development in Pariti area was estimated at 14%. Although costs of development increased between the year of the Project Paper (1985) and now, prices of the outputs have also increased, and we would expect the EIRR for Pariti II to hold.

### 5.7 Site Profiles

Site profiles are needed to support the accelerated development of production wells. While some such work has been done as part of the pilot schemes in NTT, none has been completed or is currently planned in the other two provinces. Site profiling needs to be conducted at two levels. First, in each of the basins or areas where groundwater programs are planned to intensify (i.e. in Sape in NTB) profiling work similar to that completed in the command areas of the surface schemes should be completed. This will provide basic information on matters such as land ownership, agricultural activities, irrigation arrangements, including existing pumps if any, institutional patterns and so on. If there is any existing experience with pump-based irrigation, or with the use of groundwater, careful economic analyses of these activities should be completed. This information should be used to decide what groundwater activities are needed and how such might be provided.

The second level of profiling activity is in support of the selection for specific well locations and service area boundaries. If the intention is to convert exploratory wells to production wells whenever possible, then the location of each well must be selected with its service area in mind. Socioeconomic siting analysis is required to insure that the well and service area fits with existing administrative and social boundaries that will be conducive to local O&M.

The importance of conducting site profiles is illustrated by the following observations regarding current groundwater activities in the Sape region of NTB:

- The shallow groundwater in the Sape and Keli alluvial plains in East Sumbawa is being rather extensively utilized for vegetable production during the dry season. In the Sape area 400 ha and in the Keli area 100 ha of very intensively farmed and irrigated vegetable crops (mostly onions) are being grown. During the rainy season most of these same fields are in irrigated paddy.
- At Sape the traditional method of irrigating from the shallow dug wells is by hand lifting and spreading the water by pouring it on the crop. Uniquely fabricated cans are used to carry 20 l of water at a time. The farmers literally climb into the 2- to 4-meter deep wells to fetch the water. They then carry and pour the water uniformly across their 0.1 ha fields. The 500 ha of irrigated vegetable crops in the Sape and Keli areas provide an irrigated cash crop during the dry season for about 5,000 farmers.
- P2AT has installed three 2-ha pilot shallow-dug well demonstration systems in the Sape alluvial plain. These pilot setups have a self-priming gasoline-driven pump to lift the water. Buried pipe and surface channels are used to deliver the water to sump holes located adjacent to each farmers 0.1-ha plot. SSIMP is in the process of assisting with the development of up to four additional pilot schemes using the site selection procedures developed in NTT.
- The P2AT schemes eliminate the need to climb in and out of the wells but the water is still carried and poured on the cropped area. If our observations are correct, by mechanically lifting the water the labor is cut in half. How this will effect this unique traditional activity is unknown.

Apparently the economic dynamics of the current practices have never been looked into. However, there is considerable interest on the part of the farmers in mechanized pumping. No doubt with or without assistance pumps will become the norm in the future.

- At Sape, a well drilling and expansion program might lower the shallow water table sufficiently to jeopardize extensive current activities, an outcome that could be very counter productive from both a social and economic point of view. A technical and social assessment is needed before proceeding to ensure that this does not happen.

### 5.8 Special Studies

Some suggested special study topics follow:

- assessing the private sector role in groundwater irrigation development to make recommendations for legal and procedural changes and plans of action for private sector support;
- codifying provincial groundwater regulations and drafting of groundwater legislation for the three provinces;

- documenting the experiences gained at the pilot groundwater sites and the groundwater development programs of other donors in the three provinces;
- documenting the experiences gained by using WUAOs during the site selection process and the ongoing O&M activities;
- documenting the program of exploratory groundwater development and codifying a set of procedures for a continuing program for monitoring the groundwater resources in developed areas; and
- documenting the value of conducting site profiles for the groundwater development areas and the importance of both careful socio-economic and physical siting of wells.

No SSIMP effort should be expended on feasibility level groundwater studies on Sumba and Flores, mentioned in the PP as a potential special study activity, although they might be picked up by other donors. Funding for this item was estimated to be \$1,200,000 or about half of the entire special study budget. Thus dropping it has important implications for SSIMP special study program.

# 6

## SUMMARY OF RECOMMENDATIONS

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This chapter summarizes the recommendations contained in Chapters 1 through 5 above. The reference in parenthesis at the end of each recommendation is to the chapter and section where the recommendation and its supporting discussion are presented.

### 6.1 Project Management

1. A no-cost two-year extension of the PACD should be made, to allow construction of the viable surface schemes, initial operations and maintenance of those schemes and development of a viable groundwater program. (1.5)
2. The current TA contract should be extended to September 1991 to complete the design phase of the surface projects and continue the groundwater program; and that a follow-on TA contract be let for construction supervision services and O&M support. (1.5)
3. A project management structure should be designated in DGWRD with clear responsibilities assigned to both Irigasi I and Irigasi II for their respective components. (2.1)
4. The role of the TA chief of party in Jakarta should be redefined to include clear responsibility for overall project planning, and monitoring and providing advice and assistance to the DGWRD in project implementation. (2.1)
5. Every effort should be made to reduce the detailed management activities of USAID by such actions as the use of blanket PILs for the groundwater activities. (2.1.2)
6. Implementation plans should be developed for the project as a whole and for each component, and progress should be monitored against those plans. (2.2)
7. The Government, USAID, and the TA team should develop a system for timely collaboration on the development of the provincial operating budget requests (the DUP) and the ensuing DIP, in support of agreed SSIMP implementation plans. (2.1.2)
8. The decisions of the February 1988 Bali workshop should be reviewed and implemented. (2.3)
9. The TA team should be instructed to increase attention to training and technology transfer, and to develop a comprehensive plan for achieving this. (3.1)
10. A new mechanism should be established for planning and implementing the Special Studies activities and for utilizing local and external resources for their implementation. (4.8)

### 6.2 Surface Projects

11. All subprojects should be constructed, except Raja Telaga and the Surabaya lift scheme, and additional foreign funding sources should be explored, if required. (4.5)
12. Greater use should be made of the information gathered in the site profiles for initial decisions regarding overall layout of the tertiary blocks. (4.7)
13. Final design of tertiary block layouts should not be completed until the WUAOs have worked with the tertiary groups to get their input into the design decisions. (4.3)
14. High priority should be given to completing negotiations on the LP3ES contract and fielding the WUAOs. (4.4)
15. Arrangements should be made to include the O&M units of the respective provincial irrigation offices in SSIMP project structure in both South Sulawesi and NTB. (4.6)

16. USAID should waive the limitation of \$100,000 on local consultant contracts without international competition. (2.1.2)

### 6.3 Groundwater

17. The project should carry out the groundwater exploration, pilot study and expansion program concurrently, rather than in sequence, with the use of site profiles and careful monitoring of the physical and socioeconomic consequences. (5.3)

18. In keeping with our overall recommendation on project planning, groundwater programs should be planned for each province, as soon as possible. (5.4)

19. A TA sub-team should be put in place to support the planning and execution of expanded groundwater activities in all three provinces. (5.4)

20. Arrangements should be made to provide WUAOs to work on the siting and farmer organizing activities in the groundwater programs in all three provinces. (5.5)

# **APPENDICES**

# A

## LIST OF PERSONS CONTACTED

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### Directorate General of Water Resources Development (DGWRD)

- Ir. Soebandi Worosoemarto, Director General of DGWRD
- Ir. Koesdaryono, Assistant DG for Water Resources Development

### Directorate of Planning and Programming (DPP)

- Ir. Martono, Director of DPP
- Ir. Djoko Sardjono, Head of Subdirectorate for Foreign Aid Administration
- Ir. Tri Mulat Sunarjo, M. Eng., Head of Subdirectorate of Project Evaluation

### Directorate of Irrigation I (DOI-I)

- Ir. Soenarno, M.Sc., Director of DOI-I
- Ir. Bambang Waluyono, Head of Subdirectorate of Construction Management, Eastern Area
- Ir. Mashudi, Dipl. H.E., Head of Subdirectorate of Technical Planning
- Drs. M.N. Mansyoer, Head of Region III for SulSel Projects
- Mr. Supriyono, Staff of Mr. Mansyoer
- Ir. Geovani Wiyarto, Head of Region II for NTB Projects

### Directorate of Irrigation II (DOI-II)

- Ir. Sakdoen, Director of Irrigation II
- Ir. Tjetjep Soedjana, Head of Subdirectorate of Groundwater Development
- Ir. Umar Effendy, Staff, Subdirectorate of Groundwater Development

### Directorate of Logistics

- Ir. Soeparmono, Director of Procurement

### Harza

- Eric Will, Chief of Party

### OECD

- Hisao Tanimoto, Deputy Chief Representative/Project Engineer

## **USAID/JAKARTA**

- David Merrill, Director
- Lee Twentyman, Deputy Director
- Marcus Winter, Chief, ARD
- Graham Kerr, Chief, RRM/ARD
- Curtis Christensen, Controller
- Herbert Blank, SSIMP Project Officer
- Suzanne Siskel, SSIMP Staff
- Gunawan Widjaja, SSIMP Staff
- Joes Oemarhamzah, SSIMP Staff

## **NTT Province**

### **Public Works**

- Ir. Sabbichis Rasjidi, Head of Provincial Public Works
- Ir. Heru Mashudi, Head of Provincial Water Resources Subdivision
- Ir. Ismara P. Sihombing, Project Manager for Groundwater Development Project (P2AT)
- Ir. Abraham Rasmad, Planning Assistant, P2AT
- Ir. Kendil Maryono, P2AT
- Mr. Martono, P2AT
- Mr. Hengki Hurind, P2AT

### **Harza**

- Don Adolphson, Hydrologist
- Martin Wright, Agriculturalist

## **South Sulawesi**

### **Public Works**

- Ir. H. Abd. Yantahin Dipl. H.E., Head of Provincial Water Resources Division and SSIMP Project Manager

### **Surface Systems**

- Ir. H. Syamsul Arida, Sub-Project Manager, SSIMP
- Ir. Drs. Suwarno, Project Coordinator (Predesign)
- Ir. Soeprapto B., Project Coordinator (Detail Design)
- Ir. Karel Paranoan, Senior Irrigation Engineer
- Drs. Abd Wahab, Economics/Social Science Specialist/Administrator
- Mr. Said Fatah BA, O&M staff

### **Groundwater Development**

- Ir. Soetedjo, Project Manager of Saddang-Maloso/P2AT-Wajo-Bone Sub-Project Manager
- Ir. Triharjun Ismaji, Chief, Saddang-Maloso staff
- Ir. Edy Sanusi, Geo-Hydrology Supervisor, Wajo-Bone Sub-Project

**Local Consultants—representative of:**

- P.T. Dacrea
- P.T. Airstan
- P.T. Parimac
- P.T. Indec
- P.T. Seecons

**Harza**

- Dennis H. McCandless, Team Leader
- Noel Corcoran, Civil/Irrigation Engineer
- Carol Hetler, Social Scientist
- Heru Sekti, Hydraulic Engineer
- Salahuddin Gani, Civil Engineer

**NTB Province**

**Public Works**

- Ir. Gatot Soenarjo, Head of Provincial Public Works
- Ir. H. Masnun, Head Provincial Water Resources Division

**Surface Water**

- Ir. Wahyu Djoko Marjanto, M.Sc., SSIMP Coordinator
- Ir. Kartabrata, Chief of Irrigation Section
- Ir. Gde Sudanta, Chief of Design Section/Embung Project Manager
- Ir. Danang Djojo, Kalimantanong Project Manager
- Ir. Bambang Ratmoko, Technical Assistant
- Ir. Pudji Hastowo, Batujai Surabaya
- Ir. Abas, SSIMP Counterpart

**Groundwater Systems**

- Drs. Soenyoto, MNRM, Project Manager of P2AT-NTB
- Ir. Kadarisman, Sub Project Manager of P2AT-Sumbawa

**Local Consultants**

- Ir. Santoso, Mettana
- Mr. Artama Sukarno, Geo Survey

**BAPPEDA**

- Mr. Lalu Para Mahardan, Chief of Regional Planning and Development

**Herza**

- Jeffery Frey, Team Leader
- Robin Erickson, Economist
- W.J. Schoenleber, Irrigation Engineer
- Ir. Terry Harianto, Irrigation Engineer
- Ir. Pamudji Rahardjo, Hydraulic Engineer
- Ir. Soekardi, Hydrogeologist

# **B**

## **LIST OF SITES VISITED**

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### **NTT Province**

- **Lukman Barat**
- **Lukman Timur**
- **Pukdale I**
- **Pariti I**
- **Pariti II**

### **South Sulawesi Province**

- **Salomekko**
- **Ponre-Ponre**
- **Raja Telaga**
- **Selli Coppobulu**
- **Awo**
- **Groundwater candidate sites in Sidrap**

### **NTB Province**

- **Kalimantong II**
- **Tiu Kulit**
- **Gapit**
- **Batujai Kiri**
- **Sape (groundwater sites)**
- **Sumi (groundwater sites)**

# C

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