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IMPLEMENTATION COMPLETION REPORT
(CPL-35880; SCL-3588A; SCPD-3588S)

ON A

LOAN

IN THE AMOUNT OF US\$ 54.0 MILLION

TO THE

GOVERNMENT OF REPUBLIC OF INDONESIA

FOR THE

GROUNDWATER DEVELOPMENT PROJECT

June 23, 2000

Rural Development and Natural Resources Sector Unit
East Asia and Pacific Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective As of December 1999)

Currency Unit = Rupiah (Rp.)

Rp. 1 million = US\$ 142.86

US\$ 1.00 = Rp. 7,000

WEIGHT AND MEASURES

Metric System

FISCAL YEAR

April 1 - March 31

ABBREVIATIONS AND ACRONYMS

AEDB	Agro-Economic Data Base	ITTW	Intermediate Technology Tubewell Facility
BAPPEDA	Provincial Development Planning Agency	LCO	Local Community Organizer
BAPPENAS	National Development Planning Agency	MPW	Ministry of Public Works
DGFCA	Directorate General for Food Crops Agriculture, MOA (The former DGFCH)	MOA	Ministry of Agriculture
		MSRD	Ministry of Settlement and Regional Development
DGFCH	Directorate General for Food Crops and Horticulture, MOA	O&M	Operation and Maintenance
DGWRD	Directorate General of Water Resources Development, MPW (The former DGRD)	OED	Operations Evaluation Department
DGRD	Directorate General for Rural Development, MSRD	PRA	Participatory Rural Appraisal
DLRD	Directorate of Land Rehabilitation and Development, MOA	PRAS	Provincial Agriculture Services
DOI	Directorate of Irrigation	PRIS	Provincial Irrigation Services
DTW	Deep Tubewell Facility	PAT	Sub-Directorate in Central Level for Groundwater Development
ERR	Economic Rate of Return	P2AT	Provincial Groundwater Development Project
FAO/CP	FAO/World Bank Cooperative Programme	QAG	Quality Assurance Group
FRR	Financial Rate of Return	SAR	Staff Appraisal Report
FWG	Farmer Women Group	SID	Survey, Investigation and Design
GWDP	Groundwater Development Project	STW	Shallow Tubewell System
GOI	Government of Indonesia	WATSAL	Water Sector Adjustment Loan
IIC	Interagency Irrigation Committee	WID	Women in Development
ISSP	Irrigation Subsector Project	WUA	Water Users' Association

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INDONESIA

IMPLEMENTATION COMPLETION REPORT

THE GROUNDWATER DEVELOPMENT PROJECT (LOAN NO. 3588-IND)

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<i>Project ID:</i> P003999	<i>Project Name:</i> GROUNDWATER DEVT.
<i>Team Leader:</i> Ilham Abla	<i>TL Unit:</i> EACIF
<i>ICR Type:</i> Core ICR	<i>Report Date:</i> June 23, 2000

1. Project Data

Name: GROUNDWATER DEVT.

L/C/TF Number: CPL-35880;
SCL-3588A;
SCPD-3588S

Country/Department: INDONESIA

Region: East Asia and Pacific
Region

Sector/subsector: AI - Irrigation & Drainage

KEY DATES

	<i>Original</i>	<i>Revised/Actual</i>
<i>PCD:</i> 02/25/91	<i>Effective:</i> 05/16/93	07/06/93
<i>Appraisal:</i> 07/15/92	<i>MTR:</i> 08/01/96	01/17/96
<i>Approval:</i> 04/13/93	<i>Closing:</i> 12/31/99	12/31/99

Borrower/Implementing Agency: GOI/DGWRD, DGPCA

Other Partners:

STAFF	Current	At Appraisal
<i>Vice President:</i>	Jemal-ud-din Kassum	Gautam Kaji
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2. Principal Performance Ratings

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HL=Highly Likely, L=Likely, UN=Unlikely, HUN=Highly Unlikely, HU=Highly Unsatisfactory, H=High, SU=Substantial, M=Modest, N=Negligible)

Outcome: U

Sustainability: UN

Institutional Development Impact: M

Bank Performance: U

Borrower Performance: U

QAG (if available)

ICR

Quality at Entry: U

U

Project at Risk at Any Time: Yes

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:

The major objective of the project was to develop groundwater irrigation in less developed regions in eleven provinces to help alleviate hard-core poverty. Further objectives were to promote the multipurpose use of groundwater resources; develop least cost, appropriate technology that can be sustained by user groups with minimal public sector support; enable full beneficiary participation in development and operation and maintenance (O&M) of groundwater irrigation systems, and assist the Government of Indonesia (GOI) in strengthening its planning and implementation capacity for groundwater development.

3.2 Revised Objective:

After a slow start, project performance rapidly deteriorated due to a multitude of problems. The most important of these were significant cost overruns in groundwater exploration and the construction of wells, poor/untimely procurement of equipment, and development of wells with low water outputs. The Bank seriously considered closing down the project in 1996. After lengthy discussions with GOI, it was agreed to restructure the project and continue drilling activities in only two provinces (East Java and South Sulawesi) where project implementation had least problems with significant up-front investment commitment, proven groundwater aquifers and responsive farmers. As a result of the decision to concentrate on two provinces, the main focus of the project shifted to achieving economic and technical success with less emphasis on helping to alleviate hard-core poverty in less developed regions.

3.3 Original Components:

It was envisaged that the project would finance all activities related to tubewell development from initial surveys to full operation, including two years of O&M support. Major components included: (a) survey, investigation and design; (b) construction of Deep Tubewell (DTW) and Intermediate Technology Tubewell (ITTW) systems serving about 25,000 ha; (c) initial O&M support for two years after commissioning of tubewell systems; (d) provision of domestic water supply and home garden irrigation facilities; (e) agricultural development activities, including strengthening of extension services; (f) community support, including training and strengthening of Water Users' Associations (WUAs) and activities related to the role of women; and (g) institutional support for design, implementation, supervision, and monitoring and evaluation of project performance. Technical assistance was provided to support the above activities. The project would also strengthen groundwater monitoring networks by construction and equipping of observation wells, providing water quality monitoring equipment, and training for PRIS (Provincial Water Resources Development Service) staff on groundwater resources monitoring.

Although the components were reasonably related to achieving the project's main objective of helping to alleviate hard-core poverty, its design did not take sufficiently into account the lessons learned in prior projects in the water sector in Indonesia. The first shortcoming was the ambitious scope of the project which envisaged tubewell development in too many places and provinces at the same time. This was compounded by the fact that some of the poorest provinces were remote and institutions were weak. Moreover, the implementation agency's administrative and financial management capacities were insufficient to adequately address the lessons learned under the ISSP II (Ln. 2880-IND) groundwater component, in particular: (a) the combining of exploration and pilot tubewell development to lead rapidly to full development, was not sufficiently applied; (b) supervision of construction was not properly organized and quality control was lacking; (c) the procured equipment was not accurately specified and the quality was generally poor; (d) community participation and WUA training was insufficiently strengthened; and (f) monitoring and evaluation of development impact was inadequate. Also the very low economic rate of return (ERR) in previous projects, particularly in the outer islands, should have been an early warning that the proposed high cost design would not be economically feasible.

Institutional Arrangement. The main implementing agency for irrigation and drinking water supply works were PAT in central level, and P2AT in provinces. The agriculture component was implemented through DLRD, Ministry of Agriculture in central, and PRAS in provincial level. Bappeda was supposed to coordinate the activities in provinces, and Bappenas in central level. PRIS would be responsible for supervision and technical support for the O&M of completed tubewells system after the initial O&M support by P2AT. In East Java province, groundwater monitoring and management is under responsibility of the PRIS.

3.4 Revised Components:

Following poor technical performance in the early years of implementation and expected low economic rate of return in most project provinces, the project was rescoped and components revised in 1996, as follows: (a) cancellation of new drilling in nine out of 11 provinces and reduction of the area under tubewells from 24,650 to 10,600 ha; (b) reduction of the total number of tubewells from 2,140 to 925; and (c) installation of new tubewells only in East Java (100 units covering 3,000 ha) and an additional 20 units in South Sulawesi. In the remaining period, focus was centered on rescuing and improving committed investment. The successful rate of well drilling then increased from 50-60% before restructuring, to above 80%.

3.5 Quality at Entry:

The Quality Assurance Group (QAG) - in their Rapid Supervision Assessment FY99, and the ICR team both concluded that the quality at entry was unsatisfactory. The QAG concluded that the project design had some technical and major institutional shortcomings, and that lessons learned during previous irrigation development projects do not appear to have been taken into consideration.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

The project's outcome is unsatisfactory. By restructuring the project and cancelling groundwater development in the poorest Eastern outer islands, the major objective to alleviate hard-core poverty in less developed regions has not been fully achieved. Also, the secondary objective of developing groundwater resources with least cost appropriate technology was only partially achieved, as it is now evident that the majority of farmers' groups are only partially capable technically and financially taking on the responsibility for full maintenance and eventual replacement of the highly technical and costly DTW systems. Although the responsibility for regular O&M has been formally handed over to the WUAs, the public sector continues to provide substantial support for major repairs, well redevelopment and pumpset renewal. During implementation, the project did not follow a participatory approach rigorously and beneficiaries' involvement in well siting and development has been limited. The ERR is estimated at 5%. Nevertheless, in those areas where new wells have been constructed, the project has had some positive impacts, mainly: (a) employment and income generation through increased agricultural production including high value crops; (b) provision of domestic water, thus improving water availability during dry season; (c) increased food security; and (d) benefits generated by participating farmers from home garden activities.

4.2 Outputs by components:

Project components will be discussed and separate evaluations will be made of the physical and institutional outputs based on original and revised targets.

Survey, Investigation, Design (SID). The SID activities relate to the site and facility selection screening process and planning and design of irrigation facilities. A major objective of the SID activities was to evaluate the technical, social and economic viability of each proposed development area. During the first

two project years, technical expertise and budgets were insufficient to carry out proper investigations, while procurement was continued and approved by the Bank. Combined with a lack of an agro-socio-economic feasibility assessment (and hence a dominance of technical considerations in site selection), this resulted in a high failure rate of boreholes and the location of wells in the wrong places. SID activities improved thereafter when an inter-agency site selection procedure was instituted, taking account of earlier mistakes. The most important improvement was the introduction of a geo-electrical survey combined with the drilling of exploratory wells. During this process, potential groundwater areas were identified which can still be used in future groundwater development. However, by the time the inter-agency procedure was begun the majority of the wells (of the restructured and downsized project) had already been drilled and the negative effects could not be corrected.

The tubewell design was changed during the mid-term review. The new design was a compromise between the conventional DTW and ITTW designs, which allowed for the installation of a variety of pumps, including submersible pumps, to suit different groundwater conditions. In parallel, a standard exploratory well was designed which could be developed as a production well if the yield was found to be sufficient. The new well designs were applied from FY97 onwards with satisfactory results.

In the Staff Appraisal Report (SAR), the potential irrigable area was based on a discharge at the well head of 1 l/sec/ha. This was a conservative estimate and it was suggested to monitor and evaluate existing tubewell systems to establish if the design assumptions could be modified to make the investments more economical and socially beneficial. Combined with an analysis of project observations it was concluded that a well head discharge of 0.85 l/sec/ha is acceptable for most (upland) crops, given the lower number of pumping hours observed in the field. The design assumption estimated in the SAR of at least 1 l/sec/ha at the well head remains valid for paddy and sugarcane.

Intermediate Technology Tubewell Facilities. The original SAR target was reduced after project restructuring from 1,865 units to some 680 units. Although this revised target was achieved, only about 480 units (70%) have become successful (delivering 5 l/sec or more). It is estimated that the average actual water yield per successful unit is about 9 l/sec but could increase to 10 l/sec with installation of appropriate pumps. This brings the potential total water yield for the project to 4.8 m³/sec as compared to 18.65 m³/sec as stated in the SAR, and 70% of the revised target of 6.8 m³/sec. However, with about 20% of the pump sets not functional, the present estimated water yield is 3.6 m³/sec, sufficient to irrigate only about 4,200 ha as compared to 18,650 ha, as stated in the SAR and about 60% of the revised target of 6,800 ha. The potential area could increase to about 5,600 ha if all pumpsets were in good working condition. A program is underway to replace the poorly performing pumpsets initially procured under the project and about half the sets have been replaced by more robust models.

Deep Tubewell Facilities. The total number of DTW units remained unchanged at about 240 after project restructuring. This target was achieved although only about 200 units (80%) have been successful (delivering 10 l/sec or more). It is estimated that the average actual water yield per unit is about 18 l/sec as compared to 20-30 l/sec as stated in the SAR. Pump tests reveal that the average yield could be increased to 26 l/sec if more efficient pumpsets were used. With about 10% of the pumpsets not functional, the present estimated water yield is 3.2 m³/sec, sufficient to irrigate about 3,800 ha or about 65% of the 6,000 ha appraisal estimate. The potential irrigable area could increase to the appraisal estimate of 6,000 ha if all pumpsets were in good condition and more compatible with existing well conditions.

Water User Groups. After a tubewell has been successfully tested, then the process of Water User Association (WUA) formation took place. Member of the WUA are farmers who were involved during consultation in the site selection process. Despite the formation of the WUA is under P2AT assistance, the

guidance to this group were given by both P2AT and PRIS. By loan closing date about 543 WUAs have been established, covering project command areas. About 800 training courses have been delivered to the WUAs, however the activities of the WUA is really depend on the tubewell's performance.

Initial O&M Support. The project was designed to support O&M for two years after commissioning of the facilities. During that period, beneficiaries were to pay a service fee to the WUAs to build up a cash reserve for future O&M and pump set replacement. Initial project support for O&M has been highly variable and even negligible in certain areas. Farmers pay the difference, particularly when pumpset production is adequate. Accumulated savings vary widely per WUA and amount to Rp.0.3 million to Rp.1.8 million. The water service fee set and paid by farmers varies from one site to another (Rp.1,500/hr to Rp.7,500/hr) depending on tubewell or pump type and on members' agreement. The present level of water service fees is often not totally sufficient for sustaining full levels of maintenance and repairs (including replacement) once the facilities are handed over to the farmers. Recently committed decentralization policy initiatives by the GOI would lead to discontinuing the present practises of continued public support for heavy maintenance and pumpset replacement, and thus would support transfer of financial responsibility for O&M to the users.

Domestic Water Supply. The SAR did not set specific targets for the installation of domestic water supply systems as this would depend on demand from the local communities. About 45 water tanks were constructed under the project serving about 20,000 people. However, field observations suggest that not all water systems are functioning. Generally, no water user fee is applied and the beneficiaries consider domestic water as a free good. In many schemes the construction was in response to a pressing need for domestic water supply.

Home Garden Irrigation. It was envisaged that the project would demonstrate that additional income could be provided to the rural poor by developing irrigation for home gardens. Over 590 demonstration plots have been constructed under the project, or about 61% of the original target. Despite the enthusiasm shown by women in managing demonstration plots, vegetable production has not been significantly increased because the emphasis has shifted from home garden to larger scale.

Agricultural Development. The overall outcome of this component has been satisfactory. Once the irrigation system were in place, and facilities and equipment functioning well, farmers quickly realized the potential of irrigated agriculture and about 7,000 ha out of a potential of 8,000 ha have been developed for irrigated farming. Agricultural development initiatives have been conducted as an integral part of the national extension service. Activities were concentrated on community empowerment and irrigated crop development. Related activities included training in water management, land management, and agro-support services. Demonstration plots have been widely and effectively used. The project provided post-harvest materials, taxi-pumps and production inputs. Cropping intensities have increased substantially, although there are great variations between areas. Crop yields are estimated to have increased by about 20-40%. The Directorate General for Food Crops and Horticulture (DGFCH) has provided considerable support to the introduction of high-value crops in irrigated crop rotations. However, in terms of overall land used under high value crops, the impact is still limited.

The project supported a pilot program of shallow tubewells (STWs) as supplementary irrigation to about 500 ha of lands using some 250 taxi-pump sets. This program became very popular amongst farmers and by the end of the project, some 600 units had been procured and distributed freely to farmer groups, covering a command area of approximately 3,000 ha of which about one-third can be irrigated at one time.

Community Participation Support. The project has been active in training leaders of Water Users' Associations, Farmer Women Groups and Local Community Organizers. Gender focal points were designated to work with women's groups with assistance from a Women in Development (WID) specialist. However, the focal points were not maintained as staff moved out or were transferred or promoted, resulting in a marginalization of women's activities. Nevertheless, positive changes in women's involvement have been observed under the project, the results in East Java being the most promising.

Institutional Support. The project aimed at strengthening institutional performance, primarily for non-construction tasks such as inter-agency coordination, agricultural development, and monitoring and evaluation of the performance of completed works. Office facilities, transportation, equipment and training were provided under the project as planned.

Groundwater Resource Management. The project supported the PRIS taking responsibility for monitoring and evaluation of groundwater resource data. This activity was initiated as a pilot operation in East Java. A Groundwater Resource Management Unit was set up and monitoring of groundwater levels is being carried out in some 300 observation wells in East Java. The program has yet to be expanded to the other provinces. A monitoring database has been established, including associated computer equipment and staff training. Because of lack of operational software, operating budget and functional assignment and capabilities and analytical skills of staff, it is questionable if the unit will be capable of doing more than data collection in the foreseeable future. However, in conjunction with the currently on-going GOI water resources sector reform activities under the WATSAL, it is envisaged that the data collection modules established under the project would be absorbed into a national integrated MIS for improved management of surface and groundwater resources.

Consultancy Services. The project employed two international consultants to assist the two lead agencies with project implementation and institutional capacity building. Unfortunately, consultants were mobilized one year behind schedule when project activities had already been initiated. Coordination between the DGWRD and DGFCH consultants improved over time. Due to budget limitations, consultants did not always spend sufficient time in the field. Although the input of technical assistance was reduced during project restructuring, its cost still represents a considerable overhead

4.3 Net Present Value/Economic rate of return:

The overall impact of the project has been re-evaluated, and the economic rate of return (ERR) re-estimated using updated prices, final project costs, and data and information on cropped areas, cropping intensities, crop yields and inputs. The monitoring and evaluation component of the project was inadequate, and complete findings of the Impact Study were not available. Data used in the analysis are based primarily on the Agro-Economic Data Base (AEDB) collected by the project staff. Detailed information on these analyses and assumptions is given in Appendix B.

The ERR was re-estimated at 2.5% as compared with 14.5% estimated in the SAR. The low ERR is primarily due to: (a) lower than expected discharge per pump unit, thus smaller area under irrigation; (b) about 35% higher unit costs for tubewells; and (c) slower realisation of expected agricultural production due to implementation difficulties in early years. To allow comparison with the SAR's estimate, the 2.5% ERR has been based only on the incremental irrigated areas generated from the DTWs and the ITTWs. When benefits from STWs and other benefits such as domestic water and home garden vegetables are included in the benefits stream, the ERR rises to about 5%. On a model basis including only direct costs, the ERRs of DTW and ITTW units have been re-estimated respectively at 10% and 15% based on: (a) crop yields, cropping intensities, and cropping patterns prevailing during the project; (b) current 1999 unit costs; and 3 irrigated areas of 18 ha for DTW and 9 ha for ITTW. The findings indicate that DTW and ITTW

are economically justified on a model basis, but that the overhead costs are too heavy to make the whole project economically viable.

4.4 Financial rate of return:

In line with the SAR, the financial impact on a typical farm household of 0.5 ha holding has been reassessed. The analysis indicates that, on average, the net farm income from an 0.5 ha plot would double compared with the "without project" situation, and the incremental net farm income was estimated at US\$390 compared with the SAR estimate of US\$180, both estimated in 1999 US dollars. The SAR anticipated that farm income would increase by about 200% to 300%. The financial rates of return (FRRs) for DTW and ITTW, on a model basis, have been re-estimated respectively at about 13% and 18% based on the same performance assumption given in the economic models, including satisfactory operation of the pump units. This result reveals that, on a model basis, financially: (a) investment in DTW is at the break-even point; and (b) investing in ITTW is more attractive than DTW due primarily to lower investment cost.

4.5 Institutional development impact:

The project contributed to improving inter-agency coordination, in particular at the district and sub-district levels. The institutional performance of DGFCH has improved and has contributed to the favourable response to irrigated farming. However, improvement of the institutional performance of the Directorate General of Water Resources Development (DGWRD) has been limited in particular in the field of monitoring and evaluation of completed works, as has been the case in other projects in the irrigated agriculture sub-sector.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

The Asian financial and monetary crisis came towards the end of the project period and had little effect on the bulk of implementation. It constrained implementation progress of the last two project years. The Bank helped to cushion this adverse impact by increasing disbursement percentages, thus giving additional budget support for the revised program

5.2 Factors generally subject to government control:

Factors generally subject to Government Control. Several factors generally under government's control adversely affected the project. First, the implementing agencies were re-organized in 1994, after which - responsibility of project supervisory and guidance was distributed to regional directors instead of under PAT alone - causing additional problems in project management and coordination. Combined with late appointment of consultants, this caused difficulty in preparing acceptable integrated annual work plans, related cost estimates and budget requirements. The appointment of full-time project coordinators improved inter-agency coordination at the national level, while the establishment of provincial and district working groups improved coordination at those levels. Second, late release and in particular shortage of a national budget for SID activities was a constraint over most of the project life. The late release is an annual event due to the mismatch in timing of the government's fiscal year and the annual dry season implementation period for civil works. Finally, the weak institutional capacity of implementing agencies which was not properly addressed in project design, was an impediment to overall project progress.

5.3 Factors generally subject to implementing agency control:

The following factors affected project execution. First, late employment of project consultants caused delays in project start-up. Those delays occurred because of generic issues in the general conditions of contract and slow evaluation procedures. Consultants were mobilized in October 1994, more than one year

behind schedule, instead of in September 1993 as agreed in the Loan Agreement. Second, shortcomings in SID have caused poor results, particularly during the first two project years. Third, inadequate supervision (and lack of accountability) and procurement difficulties were serious problem areas that should have been under the control of project management. Failure to address problems early on has had a lasting negative impact on project implementation. Fourth, insufficient coordination between the implementing agencies and lack of dialogue with the potential project beneficiaries, resulted in poor site selection and scheduling of activities implementation.

5.4 Costs and financing:

Because of downsizing of the project, costs are significantly lower than expected at appraisal. The total project cost is Rp.114.6 billion, representing about 66% of the SAR estimate. In US dollar terms, the total cost is US\$34.2 million (using year-by-year weighted average exchange rates), or 40% of the SAR estimate. Because of an increase in disbursement percentages, in response to the onset of the general economic crisis in 1998, the IBRD loan financed US\$26.3 million or 77% of the total cost, compared to a SAR estimate of 63%. The gross unit cost amounts to US\$4,300 per ha against an appraisal estimate of US\$3,200 estimated in 1999 constant prices. The higher than expected unit cost should mainly be attributed to inefficient project implementation.

6. Sustainability

6.1 Rationale for sustainability rating:

Based on experience with previous projects in the sub-sector, it is likely that the project sustainability will be highly variable across the project areas and would only be partially attained for the achievements generated. Factors affecting sustainability include: (a) technical viability: likely high maintenance costs due to poor quality of equipment and construction works will negatively affect sustainability; (b) diminishing government support: although the present policy of public sector support in case of heavy maintenance and pump replacement positively affects sustainability, the current intention of the GOI for decentralization and management transfer to farmers make it less likely that this will continue in future but sustainability would be continued or further established at locations where water availability is critical and value-added potential is highest; (c) varied functional strength of WUAs: although there are strong WUAs created under the project, the remaining ones are less advanced and rely more on government support; and (d) irrigation service fee levels: these are collected to cover normal O&M but are often not sufficient to fully build up savings for major repairs and pump replacement. Generally, pump units were in poor condition and GOI transferred only the O&M and not the assets, to WUAs.

6.2 Transition arrangement to regular operations:

The project is expected to make transition arrangements to regular operation, in particular: (a) completion of outstanding remedial works and hand over of regular O&M to the remaining WUAs, which will be formalized and legalized; (b) provision of inputs for the continuation of the groundwater resource management program in East Java and eventual replication of this program in other groundwater provinces; (c) continued provision of guidance to farmer-beneficiaries with respect to irrigated agriculture, in particular, high value crop selection and certified seed production; (d) promotion of community empowerment, including collective marketing arrangements; and (e) continued guidance on tubewell management, including the collection of fees, and other physical and administrative aspects of water distribution. A list of performance indicators by which the project can be monitored is shown in Annex 1. No further Bank involvement is proposed at this time, although the QAG review panel of July 1999 did discuss post-loan supervision as a means to monitor GOI commitment. Further groundwater development preferably should be handled by the private sector, with government's input limited to an advisory role.

7. Bank and Borrower Performance

Bank

7.1 Lending:

During identification, the Bank took account of the project's consistency with government's development strategy and priorities and with the Bank's assistance strategy of the country. An important consideration was that in some areas (particularly the Outer Islands) groundwater is the only viable source of water and has to be used to achieve significant increases in agricultural production. Lessons learned from previous projects were recognized and discussed with government during the preparation phase. Of particular concern were: (a) the limited institutional capability of the implementing agencies; (b) the strong focus on exploration and implementation (expenditure) activities and lack of priority with respect to accountability for performance (quality control) and post-construction activities (achieving benefits, O&M and monitoring of existing groundwater development); (c) the need for full participation of communities in all stages of the development process; and (d) ineffectiveness of technical assistance to train and transfer knowledge and experience to government staff. However, practical solutions to resolve these issues have not adequately been formulated in the final project design. In spite of lessons drawn from earlier experience, the Bank agreed to government's request to include all provinces with proven groundwater potential which were not supported under ongoing donor supported projects, thus increasing the geographical spread, and making management more complex. Given these considerations, Bank performance during preparation has been rated unsatisfactory.

Issues like project complexity, weak institutional capacity of the implementing agencies combined with a pending reorganisation of DGWRD - the main implementing agency, difficulty of Bank supervision because of the geographical spread, and questionable project economic viability were discussed at the appraisal stage. The appraisal team reported that sufficient safeguards were in place and that the project design was adequate to cope with these issues. This turned out to be overly optimistic as the existing culture of focusing on expenditure activities remained the driving force of project implementation. Issues like beneficiary participation and accountability for performance were not given sufficient weight. Bank performance during appraisal has been rated as unsatisfactory.

7.2 Supervision:

The Bank provided regular supervision missions. Refer QAG - Rapid Supervision Assessment in FY 97 and FY 99 and, as the task was initially managed by the Resident Mission, the project received considerable support up to the mid-term restructuring mission in 1996, after which the project was managed from Washington. Project implementation progress was adequately reported and implementation problems were identified early and performance ratings were realistic. Because of early unsatisfactory project implementation and development impact ratings, the mid-term review mission was mobilised at an early stage. Following the mid-term review, the Bank proposed to GOI that the project be essentially closed, but the government did not agree to the proposal. After lengthy discussions with government and a de-facto hiatus in many project activities for several months, a compromise was reached. The compromise resulted in allowing for a major downsizing of project activities by continuing activities only in the least risk provinces. The project has been rated "unsatisfactory" in six of the last eight supervision missions. The task management team has provided appropriate guidance, despite constraints by project design shortcomings in technical and institutional aspects. Bank performance during supervision has been rated satisfactory.

7.3 Overall Bank performance:

Because of the unsatisfactory performance during preparation and appraisal, and poor outcome of the project, overall Bank performance has been rated unsatisfactory.

Borrower

7.4 Preparation:

Borrower's performance during preparation has been unsatisfactory. Although lessons learned from previous projects were recognized, they were not sufficiently incorporated in the project's design. The Government had also insisted that the project cover a large number of provinces, making it unduly complex and less manageable.

7.5 Government implementation performance:

The role of the project's coordinating agency, BAPPENAS, would have been more effective with the presence of a specially assigned coordination unit. Coordination during the first project years remained weak, and responsibility for day-to-day coordination was delegated to DGWRD. This did not provide an effective inter-agency solution and coordination remained a problem. Insufficient local funding was made available for SID activities. Government implementation performance has been rated unsatisfactory.

7.6 Implementing Agency:

Compliance with covenants, progress reporting, and accounts and audits were generally satisfactory. However, the implementation schedules for the first two project years were based on incomplete surveys and inadequate site selection procedures. Moreover, there's delay in engaging the Technical Assistance (TA) and well drilling supervision was deficient. The implementing agency did not meet the requirements of the intended program particularly in the procurement of equipment and materials, by DGWRD. As a result, low quality, under-performing ITTW pumpsets and inferior well screens were delivered. Avoidance of such difficulties would have required timely attention and enforcement of suppliers' performance guarantees. Monitoring and evaluation and beneficiary participation were inadequate. The implementing agency's performance was rated unsatisfactory.

7.7 Overall Borrower performance:

Because of unsatisfactory performance in preparation, and government and implementing agency performance, overall borrower performance has been rated unsatisfactory.

8. Lessons Learned

The main lessons learned from the project, in order of importance, are as follows:

- **Project design must be in line with the implementation capacities of the designated institutions**
The original design was too ambitious and led to serious operational and implementation management difficulties including drastic restructuring. Intended stakeholders must be involved with the conceptualization, planning, design and implementation of project, so as to ensure realistic programs and phasing. In this project, the lack of participatory approaches, full assessment of capacities and roles of GOI, private sector providers and users as well as lack of demand-driven implementation led to faulty siting of many wells, less than optimal adoption and utilization of the technology, procurement of inferior quality equipment and installations.
- **Complex projects with geographically dispersed activities could be more successfully implemented at a more decentralised level** where good coordination and management are more responsive to the needs from the field. For the same reason, supervision would need to be intensified and through the World Bank resident mission to enable on-going interaction between the Borrower and the Bank.
- **Quality control and assurance of tubewells must be rigorously pursued** by project management. Critical structures of tubewells are underground, thus repairs and replacement are difficult after

implementation. Provision should be made for assessment of implementation capacities and that required technical assistance is structured to support such capacity building of client agencies and private sector service providers to assure that industry standard specifications and standards are met. Since the schemes would be managed by farmer groups, selection of pump and engine should incorporate farmers' preference and the availability of spare parts in local market.

- **Government must transfer ownership of equipment and wells to WUA, in addition to O&M responsibility**, after providing adequate guidance and training, and consider the establishing of a locally administered asset replacement fund in order to prolong sustainable operation and management of installed works beyond the expected project period. The transfer of management and assets to users is considered essential to establishing ownership and responsibility for longer term operational sustainability.
- **Successful diversification of crop production depends on obtaining farmers' confidence**; project design should be based on increased productivity from existing crops and the introduction of diversification, new enterprises (i.e. high value crops) should only be made when such modified farming systems are fully developed and accepted through extensive testing and extension support.
- **Intersectoral coordination mechanisms must be established before implementation take place**. This is very important, especially during the site selection process when the potential aquifer, soil suitability and land use are to be overlaid.

It should be noted that although many of these issues were recognised at the time of appraisal based on the experience of previous projects, they were not adequately incorporated into project design and implementation.

9. Partner Comments

(a) Borrower/implementing agency:

1. INTRODUCTION

In response to the request, the Bank sent an appraisal mission to Indonesia in September/October 1992. The mission agreed with GOI: (i) the concept, objectives, and scope of the proposed project; (ii) institutional arrangements; (iii) procedures for coordination at national and provincial levels; and (iv) post-appraisal action. Resulting from this appraisal, the loan agreement for GWDP, Loan 3588-IND, was signed between the Bank and GOI on May 26, 1993, and became effective on July 6, 1993, loan closing date on December 31, 1999.

2. PROJECT BACKGROUND

2.1 Project Objectives

The major project objective was to develop groundwater irrigation in less developed regions to help alleviate hard core poverty. Technical objectives were to promote multipurpose use of groundwater resources and to develop least-cost, appropriate technology that could be sustained by user groups with minimal public sector support.

2.2 Project Components

Project components, as defined for the purposes of the Loan Agreement and together with the concerned GOI executing agencies, were:

Component	Executing Agency
Part A: Surveys, Investigations, & Design	DGWRD, DGFCFA
Part B: Construction of Groundwater Facilities	DGWRD
Part C: Initial Support for O&M of Tubewell Facilities	DGWRD
Part D: Agricultural Development	DGFCFA
Part E: Community Participation	DGWRD
Part F: Institutional/Support	DGWRD, DGFCFA
Part G: Groundwater Resources Management	DGWRD

2.3 Scope of Project Activities

In line with the objectives and components of the project, the scope of project activities included:

- (a) construction of some 1,900 intermediate technology tubewells (ITTWs) to serve about 18,650 ha;
- (b) construction of some 240 deep tubewells (DTWs) to serve about 6,000 ha.
- (c) promotion of multipurpose use of groundwater, in particular domestic water supply and irrigation of house garden plots;
- (d) agricultural development activities;
- (e) strengthening of the involved GOI institutions and their implementation procedures; private sector involvement, through community participation in the project, including establishment of Water Users' Associations (WUAs) and promotion of women's activities;
- (g) monitoring and evaluation of irrigation and agricultural outcomes of the project;
- (h) strengthening the monitoring, evaluation, and regulation of groundwater resources.
- (i) training of GOI staff, and WUA/FWG members and other beneficiaries, in order to fully capture project benefits.

The provinces included in the project were Aceh, North Sumatra, West Sumatra, Lampung, West Java, East Java, Nusa Tenggara Barat, Nusa Tenggara Timur, North Sulawesi, Central Sulawesi, and South Sulawesi.

3. PROJECT ORGANISATION & COORDINATION

3.1 Project Organisation

The project was designed to be implemented under existing GOI organisational structures for groundwater development. The main implementing agency at the national level was Pengembangan Air Tanah (PAT). At the start of the project PAT was a sub-directorate of the Directorate of Irrigation II (DOI-II) of the Directorate General of Water Resources Development (DGWRD) within the Ministry of Public Works (MPW). In 1987, DOI-II was dissolved, and PAT became a sub-directorate under the newly-formed Directorate of Technical Guidance. At the provincial level, PAT interests were the responsibility of the Proyek Pengembangan Air Tanah (P2AT) offices, which operated under the direction of the Provincial Irrigation Service (PRIS). The PAT and P2AT offices would be responsible for planning, design, and construction of the tubewell systems and related works, and for O&M of the completed works during the first two years after completion of well installation. After this period, O&M of the works would become the responsibility of the WUAs to be established under the Project.

3.2 Coordination of Project Activities

Coordination of Project activities, including planning and integration of budget proposals, would

be undertaken at national and provincial levels by BAPPENAS (the national planning agency) and BAPPEDA (the provincial planning bodies) respectively. Through the Project, the Interagency Irrigation Committees (IICs) at provincial, district, and sub-district levels would become oriented more towards groundwater development than in the past, and used as the local coordination mechanisms. In this respect, the district level committee chaired by the district officer (Bupati, or his nominee) would have the most important role.

4. IMPLEMENTATION RECORD & PROJECT COSTS

4.1 Project Period

Project implementation commenced in FY 1994/95, in accordance with the annual work programs outlined in the SAR, and was originally scheduled to be completed by June 30, 1999. Loan closing date was December 31, 1999. Consulting services started on October 1, 1994 and were scheduled to be completed by September 30, 1997. The period of the consulting services was extended twice, initially to March 31, 1999 and subsequently until December 31, 1999, to correspond to revised activity schedules agreed with the Bank.

4.2 Changes in Project Scope

A Bank comprehensive review mission in January/February 1996 estimated that the EIRR of the Project had been reduced to an unacceptably low level.

As a result of this assessment, and after appropriate discussions and consultations, GOI and the Bank agreed to reduce the scope of the Project from FY 1996/97 onwards and introduce procedures to increase the likelihood of eventual success.

4.3 Amendment of Loan

The original loan of US\$ 54.0 million was reduced to US\$ 26.86 million by cancellations of US\$ 18.94 million in February 1997, US\$ 6.00 million in August 1998 and a further US\$ 2.2 million in June 1999. These reductions were mostly resulted from agreed reductions in Project scope.

4.4 Project Costs

Total Project expenditure, estimated on the basis of actual expenditure to FY 1998/99 and projected expenditure up to December 31, 1999 during FY 1999/00, is Rupiah 114.6 billion. This cost is Rupiah 59.5 billion less than the SAR estimate of Rp.174.1 billion and reflects the reduced scope of the Project agreed during the implementation period. Annual expenditures, by Indonesian fiscal year, are shown in the table following.

ANNUAL EXPENDITURES

Unit: Rupiah billion

	94/95	95/96	96/97	97/98	98/99	99/00 (Estimated)	Total
DGWRD	9.10	20.13	17.99	16.03	12.59	12.96	88.80
DGFCH	3.16	4.13	4.74	4.84	5.23	3.74	25.64
Annual Total	12.26	24.26	22.73	20.87	17.82	16.70	114.64
Cumulative Total	12.26	36.52	59.52	80.12	97.94	114.64	

Notes: 1. Expenditures exclude DGWRD administration costs

4.5 Loan Disbursements

Loan disbursements reached US\$ 26.3 million by the end of FY 99/00. Disbursements are

summarized by loan category as follows:

Here under a summary of the loan as of June 20th, 2000:

Categories	USD
1A- civil works	5,155,932.20
1B- civil works	27,142.41
2A- Equipment & materials-B&D	8,346,149.48
2B- Equipment & materials - F&G	197,866.77
3- Survey investigation & design	1,159,083.41
4- Agricultural support	1,248,689.70
5- Institutional support	972,966.64
6- Operation & maintenance	342,152.63
7- Studies	234,169.45
8- Training	1,660,048.94
9- Consultants services	6,951,037.55
Sub-Total disbursed	26,295,239.18
Sub-Total canceled	27,140,000.00
SA to be reimbursed	452,381.57
Balance	112,379.25
Total LOAN	54,000,000.00

NB: The SA will be reimbursed and the final cancellation for closing should be USD 564, 760.82

5. ACHIEVEMENT OF PROJECT OBJECTIVES

5.1 Implementation Constraints

The major constraints encountered during Project implementation that arose from factors outside the control of the Project were: the economic crisis in late 1997, the 1997 drought prompted GOI to mount a number of agricultural crash programs, restricted capacity of institutional and agricultural support services.

5.2 Resolution of Specific Problems

Resolution of early problems concerning site selection and tubewell design were critical to the shape of the restructured Project and to subsequent Project achievements. Several aspects have been reviewed accordingly such as: tubewell site selection procedure, to carry out geo-electrical survey and tubewell design.

Accordingly, the Bank comprehensive appraisal mission of February 1996 suggested that one design of tubewell should be adopted for all GWDP areas. This design would be a compromise between the conventional DTW and ITTW design, and significantly would allow installation of a variety of pumps, including submersible pumps, to suit a variety of groundwater conditions.

In parallel with this re-design of production wells, a standard exploratory well was designed, the significant feature of which was that it could be developed as a production well if the yield was found to be sufficient.

5.3 Physical Achievements

Major physical achievements are summarised in the table below.

SUMMARY OF MAJOR PHYSICAL ACHIEVEMENTS

Item	Unit	Original SAR Target	Revised Target	Achievement
Tubewells (DTWs & ITTWs)				
Deep tubewells (DTWs) installed	no	243	245	245
Intermediate technology TWs (ITWs) installed	no	1865	680	680
Pump discharge at commissioning	ltr/sec	24,650	10,588	10,038
Shallow Tubewells (STWS, 'Taxi Pumps')				
Taxi pumps procured & utilised	no	250	n/a	584
Domestic Water Supply (DWS) from TWs				
DWS systems installed	no	n/a	48	44
Irrigation Demonstrations				
Field demonstrations conducted	no	1,940	1,265	1,793
House garden demonstrations conducted	no	970	401	591
Agricultural Training				
GOI staff trained	no	286	484	577
Farmer WUA courses held	no	10,000	1,135	803
FWG courses held	no	n/a	n/a	471
WUA/FWG Leaders & LCO courses held	no	n/a	n/a	219
Taxi pump courses for farmers held	no	250	162	75
Groundwater Monitoring				
New observation wells constructed	no	120	50	31
Observation wells monitored (new + existing)	no	120	100	105

Agricultural Production

The achievements outlined in the preceding paragraphs have resulted in increases in agricultural production which are summarised in the table following.

SUMMARY OF AGRICULTURAL ACHIEVEMENTS

Item	Unit	Pre-Project (per SAR)	Original SAR Target	Achievement
Crops & Areas				
Padi (wet season)	Ha	19,995	22,970	10,038
Padi (dry season)	Ha	916	9,906	7,528
Palawija	Ha	17,304	29,074	5,019
T.B.D.	Ha	200	6,630	3,011
Cropping Intensity				
Cropping Intensity	%	155%	278%	255%
Average Crop Yields				
Padi	T/ha	3.0	4.8	5.1
Soybean	T/ha	0.8	1.3	1.3
Maize	T/ha	1.8	3.0	4.5
Groundnut	T/ha	0.7	1.2	1.3
Shallot	T/ha	n/a	7.0	7.5
Chilli	T/ha	n/a	4.5	4.8

Consulting Services

Consultants have been engaged to assist GOI in Project implementation according to TORs agreed with the Bank. Utilisation of the consultants, in terms of professional man-months used, was as shown in the table overleaf.

CONSULTING SERVICES**Unit: Man-Months**

		SAR Estimate	Original Contract	Revised Contract
DGWRD	Foreign	164.0	164.0	103.0
	National	528.0	528.0	308.0
DGFCH	Foreign	130.0	127.0	102.5
	National	396.0	396.0	329.7
Total	Foreign	294.0	291.0	205.5
	National	924.0	924.0	637.7

5.4 Economic Achievements

In view of the Bank's concern over the possible low return on Project investment, which led to the agreed reduction in Project scope from FY 1996/97, efforts have been made during preparation of this report to assess the actual return in detail. Two stages analysis carried out in November and December 1999.

The achieved return is 39.6% (November) and 19.1% (December).

6. REMAINING & FUTURE WORKS**6.1 DGWRD Remaining & Remedial Works**

In order to rectify shortages and deficiencies in TW installation and performance, and as agreed with the Bank during the April/May 1999 review mission, a program of completion and remedial works is in hand during FY 1999/00. The works being undertaken comprise of redevelopment/cleaning of tubewell, construction of remaining pump house and distribution system, procurement and installation 47 electric submersible pump.

6.2 Procurement and Installation of 47 Electric Submersible Pumps

Following the Bank NOL in August 1999, the Contract has been signed on September 15, 1999. The Caprari electric submersible pumps which is made in Italy were arrived in Tanjung Priok / Jakarta on 1 December 1999 for further testing and resetting at P.T. Indopump Lestari Warehouse in Bandung and have been completed on 10 February 2000. In the meantime those pump already tested has been sent to the project sites directly.

Installation of the above pump in each projects area would be carried out soon after received at site and at the latest by end of March 2000, as committed by DGWRD.

6.3 Post-Loan Operation Plan

The joint DGWRD/DGFCH Post Loan Operational Plan includes the following items:

DGWRD Activities, such as : formation of remaining WUAs, completion of the outstanding of remedial works, initial O & M and continuation of the groundwater resources management in East Java.

DGFCH Activities, such as : provision of guidance of beneficiary of agriculture development, promotion community empowerment and tubewell management.

Joint DGWRD/DGFCH Activities, such as : liaison with the WUAs to ensure O&M fee are collected, and provision of guidance O & M of TW system.

7. ASSESSMENT OF PROJECT OUTCOME & LESSONS LEARNED

7.1 Assessment of Project Outcome

Although progress during the early years of the Project did not meet expectations, it is considered that the restructuring initiated during the February 1996 comprehensive review mission proved successful and that the outcome of the Project was satisfactory, in terms of both return on investment and achievement of major socio-economic objectives.

The geo-electrical surveys carried out as part of the restructured Project procedures have identified some 176,000 ha of potentially productive aquifers spread over 9 provinces. This finding indicates that further groundwater development may be feasible and is a satisfactory outcome of the Project.

Project outcome with respect to improved coordination between GOI agencies is less satisfactory. The Project has not yet achieved the ambitious targets set relating to community participation, particularly with regard to community take-over of O&M responsibilities.

7.2 Special Study of Impact of GWDP

The overall conclusions of the study were that cropping intensities, yields, and net farm incomes were higher in the newly-irrigated areas, and that there was no evidence of negative environmental impacts (such as permanent lowering of the groundwater table and saline intrusion) resulting from the Project.

7.3 Future Uncertainties

In the longer term, the foundation for Project sustainability is the willingness and capability of the WUAs to take responsibility for operation and maintenance of the irrigation systems.

7.4 Lessons Learned

Technical Lessons

The "go-ahead" schemes were identified on the basis of incomplete hydro-geological information, and the need for more positive identification of groundwater locations was not appreciated. The aquifers in Indonesia are generally found in local pockets and do not cover extensive areas. Hydrogeological characteristics also vary within short distances. Intensive prior investigation work, including drilling of exploratory wells, is necessary to ensure the best chance of satisfactory aquifer yields.

Taxi pumps have many advantages over fixed pumps and should be used wherever possible. These advantages include no detailed survey, easily procured and setup, simple low capital O&M.

Socio-Economic Lessons

Establishment of WUAs would be better handled by DGFCH, so that foundations are laid for long-term interaction between field PRAS staff and the beneficiaries. The involvement of PRAS in the commissioning and hand-over of TWs is necessary to ensure sustainability of WUA activities in the post project period.

Community participation is a key factor in ensuring a successful and sustainable Project outcome, and the participative rather than the instructional approach should be adopted.

A change to high-value crops cannot be achieved in the short term. In this respect Project targets were too optimistic. It has been found that the key ingredient for such a change is farmer confidence, which can be promoted only to a limited extent by demonstrations and training. It is more realistic to plan on a two-stage approach: firstly, an increase in cropping intensity, then diversification.

Groundwater in the Next Millenium

It is considered that the Project has demonstrated that farmer in groundwater areas are more diligent in using water efficiently than those in surface irrigation schemes where practices tend to be more traditional and conservative.

8. BANK AND BORROWER / GOI PERFORMANCE

8.1 Bank Performance

The ambitiously appraised projects, which was located spread over wide areas in 11 Project Provinces was complex and difficult to manage and required extensive supervision.

Appraisal assumptions and uniform criteria of TW facility design for benefit prediction in the area of agricultural production improvement, O&M sustainability and institutional capacity to implement have been too optimistic.

8.2 Borrower Performance

Project Coordination was less satisfactory almost in all level. BAPPENAS (the National Planning Agency) and BAPPEDA (the Provincial Planning Bodies) are responsible of Coordination activities. Inter-agency Irrigation Committee (IIC) at provincial, district and sub district level was

not effectively work due to the lack of financial support. The wide spread of project location in 11 Provinces made the coordination at national level become more complicated resulting weak coordination.

Following reorganization of DGWRD in 1994, the role of Subdit. PAT under Directorate of Irrigation II as reported during Appraisal stage (SAR) was splitted and shared among Directorate of Technical Guidance, Directorate of Construction Guidance and Loan Coordinator / BPP. Inadequate GOI fund support due to the monetary condition, for field supervisory activities without provision of field transportation mean, combined with ineffective coordination resulting of less supervision intensity.

(b) Cofinanciers:

N/A

(c) Other partners (NGOs/private sector):

N/A

10. Additional Information

N/A

Annex 1. Key Performance Indicators/Log Frame Matrix

Annex 1

Key Performance Indicators

Outcome/Impact Indicators

Indicator	Projected in SAR/PAD	Actual/Latest Estimate
Increased Cropping Intensity (%)	123	90
Yield Increased (%)	40 – 70	20 – 40, except maize 70%
Beneficiaries (Families)	50,000	21,000
Increased in Farm Income USD/0,5 ha	180	390
Establishment of WUA/FA	NA	543
Developed groundwater irrigation in less developed region	NA	Marginally achieved
Developed least cost appropriate technology	NA	Partially achieved
Strengthened GOI's planning & implementation capacity	NA	Partially achieved

Output Indicators:

Indicator	Projected in SAR/PAD*	Actual/Latest Estimate
Deep tubewells (DTWs) drilled (No.)	265	245
Successful DTWs (No.)	243	200
Functioning DTWs (No.)	243	180
Intermediate tubewells (ITTWs) drilled (No.)	1,865	680
Successful ITTWs (No.)	1,865	480
Functioning ITTWs (No.)	1,865	400
Taxi pumps (No.)	250	580
Command area served (ha)	25,000	8,000
Command area presently irrigated (ha)	25,000	7,000
Domestic water supply installed (No.)	NA	45
Field demonstrations (No.)	1,940	1,790
Home garden demonstrations (No.)	970	590
Various training (courses)	10,286	2,070
New observation wells constructed (No.)	120	31
Observation wells monitored (No.)	240	284

Annex 2. Project Costs and Financing

Project Costs by Components (in US\$ million equivalent)

Project Component	Appraisal Estimate	Actual/Latest Estimate	Percentage of Appraisal
A. Works			
- Tubewell irrigation	19.6	10.8	55.1
- Domestic water supply	1.7	0.2	11.7
- Observation wells	0.3	0.5	166.6
B. Equipment & Materials			
- Tubewells equipment/materials	23.1	8.3	35.9
- Office and survey equipment	0.9	0.7	77.7
- Vehicles	0.7	0.1	14.2
C. Services			
- Survey, investigation & design	0.8	1.3	162.5
- Agricultural support	0.8	1.0	125.0
- Institutional support	5.0	1.6	32.0
- Initial O&M support	2.6	0.4	15.4
D. Training	1.6	1.7	106.2
E. Consultants			
- Consultancy services	10.1	7.0	69.3
- Special studies	0.6	0.2	33.3
F. Project Administration	2.8	0.6	21.4
Base Cost	70.6	34.2	48.4
Physical Contingencies	3.2		
Price Contingencies	11.1		
Total Project Cost	84.9	34.2	40.2

Project Costs by Procurement Arrangements (Appraisal Estimate) (US\$ million equivalent)

Expenditure Category	Procurement Method			N.B.F.	Total Cost
	ICB	NCB	Other ²		
1. Works	0.00 (0.00)	27.60 (11.20)	0.00 (0.00)	0.00 (0.00)	27.60 (11.20)
2. Goods	26.70 (23.20)	1.30 (1.00)	0.30 (0.30)	0.70 (0.00)	29.00 (24.50)
3. Services	0.00 (0.00)	0.00 (0.00)	12.90 (7.80)	0.00 (0.00)	12.90 (7.80)
4. Consultancies	0.00 (0.00)	0.00 (0.00)	12.00 (10.50)	0.00 (0.00)	12.00 (10.50)
5. Miscellaneous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	3.40 (0.00)	3.40 (0.00)
Total	26.70 (23.20)	28.90 (12.20)	25.20 (18.60)	4.10 (0.00)	84.90 (54.00)

Project Costs by Procurement Arrangements (Actual/Latest Estimate) (US\$ million equivalent)

Expenditure Category	Procurement Method ¹			N.B.F.	Total Cost
	ICB	NCB	Other ²		
1. Works	10.60 (0.00)	0.60 (4.92)	0.00 (0.28)	0.00 (0.00)	11.20 (5.20)
2. Goods	7.20 (7.10)	1.40 (1.20)	0.30 (0.20)	0.20 (0.00)	9.10 (8.50)
3. Services	0.00 (0.00)	2.30 (1.90)	3.80 (3.50)	0.00 (0.00)	6.10 (5.40)
4. Consultancies	6.40 (6.40)	0.80 (0.80)	0.00 (0.00)	0.00 (0.00)	7.20 (7.20)
5. Miscellaneous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.60 (0.00)	0.60 (0.00)
Total	13.60 (13.50)	15.10 (8.82)	4.70 (3.98)	0.80 (0.00)	34.20 (26.30)

^{1/} Figures in parenthesis are the amounts to be financed by the Bank Loan. All costs include contingencies.

^{2/} Includes civil works and goods to be procured through national shopping, consulting services, services of contracted staff of the project management office, training, technical assistance services, and incremental operating costs related to (i) managing the project, and (ii) re-lending project funds to local government units.

Project Financing by Component (in US\$ million equivalent)

	Appraisal Estimate			Actual/Latest Estimate			Percentage of Appraisal		
	Bank	Govt.	CoF.	Bank	Govt.	CoF.	Bank	Govt.	CoF.
Works	11.20	16.40	0.00	5.20	6.00	0.00	46.4	36.6	0.0
Goods	24.50	4.50	0.00	8.50	0.60	0.00	34.7	13.3	0.0
Services & Training	7.70	5.20	0.00	5.40	0.70	0.00	70.1	13.5	0.0
Consultancies	10.60	1.40	0.00	7.20	0.00	0.00	67.9	0.0	0.0
Miscellaneous	0.00	3.40	0.00	0.00	0.60	0.00	0.0	17.6	0.0

Annex 3: Economic Costs and Benefits

	Present Value of Flows			
	Economic Analysis		Financial Analysis	
	Appraisal	Latest Estimates	Appraisal	Latest Estimates
ERR %	14.5	5		
Command area/DTW (ha)	20-30	20	20-30	20
Command area/ITW (ha)	10	10	10	10
Incremental paddy production (tons)	83,000	18,000		
Incremental palawija production (tons)	33,000	16,000		
Incremental high value crops production (tons)	NA	3,500		
Incremental farm income (per 0.5 ha) (US\$)			180	390

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle Month/Year	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating	
	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation Sept/Oct. 91 April/May 92	3 9	G; I(2); C; E(2); D; G; I(2); W(2);		
Appraisal/Negotiation Sept/Oct. 92	5	C; E; G; I; W;		
Supervision 1) Sept/Oct. 93 2) April 93 3) Nov. 94 4) July/Aug. 95 5) (mid-term) Jan/Feb.96 6) Oct/No. 96 7) June 97 8) May/June 98 9) Nov.Dec. 98 10) April/may 99	8 4 5 5 6 4 6 6 6 4	A; C; G; In; I(3); W; A; C; G; I; W; A; Dw; G; I; W; A; Dw; G; I; W; A; Dw; E; G; I; W; A; E; I; W; A; Dw; E; G; I; W; C; Dw; G; I; W; Wr; A; D; E; G; I; Wr; A; Dw; I; Wr;	S S U U U S S U U U	S S U U U S S U U U
ICR Supervision 11	7	A; Dw; I; Wr; E; I; Rd; (FAO)	U	U

a/ A = Agronomist; C = Community Development; D = Disbursement; Dw = Drinkwater;
E = Economist(agro); G = Groundwater; I = Irrigation Eng.; In = Institutions; Rd = Rural Dev. Eng.;
Wr = Water Resources; W = Women in Development.

b/ U = Unsatisfactory; S = Satisfactory; 1 = no significant problems; 2 = moderate problems.

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US\$ (,000)
Identification/Preparation	65.4	217.2
Appraisal/Negotiation	100.1	297.6
Supervision	188.7	410.5
ICR	13.8	40.0
Total	368.0	965.3

a/ Also includes Bank-financed and trust fund consultants.

Annex 5. Ratings for Achievement of Objectives/Outputs of Components

(H=High, SU=Substantial, M=Modest, N=Negligible, NA=Not Applicable)

	<i>Rating</i>
<input checked="" type="checkbox"/> <i>Macro policies</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Sector Policies</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Physical</i>	<input type="radio"/> H <input type="radio"/> SU <input checked="" type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Financial</i>	<input type="radio"/> H <input type="radio"/> SU <input checked="" type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Institutional Development</i>	<input type="radio"/> H <input type="radio"/> SU <input checked="" type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Environmental</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<i>Social</i>	
<input checked="" type="checkbox"/> <i>Poverty Reduction</i>	<input type="radio"/> H <input type="radio"/> SU <input checked="" type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Gender</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input type="checkbox"/> <i>Other (Please specify)</i>	
<input checked="" type="checkbox"/> <i>Private sector development</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Public sector management</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input type="checkbox"/> <i>Other (Please specify)</i>	

Annex 6. Ratings of Bank and Borrower Performance

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HU=Highly Unsatisfactory)

6.1 Bank performance

Rating

- | | | | | |
|---|--------------------------|------------------------------------|------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> Lending | <input type="radio"/> HS | <input type="radio"/> S | <input checked="" type="radio"/> U | <input type="radio"/> HU |
| <input checked="" type="checkbox"/> Supervision | <input type="radio"/> HS | <input checked="" type="radio"/> S | <input type="radio"/> U | <input type="radio"/> HU |
| <input checked="" type="checkbox"/> Overall | <input type="radio"/> HS | <input type="radio"/> S | <input checked="" type="radio"/> U | <input type="radio"/> HU |

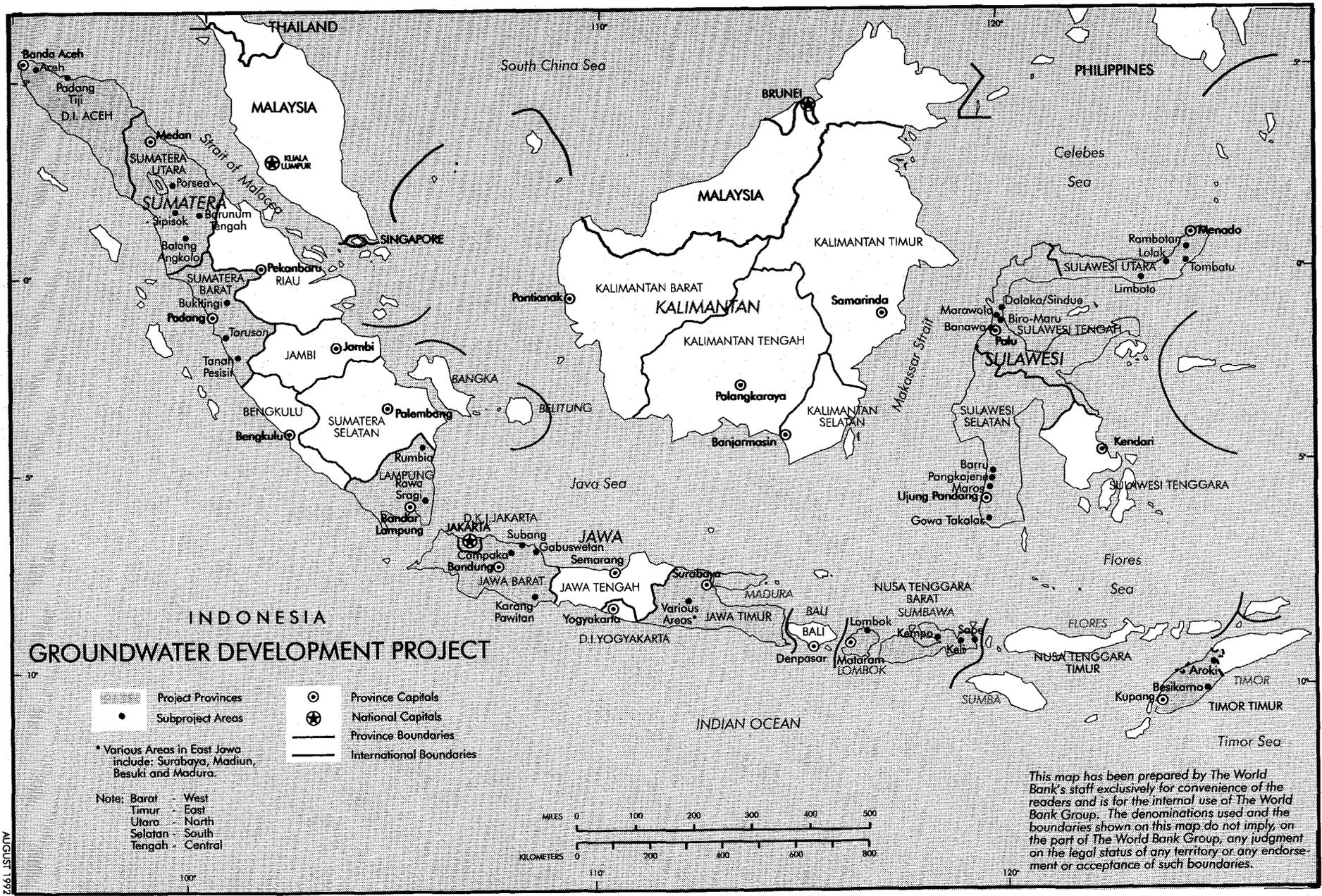
6.2 Borrower performance

Rating

- | | | | | |
|---|--------------------------|-------------------------|------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> Preparation | <input type="radio"/> HS | <input type="radio"/> S | <input checked="" type="radio"/> U | <input type="radio"/> HU |
| <input checked="" type="checkbox"/> Government implementation performance | <input type="radio"/> HS | <input type="radio"/> S | <input checked="" type="radio"/> U | <input type="radio"/> HU |
| <input checked="" type="checkbox"/> Implementation agency performance | <input type="radio"/> HS | <input type="radio"/> S | <input checked="" type="radio"/> U | <input type="radio"/> HU |
| <input checked="" type="checkbox"/> Overall | <input type="radio"/> HS | <input type="radio"/> S | <input checked="" type="radio"/> U | <input type="radio"/> HU |

Annex 7. List of Supporting Documents

1. Aide-Mémoire of the ICR Team
2. Financial and Economic Analysis
3. Notes on Technical Aspects of Irrigation
4. Government's Contribution to the ICR
5. Various Reports Prepared by the Borrower

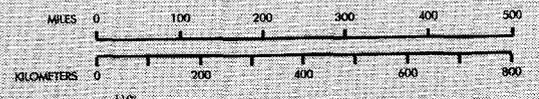


**INDONESIA
GROUNDWATER DEVELOPMENT PROJECT**

- Project Provinces
- Subproject Areas
- Province Capitals
- National Capitals
- Province Boundaries
- International Boundaries

* Various Areas in East Jawa include: Surabaya, Madiun, Besuki and Madura.

Note: Barat - West
 Timur - East
 Utara - North
 Selatan - South
 Tengah - Central



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