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IMPLEMENTATION COMPLETION REPORT
(IDA-27110)

ON A

CREDIT

IN THE AMOUNT OF SDR 67.0 MILLION
(US$ 100.0 MILLION EQUIVALENT)

TO THE SOCIALIST REPUBLIC OF

VIETNAM

FOR A

IRRIGATION REHABILITATION PROJECT

December 22, 2003

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

CURRENCY EQUIVALENTS

(Exchange Rate Effective June 30, 2003)

Currency Unit	=	Vietnamese Dong (VND)
1 VND	=	US$ 0.65
US$ 1	=	VND 154970.0

FISCAL YEAR

Government: January 1 December 31

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
DAF	Development Assistance Fund
CAS	Country Assistance Strategy
CPO	Central Projects Office
DARD	Department of Agriculture and Rural Development (provincial)
DCA	Development Credit Agreement
DFE	Department of Fisheries and Environment
ERR	Economic Rate of Return
FAO	Food and Agriculture Organization
GoV	Government of Vietnam
IBRD	International Bank of Reconstruction and Development
ICR	Implementation Completion Report
IDA	International Development Association
IMC	Irrigation Management Company
IRP	Irrigation Rehabilitation Project
M&E	Monitoring and Evaluation
MARD	Ministry of Agriculture and Rural Development
PMIS	Management Information System
MTR	Mid-Term Review
O&M	Operation and Maintenance
PAF	Project Affected Family
PIM	Participatory Irrigation Management
MIS	Project Management Information System
POM	Plan of Operations Management
QAG	Quality Assurance Group
RAP	Resettlement Action Plan
SAR	Staff Appraisal Report
SDR	Special Drawing Right
SIO	Sub-project Implementation Office
MWR	Ministry of Water Resources
WUA	Water User Association

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VIETNAM
IRRIGATION REHABILITATION PROJECT

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Project ID: P004834	*Project Name:* IRRIGATION REHABILITATION PROJECT
Team Leader: Cuong Hung Pham	*TL Unit:* EASRD
ICR Type: Core ICR	*Report Date: December 22, 2003*

1. Project Data

Name: IRRIGATION REHABILITATION PROJECT
L/C/TF Number: IDA-27110
Country/Department: VIETNAM
Region: East Asia and Pacific Region

Sector/subsector: Irrigation and drainage (95%); Central government administration (5%)
Theme: Rural services and infrastructure (P); Other rural development (P)

KEY DATES		*Original*	*Revised/Actual*
PCD:	06/22/1993	*Effective:*	10/09/1995	09/13/1995
Appraisal:	09/29/1994	*MTR:*	11/16/1998	11/20/1998
Approval:	04/25/1995	*Closing:*	12/31/2001	06/30/2003

Borrower/Implementing Agency: GOV/MINISTRY OF AGRICULTURAL & RURAL DVELOPMENT
Other Partners:

STAFF	Current	At Appraisal
Vice President:	Jemal-ud-din Kassum	Gautam Kaji
Country Director:	Klaus Rohland	Bradley Babson
Sector Manager:	Mark D. Wilson	Jeffrey Gutman
Team Leader at ICR:	Cuong Hung Pham	William L. Cuddihy
ICR Primary Author:	Cuong Hung Pham	

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: S
Sustainability: L
Institutional Development Impact: SU
Bank Performance: S
Borrower Performance: S

	QAG (if available)	ICR
Quality at Entry:		
Project at Risk at Any Time:	No	

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

3.1 Original Objective:

The aim of the Irrigation Rehabilitation Project (IRP) was to restore or establish irrigation service by rehabilitation and completion of infrastructure and the improvement of operation and maintenance in selected irrigation schemes. The project's objectives were to increase agricultural production (primarily of rice for food) and farmer incomes, and reduce poverty. IRP's aim and objectives were relevant and appropriate at the time and have build a foundation of experience in the Government of Vietnam (GoV) for further investment by the Bank and other donors.

IRP was the first World Bank-assisted irrigation project in Vietnam since the 1970s and only the second in the rural sector after the Bank's return to Vietnam in 1993. The project concept grew out of a joint GoV and FAO-IBRD Agricultural and Food Production Review in 1989 which concluded that the highest priority for irrigation and drainage was the rehabilitation, repair and upgrading of existing irrigation schemes in the northern and central regions, followed by the completion of schemes in the Mekong Delta. When international donors returned to Vietnam in 1993 this GoV priority was reflected in the World Bank's first Country Assistance Strategy (CAS) which was approved by the Bank's Board of Executive Directors on October 25, 1994.

A primary objective of the CAS was rural poverty reduction. Vietnam's poverty rate in 1993 was 58 percent and its rural poverty rate 68 percent. The strategy to reduce rural poverty included the allocation of land-use rights to farmers, freeing-up of agricultural factor and product prices, and targeted projects to improve rural infrastructure. The project was consistent with the CAS' recommendations. The GoV signed a Development Credit Agreement (DCA) on July 11, 1995 to implement a US$ 135.7 million with IDA financing of US$100.0 million (SDR67 million) of which US$79.5 million was disbursed and US$20.5 million was canceled.

Given Vietnam's unfamiliarity with Bank procedures, managing the project, which contained a number of related activities which were dispersed geographically, provided a formidable challenge to the GoV. Achieving the project's goal and objectives required the successful integration of: (i) seven multipurpose civil works projects, (ii) numerous institutional development activities, (iii) appropriate resettlement and compensation programs for affected farm families, and (iv) meaningful environmental safeguard measures. Achievement of the project's objectives required an effective management systems able to work through regional and provincial offices and agencies.

At the time of project preparation and start-up, devolved management systems were being introduced into Vietnam's public sector for the first time. In 1993, the designated implementing agency was the Ministry of Water Resources (MWR) which in 1995 became part of the Ministry of Agriculture and Rural Development (MARD). MARD's Central Projects Office (CPO) and its Sub-implementation Offices (SIOs) - responsible for all donor-supported irrigation projects - were established only in 1994. However, the mutual respect shown among Vietnam's development partners and the responsiveness of the project to Vietnam's development priorities provided a satisfactory environment and incentives for these new management units to pursue the project's aims and objectives effectively.

3.2 Revised Objective:

The project objectives were not revised. However, the scope of the project was expanded to respond to requests for additional work and to support flood damage repairs. These additional activities were all consistent with the project's original aims and objectives. Additional work as agreed and reflected in amendments of the DCA allowed the Credit to be used to: (i) extend the scope of rehabilitation work within

some of the original subprojects; (ii) include new subprojects with comparable rehabilitation needs in the same regions as the original subprojects; and (iii) respond to urgent requests for flood damage repair work in the project areas including dam safety inspections and repairs following acute floods in 1998, 1999 and 2000.

By applying national and international competitive bidding for goods and works actual project costs were well below the estimates made during preparation. These project savings were used to finance the additions to the seven original subprojects, to add seven, new small rehabilitation subprojects and to repair flood damage. These changes were formalized in three amendments to the DCA: (i) in 1997 to finance retroactive works; (ii) in 1999 to extend project support to tertiary system development of areas less than 150 ha; and (iii) in 2001 to reallocate project savings to new areas for rehabilitation, to flood damage repairs and to extend the project duration by 18 months. By making these changes, the project financed more rehabilitation work than originally planned and provided funds responsively in emergencies. Nevertheless, despite these additional activities, total actual project costs were about 80% of the estimated costs and 20% of IDA's credit was cancelled.

3.3 Original Components:

The original project components as described in the Staff Appraisal Report (SAR - paragraph 3.3) and agreed in the DCA (Schedule 2) were as follows:

Component 1. Rehabilitation and Completion of Seven Irrigation Schemes. The first project component was for rehabilitation and completion of seven irrigation schemes with a gross area of 130,000 ha located in southern central and northern regions of Vietnam. The main works included rehabilitation of diversion and head works, main canals, structures and pump, and completion and construction of main, secondary and tertiary canals and on-farm works (US$108.1 million).

The seven subprojects were: (i) Cam Thuy in Thanh Hoa Province; (ii) South Nghe An in Nghe An Province; (iii) Linh Cam in Ha Tinh Province; (iv) An Trach in Quang Nam and Da Nang Provinces; (v) Thach Nam in Quang Ngai Province; (vi) Dong Cam in Phu Yen Province; and (vii) Hoc Mon and North Binh Chanh in Ho Chi Minh City and Long An Province.

Component 2. Institutional Development The second component was for institutional development through (i) the transfer of technology for engineering design, procurement and construction of irrigation works through technical assistance and job training (ii) the improvement of operation and maintenance practices and cost-recovery mechanism; (iii) the strengthening the delivery services through irrigation management companies (IMCs) and farmer user groups through training; and (iv) support for accounting and auditing. This component focused on strengthening the capacity of the MWR and MARD at the central and provincial levels (US$4.6 million).

Component 3. Resettlement and Rehabilitation The third component was for resettlement of families whose land or assets were acquired by the state for the project to be carried out in accordance with the provisions of the Resettlement Action Plans (RAPs). This was the first time in Vietnam an irrigation project was implemented using the RAP (US$7.4 million).

Assessment of Original Components:

Project design responded to the recognized need to rehabilitate deteriorated irrigation infrastructure and to extend civil works in unfinished irrigation systems. By doing so, the project contributed to improvements in rural income and poverty reduction. Agriculture continues to be Vietnam's major employer (about 60%

of the national labor force) accounting for some 24% of GDP and exports, as well as providing essential food security for Vietnam. During the 1990s, Vietnam went from a food deficit country to the world's second largest rice exporter largely due to the restoration of land-use rights to farm households, the freeing-up of farmgate prices and investments that improved rural infrastructure, including irrigation.

The component design was relevant and appropriate to the circumstances faced by Vietnam in the early-1990s and to the achievement of the project's development objectives. The project's design adopted lessons learned from two previous IDA agricultural development credits in Vietnam: the Dau Tieng Irrigation Project (Cr. 845-VN; ICR No. 8239; and PPAR No. 9993) and the Agricultural Rehabilitation Project (Cr. 2561-VN).

The limitations of MWR and MARD and the need to strengthen their administrative and technical management capacities were addressed in part through the advanced preparation of technical components (survey investigations and design of works) and provision of technical assistance to support implementation management. The financial and organizational arrangements for implementation management, were in practice complex and the CPO shared responsibility for implementation with several other MARD departments and external agencies which resulted at times in delays in project decision making. Although this is a critical weakness, it was not foreseen at appraisal and it contributed to implementation delays.

3.4 Revised Components:

While overall project structure remained unchanged, the scope of work for the first project component *(Rehabilitation and Completion of Seven Irrigation Schemes)* was revised to increase the number of sub-projects to 14 and the geographic coverage from seven provinces to 12. These additions - which were all much smaller in scale than the original subprojects, but involved similar rehabilitation works - were assessed in accordance with Bank policies for feasibility and safeguards. The additions enabled the project to: (i) respond to acute natural disasters and the need for dam safety improvements revealed following acute floods; and (ii) extend project benefits to a larger number of sites - that were immediately adjacent to or very similar to those in IRP - but which had not been appraised originally because of expected financing constraints.

Cost savings resulted from the introduction of competitive bidding and prudent financial management of the project credit facility. Actual subproject costs were much lower than those used in the project Feasibility Study that used administrative rather than market prices, in 1998 MARD requested the World Bank to reallocate savings to an expanded scope of work in order to repair flood damage and enhance dam safety, and to finance new and complementary works associated with the original subprojects or flood-damaged structures.

The Revised Project Component included the following additional works:

Scheme / Works		Province
(i) Flood Damage Repair and Reinforcement Works		
• *Original and New Sub-projects and Associated Works*		
(a)	An Trach	Quang Nam
(b)	Thach Nham	Quang Ngai Province;
(c)	Thu Bon River Bank Protection	Quang Nam
(d)	Phu Ninh Reservoir	Quang Nam
• *New Sub-project areas*		
(e)	Hoa My	Thua Thien Hue
(ii) Expansion Works		
•*Original Sub-projects and Associated Works*		
(a)	Dong Cam	Phu Yen
(b)	Linh Cam	Ha Tinh
(c)	South Nghe An	Nghe An
(d)	Hoc Mon N. Binh Chanh	HCMC and Long An
• *New Sub-projects areas*		
(e)	Kieu	Thanh Hoa,
(f)	Kinh Mon	Quang Tri
(g)	South Truoi	Thua Thien Hue
(h)	Da Mai	Quang Binh
(i)	Vuc Tron	Quang Binh
(j)	Liet Son	Quang Ngai
(k)	Duy Thanh sluice	Quang Nam

3.5 Quality at Entry:

Quality at entry is considered satisfactory in that: (i) the project objectives were clear and consistent with GoV priorities for the sub-sector as well as the Bank's first CAS; and (ii) projects were appropriately appraised using reasonable risk assumptions. The project design was coherent, incorporating lessons from previous experience and took account of the organizational arrangements and capacity of the implementing agencies that was emerging. However, the highly decentralized approach to project implementation that came to be pursued by the GoV during the late-1990s was not foreseen. The SAR did not include a logical framework or key performance indicators, but these were not required at the time the project was appraised. Lacking these made the assessment of project performance and the completion of the ICR more difficult.

Perhaps the most significant weakness of the SAR was that it failed fully to quantify risks associated with varying degrees of progress in agricultural diversification and land-use change especially in the industrializing Mekong Region and with potential changes in the national policy environment. Also, the assessment of procurement capacity could have been more rigorous for a new borrower. The risks associated with inexperienced procurement offices handling large numbers of contracts (more than 230) for

physical works and goods were not fully appreciated. The geographic and dispersion of subprojects and the potential for delays in operating decisions were not recognized. Based on assessments of implementation capacity, new accounting, procurement and information management systems were introduced. However, MARD and the CPO were "learning by doing" and implementation delays were encountered.

The SAR adequately described the targeted physical improvement, production and economic benefits for each sub-project although in some it overestimated the extent of physical rehabilitation that was feasible under IRP. For these subprojects, the SAR projected that all the remaining rehabilitation work will be completed under IRP when in fact it only completed the next phase of a long-term development plan. Summary output and outcome indicators for each of the original subprojects are presented in SAR Tables 3.1 and 5.1 and SAR Annexes 1-7. Some of the verifying SAR data were overly ambitious or inconsistent, reflecting data limitations prevalent in Vietnam in 1993-95. This made the definition of some "with" and "without" project results imprecise. It is important to remember that in the early-1990s when IRP was prepared and appraised, precise analysis and sharing of data did not exist in Vietnam.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

The overall project outcome and the achievement of its objectives is rated satisfactory based on its contribution to improved of food production, food security and farm income, and poverty reduction. While the original project was implemented more slowly than planned (closing was extended once by 18 months), it achieved its aims and objectives by strengthening and expanding irrigation infrastructure, developing more capable and responsible institutions and services and managing resettlement according to an approved RAP. In addition, the project was extended to support rehabilitation in seven additional sub-projects and contributed to flood damage repair and improved dam safety following natural disasters.

The project produced substantial socioeconomic benefits. The final achievement exceeded the appraisal targets in most categories, but utilizing approximately only 80% of the total investment support requested from IDA when the project was approved. Additional benefits resulted from implementation of the seven new sub-projects - which expanded the extent of rehabilitation, enhanced dam safety and restored the integrity of systems that had been damaged by floods. However, since implementation was delayed, most sub-projects are still only in year 2 or 3 of a 5-year development schedule following the completion of physical works (see Appendix A) and the full benefits are yet to be realized.

Compared to appraisal, the main project achievements are already evident. These include:

- 338,388 families have benefitted (108% of the appraisal estimate), including 205,000 farm families in the seven original subprojects and 133,388 farm families in the new areas;
- the area rehabilitated has been increased by 103%, from 67,700 to about 133,889 ha, including 24,015 ha in the new project areas;
- rice production has been increased by 179%, from 518,000 tons per year to about 926,229 tons per year; and
- overall net farm income increased by US$66.8 per annum (112% of the SAR objective).

At the same time the total cropped areas has fallen from 250,090 ha to 235,035 ha due to more intensive land use; and cropping intensity has fallen from 192% to 175% because of losses of cropped land to rapid urban growth in the Mekong Region.

One significant project outcome was the overall increase in paddy rice productivity from 3.0 to 4.8 tons per ha. At appraisal, average yields in five of the seven original project areas were significantly lower than

averages for the provinces, while at completion, average yields were close to or greater than provincial averages in all seven original subproject areas. The freeing-up of input and farmgate prices in the 1990s made rice a profitable crop for Vietnam's farmers and increases in rice production have contributed to improved farm incomes and reduced rural poverty. Project outcomes and benefits are detailed in Annexes 1 and 3.

Resettlement and rehabilitation of Project Affected Persons (PAFs) was implemented satisfactorily and in accordance with the provisions of the RAP and World Bank guidelines and safeguard requirements, meeting or exceeding the original resettlement targets. The compensation, resettlement and rehabilitation of PAFs in the new sub-projects of Kieu, South Truoi, Hoa My, Liet Son, Vuc Tron, Kinh Mon and Da Mai irrigation schemes was supported through the provisions of a second-phase RAP. Resettlement activities have been completed satisfactorily with more than 22,000 PAFs covered under the project (more than 14,000 more than expected at appraisal) and only one residual issue concerning six households unresolved (the location of replacement land is still outstanding).

The project's environmental action plan to mitigate potential negative environment impacts during project construction and operation was fully implemented, providing support for sustainable improvements in agricultural productivity as well as social benefits. A specific Environmental Monitoring Program was carried out for the Hoc Mon-North Binh Chanh sub-project as part of the safeguards policy activities because of special soil and groundwater conditions prevailing there. Reports from the environmental monitoring contractor, the Southern Institute of Water Resource Research (SIWRR), show that soil salinity has been reduced, soil acidity levels although still fluctuating are generally dropping, water pollution levels have been reduced and acid-sulfate soils have been restored.

4.2 Outputs by components:

Component 1. Rehabilitation and Completion of Irrigation Schemes. (US$108.1 million SAR, US$95.3 million actual, including additional works and flood repairs.) The original scope of work, with one exception; Duy Thanh Sluice has been satisfactorily completed as were the additional works and flood damage repairs. The output indicators shown in the SAR table 3.1 have been substantially exceeded in most of the original and additional sub-project areas, as shown in Annex Table 1b.

The achievement of this component is fully satisfactory both in terms of the volume of work completed and cost effectiveness. Actual costs of civil works and goods were substantially less than their SAR estimates due largely to the introduction of competitive bidding. The results shown in Annex 1b indicate that for 85% of the output categories (table 3.1 SAR) the targets have been significantly exceeded, including 300% of the SAR for main canals, 112 % for the pumping stations, 361% for rehabilitation of sluices and spillways, 375% for reservoir works, and 124% for tertiary canal systems development. Overall, 226 contracts for civil works packages were implemented in 41 rural districts in 12 provinces and the quality of completed works is rated overall as satisfactory. Overall physical completion at ICR is 99.8% of the amount planned. This small gap (0.2%) is attributable to unfinished work at one subproject - the Duy Thanh Sluice (see below).

Additional Works. Additional work included the expansion of South Truoi, Da Mai and Kinh Mon irrigation systems, the Duy Thanh sluice and Thu Bon riverbank protection works. All but one of the seven additions has been completed. The only unfinished work is at the Duy Thanh Sluice (which was more than 95% complete at project closing) where complex, in-river site conditions, delays in processing approvals and releasing counterpart funds, slowed implementation. MARD is completing Duy Thanh Sluice in FY2004 using the state budget. Additional completion information and details are given in the CPO's Project Progress Report-May 2003 and the appendix tables.

Tertiary System Development. Tertiary system development planned for the seven original sub-projects is complete. In total, 48,152 ha was improved compared to 41,135 ha planned. Total cost of this activity was VND 185.626 billion, i.e. 31% greater than the planned budget. Tertiary system development action plans were developed by the International Consultant in 1998, approved by MARD and assigned to the IMCs for implementation. However, only five of the seven subprojects chose to utilize funds channeled via the Development Assistance Fund (DAF); the two remaining provinces preferred to carry out improvements using their own funds. The DAF is a Government funding institution, formerly under the Ministry of Finance, which loaned funds to provinces to prefinance tertiary canal system development. The provinces are obligated to repay the borrowed amounts to the DAF. Of the US$10.5 million allocated for this purpose by IDA, US$9.45 was used.

Progress reports from the IMCs and the DAF provided consistent and complete project information. While the works are fully satisfactory, too little time has elapsed to assess the success of the cost recovery mechanism included in the action plans. While repayment by most IMCs is irregular, they appear to be gaining a better understanding of the process. Full cost recovery from end users, however, has been limited so far by the reluctance of provincial authorities to pass on the full cost of tertiary system improvements to farmers - a political decision - preferring to raise fees step-by-step as the benefits of system development are realized by farmers.

Component 2. Institutional Development. (US$4.6 million SAR; US$7 million actual). Overall institutional development outputs were satisfactory, but with some mixed results. This component provided significant new opportunities to strengthen technical, administrative and operational management within the implementing agencies and partners (MARD, CPO, SIOs, IMCs and DARDs) through the provision of practical training, on-the-job experience and technical assistance. Financial Management Plans were prepared for the IMCs for the first time.

Specifically, this component supported the following: (i) technical assistance, on-the-job and formal training for CPO, SIOs and IMCs in engineering design and technical reviews, management of the Bank's procurement procedures (from needs assessment and scope of work to selection of goods and services, and monitoring their delivery and acceptance) and overseeing irrigation works construction; (ii) technical assistance and preparation of guidelines supplemented by formal workshops in financial management to improve operation and maintenance practices, and cost recovery mechanisms in IMCs and WUAs; (iii) provision of training modules and the conduct of seminars and workshops in participatory methods for irrigation management (PIM Workshops in 1997 and 1998) and the purchase of basic equipment for strengthening of the construction, operations and maintenance capacity of IMCs and WUAs; (iv) development and deployment of a project management information system (PMIS) to track project transactions for accounting and auditing purposes; (v) training of trainers for district extension officer training; and (vi) extension worker and farmer training.

More than 550 participants completed irrigation-related, in-country training courses at a total cost of about US$155,000 The 20 separate training modules provided, included construction and project management, construction quality assurance and use of management information systems. A total of 10 overseas training programs was organized for 138 participants at a total cost of US$466,000. These included three international conferences and seven technical management courses held in Australia, China, Thailand and the U.S. chosen for their relevance.

In addition to the irrigation-related training modules, the project cooperated with the National Center for Agricultural Extension Services and nine provincial agricultural extension centers to plan and conduct “training of extension trainers”and farmer training courses in 25 districts with 1,885 participants, at a cost

of approximately US$134,800. The cost of this training was included under the Agricultural Support component. Most training was carried out on schedule. Training objectives and requirements were fulfilled and financial disbursements for training were made in accordance with the relevant financial policies and disbursement procedures. A total of 8,862 person day of training (443% of SAR) at a total cost of US$773,000 (110.4% of SAR) were given at the farm, commune, district, city, provincial and national levels during implementation.

IMC operations and system maintenance. Subproject operation and maintenance was elaborated with IMCs during the preparation of their Financial Management and Tertiary Development Investment Cost Recovery Plans. The IMCs, assisted by the CPO's Consultant through a participatory process, produced Action Plans to improve their operational performance. These Action Plans identified specific areas where technical assistance and training were needed. These areas were subsequently addressed in the O&M Plans and Procedures and in the training programs prepared by the CPO with technical assistance from the International Consultant. In Phase I, the Consultant developed an Outline Plan of Operation and Maintenance (POM). The IMCs were provided with the outline plan and guidelines for preparing their own POMs. The IMCs completed the draft Plans and submitted them to the CPO's approval in June 1998.

Phase II activities, during the final two years of implementation, were limited to working with two IMCs to review and reinforce the POM standard and its implementation and to provide reviews and workshops on financial operations and asset maintenance. Assessments of further needs for strengthening IMC operational and financial management capacities for O&M indicated that continued capacity building is needed if the IMCs are to realize the objectives of self-sufficiency in IMC operations fully.

Dam Safety Activities. A dam safety improvement activity that was included at appraisal and expanded following the acute floods of 1998 and 1999, was completed satisfactorily. Specifically, the project provided dam safety inspection of the Thung Bang, Dau Tieng, Lower Yazul and Hinh dams. The SAR required the conduct of a technical evaluation by an independent panel of experts. This was provided by Hanoi University of Water Resources experts hired by MARD (contract value US$ 47,000) in order to ensure that national and World Bank dam safety standards were met. Following the acute 1998 floods, it was decided to support improvements in dam safety and associated irrigation systems in Phu Ninh, Liet Son, Hoa My and Vuc Tron, as part of the additional scope of work. International technical expertise was provided for this activity by a grant from the Government of Italy for US$150,000.

Reservoir rehabilitation and improved dam safety features typically included: installation of additional spillways and spillway gate-hoists (complete with fail-safe, emergency operators) to increase flood retention and spill capacity; dam slope erosion protection; improved drainage; operation management facilities; upgrading access, emergency services and community roads; and rehabilitation of controls and irrigation water delivery canals. These works were successfully completed and handed-over in accordance with the acceptance criteria of local IMC boards.

Agricultural Support Program. The Credit Agreement or DCA called for a two-year Agricultural Support Program in the seven original subproject areas. The agreed program included construction of experimental sites and extension service stations for training and the transfer of advanced agricultural technology to the project's beneficiaries. In most cases, this was a first for the participating provinces. The SAR allocated approximately US$ 950,000 for implementation of this component and the design called for 24 months of intensive technical support to implement the program, although this was not a stated objective in the SAR. Recognizing the need to intensify agricultural production and the importance of effective agricultural extension services to enhancing the benefits of the infrastructure investment, the CPO allocated consulting

resources for the preparation by the Consultants of an agricultural support investment plan. This resulted in a detailed investment plan, based on a participatory needs assessment and a stakeholder workshop to share experiences and set priorities.

In 2002, an Agriculture Support Investment Plan was approved by MARD with total investment budget of VND 24.3 billion (about US$1.6 million). The project financed construction of 25 district level extension centers; procurement of furnishings and equipment for the centers; “trainer training” programs for extension service field staff in extension methods and delivery; and farmer training in improved production and post-harvest practices. The training programs were conducted in coordination with the National Extension Service Center and completed by June, 2003. The program has improved the capacity of district extension staff to provide their clients with appropriate levels of technical support and materially assisted sustainable increases in agricultural productivity.

The project organized a National Participatory Irrigation Management (PIM) workshop in 1997 and carried out financial and operations and maintenance activities in support of IMCs and WUAs. This effort increased implementing agency and user awareness, understanding, and experience with these functions. This helped enhance implementation capacity and the sustainability of operational management for improved infrastructure at district levels. During project implementation, the GoV and its development partners adopted a complementary policy promoting IMC and WUA responsibility for financing of irrigation system O&M based on PIM-related methodologies.

Overall, this institutional development component supported the improvement of irrigation works and O&M activities by strengthening IMC and WUA management and service delivery capabilities. The outcome of these activities could have been more successful if: (i) MARD's construction and irrigation departments were more unified in their approaches and more cooperative; (ii) the coordinating mechanisms between provincially-owned IMCs and nationally-based MARD was stronger; and (ii) an effective performance monitoring system based on benchmarking data to ensure compliance had been in place. These lessons, however, are already valuable inputs to the preparation of the Bank's next irrigation investment in Vietnam.

Consulting Services Technical Assistance. An International Consultant contract valued at US$3,278,039 was signed between the CPO and the Louis Berger Group/SMEC International on June 23, 1997, later than planned. The original contract provided for 120 international consultant person months and 150 local consultant person months. During the period of the contract the Consultant carried out all assigned activities and prepared numerous reports including inception, design review, draft tender documents, draft bid evaluation, quarterly progress, O&M plans, financial management and tertiary development recovery, sub-project MIS and M&E system recommendations, environmental monitoring, consultant training, and other project documentation as requested.

The International Consultant's performance is rated fully satisfactory. The Consultant completed all the assignments and provided the technical assistance required under the contract. In particular, the amendment of the Consultant contract in 2002 to provide additional assistance to project management in the final stages of delayed project implementation proved highly beneficial in terms of management and technical support as well as institutional development. The Consultant guided completion plans for civil works, provided construction quality assurance in the field, installed information systems modules, delivered agricultural extension training, reviewed financial management and O&M capabilities of IMCs, designed the Agricultural Support Program, and drafted project progress and completion reports. At ICR, a total of US$3,239,000 has been disbursed for consulting services, representing 98.8% of the contract value and 87.5 % of the original DCA allocation of US$3,700,000 .

Component 3. Resettlement and Rehabilitation (US$7.4 million SAR; US$3.9 million actual). This component supported resettlement under the agreed RAP. This was the first time MARD implemented a RAP and performance was satisfactory, largely due to the commitment of the implementing agencies and the frequent Bank supervision available from a decentralized office. Only 312 project-affected households were relocated (175% of the SAR estimate) but 22,104 PAF households received compensation for some permanent or temporary loss of land (262% of the SAR estimate). About 503 ha. of land was permanently lost compared with 582 ha. in the SAR (89%) and compensation provided for 9,651 ha of land temporarily affected by the project. Approximately US$3.87 million was spent on resettlement compensation programs under the RAP, 60% of the SAR estimate of US$ 6.4 million. Only six outstanding issues remain with PAFs in one subproject to be completed by local authority. The successful outcome is notable because this was the first irrigation project in Vietnam to implement resettlement and land compensation according to RAP policies.

Environmental Measures. An Environmental Action Plan was approved by World Bank in three parts; June 1996, September 1996 and March 1997. Environmental monitoring of compliance with the action plan and water quality in the Hoc Mon-North Binh Chanh subproject was requested by the Bank and undertaken to determine potential physical, chemical and socioeconomic impacts. According to the monitoring reports, (i) civil works construction during subproject implementation did not affect the environment, plants or domestic animals; and (ii) the completed structures helped improve water quality by reducing levels of salinity and metals, and reducing flooding. This improved agricultural production through increases in cultivated area and crop productivity. The projects Environment Mitigation Budget was included under the Resettlement and Rehabilitation category, above.

4.3 Net Present Value/Economic rate of return:

The project's economic rate of return (ERR) was re-estimated for the overall project and the seven original subprojects, and estimated for the seven additional subprojects using actual costs and benefits and updated assumptions of future costs and benefits based on the latest data and information available. Project costs were based on project records and data provided from the field by Subproject Implementation Offices (SIOs), IMCs and Provincial Departments of Agriculture & Rural Development (DARDs) who annually collect agroeconomic data. The Bank's and the CPO's International Consultants conducted quantitative and qualitative analyses based on data collection and field assessments at the seven original subproject sites and data collection from the seven new sites. All data were cross-checked with stakeholders at CPO and relevant agencies. The projected benefits are best estimates and are based on the actual performance of existing crops, field visits and discussions with farmers and project staff. Full details are presented in Annex 3.

Despite delays in implementation, economic analysis shows that 13 of the 14 subprojects exceed the Bank's 12% guideline, with an overall ERR of 19% for the seven original subprojects (compared with the 17% at SAR) and an ERR of 20% for the seven additional subprojects. (Only Da My subproject has a low ERR (3%) and this new subproject was included for emergency flood damage repair.) In addition, the project provided numerous, non-quantifiable social and environmental benefits. These include community safeguards under the RAP, the increase in reliability of water delivery brought about by the lined canals, enhanced drainage and salinity intrusion protection, improved road access to communities, improved dam safety and accelerated repair to flood-damaged irrigation systems in 1998, 1999 and 2000. Benefits achieved by the original subprojects, new subprojects and the entire project - as well as comparisons with the estimates made at the time of project appraisal - are provided in Annex 1.

Agricultural Benefits. The project met almost all of the quantitative targets and made a significant impact

on agricultural production in the project area compared to SAR projections and the "without project" case. These are detailed in Annexes 1 and 3. The total irrigated area has increased from 67,000 ha to 133,889 ha; total rice production has risen from 518,000 tons to 926,000 tons; average rice yields have risen from 3.0 to 4.8 tons per ha; corn yields have increased from 1.2 to 3.6 tons per ha; peanut yields have increased from 1.3 to 2.5 tons per ha; and soy bean yields have increased from 0.7 to 1.3 tons per ha. Small but valuable increases in fruit production (14,000 ha) and - on acid sulfate soils in the Mekong Region - forestry (175,000 ha) have taken place that we not anticipated at appraisal. Reasons explaining this situation is the change in cropping pattern as triple cropping of rice has declined since it has been shown to be environmentally less sustainable in many areas and winter crop land in the north of Vietnam is being followed or used for crops other than rice. At the same time, total crop area and cropping intensity have fallen slightly due to the encroachment of urban land uses into rural areas - notably in the Hoc Mon/North Binh Chanh subproject on the edge of Ho Chi Minh City.

4.4 Financial rate of return:

The impact of the project on farm incomes has been substantial and helped to raise farm incomes for some 338,388 farm families benefiting directly from the project. At ICR, the incremental net annual income of farm households that adopted improved irrigation and technology under the project has been raised by US$86 (about 246% of SAR) in Cam Thuy, US$12.4 (about 17.2% of SAR) in South Nghe An, US$52.1 (about 75.6% of SAR) in Linh Cam, US$69 (about 82.1% of SAR) in An Trach, US$152 (about 175% of SAR) in Thach Nham, US$17 (about 188.9% of SAR) in Dong Cam, and US$78.9 (not available in SAR) in the Hoc Mon - North Binh Chanh subproject area. The overall annual average net farm income for farm households in 7 original subproject areas has increased about US$66.8 (about 112% of the SAR projection). This indicates strong financial incentives for farmers to participate in the project and the direct poverty alleviation effects. The full set of farm models representing all the subprojects are provided in the project file.

4.5 Institutional development impact:

There was a high level of interest and participation in capacity development activities, including the management and administration training modules. Activities varied in intensity and absorptive capacity for institutional change varied considerably across the project's organizational spectrum as expected with exposure to new systems and methods. The PMIS in particular has been well received and will likely be eventually deployed in all the provincial DARD offices. However, it is important to note that effective office information systems and technology utilization normally requires dedicated in-house support staff and facilities to ensure sustainability, including development of specific needs based data applications. In this regard and with other facets of intended institutional development (e.g. improved O&M, financial management, tertiary development cost-recovery, WUA participation in IMC management), the project design underestimated existing capacities and assignment of resources for institutional strengthening. Investment in the Agriculture Support Program has provided much needed improvements in the capacity to deliver effective extension services to farmers.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

Acute and record breaking floods and typhoons in 1998 and 1999 in Central Vietnam and in 2000 in the Mekong Region slowed down project implementation significantly, damaging some works that had already been rehabilitated and needed to be restored a second time. The East Asia financial crisis between 1997 and 1999 reduced the availability of counterpart funding and caused delays in implementation. Vietnam weathered the crisis well but only with careful management of its budget and expenditures. Devaluation of the Vietnam dong over the life of the project made more local currency available than expected and this contributed to the extension of the project's scope of work. The SARs outbreak in 2002 interfered with

project implementation and delayed some procurement activities in the final year of implementation.

5.2 Factors generally subject to government control:

These included the following factors: (i) although MWR and subsequently MARD, through the CPO as the lead agency, was required within the organizational framework to provide overall project coordination, CPO's management lacked sufficient authority always to ensure timely decision making and proper integration of development activities within MARD and among the line agencies involved; (ii) coordination was made difficult by the horizontal organization of the implementing organizations and the proliferation of reporting lines between central and provincial agencies; and (iii) due to several delays in deployment and implementation, particularly for some the extended works and pump procurement, the project was unable to adhere strictly to the schedule proposed in the SAR.

5.3 Factors generally subject to implementing agency control:

Some delays in implementation resulted from: (i) occasional lack of effective coordination among implementing agencies of procurement and lack of timely decision making mechanisms for timely and efficient and effective management of project activities; and (ii) delays in decision making caused by the lack of clearly defined and project-specific lines of authority, reporting and communications among the various implementing agencies with the MARD.

5.4 Costs and financing:

Total project costs at SAR were originally estimated to be US$135.7 million (US$128.7 million net of taxes), with a foreign exchange component of US$ 75.5 million, or 55 percent. The IDA Credit of SDR 67 million (about US$100 million equivalent) was expected to finance 78 % of project costs. At completion, total disbursement reached US$79.5 million or 79.5% of the original US$ 100.0 million allocation, and 89 % of the allocations of US$89.1 million when the DCA was amended in 2001. Not all of the amended allocation was used. GoV consistently overestimated the cost of goods and works and its own capacity to spend money and about US$20.5 million was canceled.

DCA Category	**Amended Allocation 2001US$ millions**	**Value relative to amended DCA %**
Civil works	76.76	92%
Goods	4.04	41%
Consulting Services	3.67	88%
Training	0.63	105%
Unallocated	4.77	0%
Special Acct. balance	-0.149	-
Total	89.72	89%

6. Sustainability

6.1 Rationale for sustainability rating:

Sustainability of project outcome is considered to be likely. The GoV is committed to: (i) completing the outstanding subproject (Duy Thanh Sluice) in FY04; and (ii) sustained operation of works financed under the project. The policy environment, the available institutional and human resources, the provincial capacity and commitment to financing the IMCs (from a combination of water fees and budget), and the commitment by GoV generally to provide continued funding and further development for irrigation are positive indicators that the project will fulfill its expectations over the long term.

The assessment of project sustainability is based on the: (i) Government of Vietnam's commitment to alleviating rural poverty through support of the agriculture sector, including sustained improvements in the operational capabilities of irrigation systems; (ii) increase in crop productivity through intensification, brought about by the greater availability and application of production inputs including irrigation water; (iii) development of community participation, including promotion of greater WUA responsibility for O&M and eventual self-sufficiency for IMCs; and (iv) integrated approach being adopted toward water resources management. The improvements in specialized technical and contracts management capacity developed within the CPO and SIOs during project implementation will remain a continuing asset. While IMCs may be limited in their ability to finance O&M costs fully from water fees, most provincial governments are committed to raising water fees progressively and all are committed to financing fully the operating costs of the IMCs themselves.

RAP implementation, involving direct participation by the community and the affected persons, has produced good results with very few conflict situations that required higher level resolution. Sound implementation of the RAP has helped to establish a positive social environment for future development initiatives. The Agriculture Support Program, although a late entrant to the project, is already contributing to agricultural productivity gains by providing needed facilities, equipment and training programs to district extension services. The program should continue to have a positive impact on sustainable realization of the potential economic benefits attributable to the project.

Infrastructure designs and quality are considered to be generally sound, with minor upgrades and repairs anticipated to accommodate recurrent damage from adverse weather and natural disasters. It will be essential to provide continued public service support for improvement of O&M capabilities and proper infrastructure utilization during the immediate post-construction period in order to entrench the culture of sound water management and strengthen the participation of beneficiaries (through WUAs) in irrigation scheme O&M. However, the allocation of responsibility for O&M between IMC's (government) and beneficiaries (WUAs) should, over time, also become more clearly defined.

Project implementing agencies have shown a solid commitment to the project, although there have been some shortfalls in local budgetary support. Physical maturity is considered in mid-2003 to be about 50%. Institutional sustainability for future operations is considered adequate, although some risks remain. Risks are primarily related to the impact of community development strategies to be applied by regional government and the priority given to providing necessary public resources for the continued delivery of O&M and water management services through IMCs. Water fees are rising but they cover only a share of total O&M costs. Given the application of adequate public services, appropriate agricultural growth strategies and sufficient O&M resources, and the already demonstrated active participation of WUAs, the risks are considered to be modest.

6.2 Transition arrangement to regular operations:

The commitment expressed by the MARD and CPO to develop fully the potential of all of the subprojects has been met at ICR, with a sole exception (Duy Thanh Sluice). Some 195 project packages have been procured and handed over to IMC management, with an additional 39 completed packages ready for hand-over. Only packages connected with the Duy Thanh Sluice are still under construction, being funded fully by the government. The GoV is committed to full utilization of the agricultural land base and infrastructure, with the aim of achieving full agricultural production potential through crop intensification. It is also fostering agricultural policy changes and expanding its programs to encourage community involvement in management of the agricultural resource base. These measures should help to optimize returns from rehabilitation investments.

7. Bank and Borrower Performance

Bank

7.1 Lending:

IRP was the first Bank-supported irrigation project in Vietnam following its return in 1993. Accordingly, the Bank provided a highly qualified team to guide preparation and appraise the project, building on information gained from FAO-World Bank explorations in Vietnam that began in 1989. The appraisal team included seasoned experts able to work effectively in an environment where the GoV was unfamiliar with the Bank and where information was scarce. Particular attention was paid to managing resettlement issues under a RAP (a first for the GoV) and to special environmental conditions in the Mekong Delta Region. While the PAD contains some weaknesses due to data limitations, Bank performance during project preparation is rated as satisfactory.

7.2 Supervision:

Sixteen Bank supervision missions supported fiduciary oversight and guidance of project activities by MARD, CPO, the SIOs and their implementing partner agencies. Bank missions were regular and timely, developing a high level of understanding of the project, as well as effective cooperation with a new borrower agency coming to terms with the Bank complex procedural issues for the first time. Supervision was enabled by the Bank's policy of decentralization that resulted in the opening of a Bank office in Hanoi in 1994, the recruitment on national operations officers with knowledge of the GoV, and the assignment of supervision responsibility to the field office in 1995. Numerous mini-supervision missions were mounted between the formal, six-monthly supervision missions. Supervision performance is rated as fully satisfactory.

7.3 Overall Bank performance:

Overall the performance of the Bank is considered to be fully satisfactory. This judgement has been reinforced by the borrower, including the national and local agencies involved in project implementation. Satisfactory performance was supported by decentralization of task team leadership and supervision to the resident staff of the World Bank Mission in Hanoi. Having key members of the project task team in the field, including the team leader, allowed extensive direct communication with the borrower outside normal schedule of supervision missions. The continuity provided by one operations officer who followed the project from appraisal to ICR proved invaluable in a project with five task managers between identification and ICR.

Borrower

7.4 Preparation:

Although the Borrower was unfamiliar with the Bank when preparation began and data limitations were common in Vietnam at that time, ownership of, involvement in and contributions to project preparation were always constructive and are considered fully satisfactory. Relevant aspects of project design were adequately addressed including technical, institutional, environmental and social issues, and the planning of activities and budgets.

7.5 Government implementation performance:

Despite its inexperience with World Bank-financed projects, Borrower performance was satisfactory. MARD had created the CPO in 1994 and worked hard to develop and maintaining effective coordination with the several departments involved with project implementation and the Bank. This was challenging working within the project's institutional arrangements as agreed at appraisal. Organizational arrangements required adjustment to established lines of accountability for processing activities related to procurement and financial management. Some progress was made in strengthening IMC capacity for

autonomous operations and self-reliance as well as for the use of the DAF to fund tertiary system development and other O&M activities. Nevertheless, some delays were encountered in MARD's internal decision making, the timely provision of counterpart funding and the fielding of technical assistance. These events slowed down project implementation. However, given the scope and complexity of the project and the long learning process MARD went through, Borrower performance was satisfactory throughout implementation.

7.6 Implementing Agency:

The overall performance of the implementing agency (MARD its CPO and SIOs) is considered to be satisfactory. CPO performance improved steadily from the outset of implementation to project closing. At the outset, the CPO and its project implementing partners were unfamiliar with Bank procedures, and their management effectiveness steadily improved in light of experience. The CPO's administrative, procurement and financial management processes, as well as the staffing and general resource levels, are still in need of further strengthening if future projects are to be implemented effectively and on time.

MARD's implementing units, the CPO and SIOs, require further capacity strengthening to undertake project tasks, particularly with respect to implementing monitoring, financial management and related information systems efficiently. Specific areas where further support for capacity building would be valuable include procurement planning and procedures, application of the MIS, construction quality assurance systems for works in the field, processing of delayed contracts payments and administration and financial accounting systems.

7.7 Overall Borrower performance:

Overall Borrower performance is rated satisfactory. MARD, the CPO, SIOs and IMCs have learned World Bank procedures and shown the flexibility and commitment needed to improve their capacity to make the project outputs and outcomes successful. Despite some shortcomings, most project targets have been achieved within a slightly extended time frame, at or below budget and to an acceptable standard of quality. Numerous additional tasks were also completed, many under difficult circumstance, such as those caused by the Asian Financial Crisis and after acute flooding. The GoV through its pursuit of improved policy and regulatory commitments is also providing assurances of project sustainability.

8. Lessons Learned

A number of lessons have been identified based on project implementation, these include:

Future project designs should include a logical framework and KPIs applied in all World Bank-assisted projects. When these are not available in dated projects, some effort should be made to compensate for their absence.

The authority, responsibilities and accountability of the implementing agencies – notably the CPO and SIOs - should be sufficient and clearly defined at project start-up. The ability of agencies outside the project - but inside MARD - to delay implementation should be reduced.

The existence of an institutional framework and capacity to coordinate activities and decision-making among project implementing agencies effectively is a prerequisite for efficient and timely project management. The CPO should be provided with increased authority to fulfill its interdepartmental functions in a timely way.

Good coordination among agencies at all levels requires common understanding of the project concept

and objective and shared information. To facilitate this common understanding, primary project documents such as the Staff Appraisal Report, Mid-term Review, and periodic Aide-Memoires should be translated and widely distributed throughout the project as they become available.

Institutional capacity building (e.g. for O&M and Cost Recovery) should include activities enabling timely recruitment and participation of locally engaged staff through appropriate human resources management methods in order to: (i) deliver services effectively; (ii) integrate agriculture extension and water user groups into the program; and (iii) facilitate formation of organized beneficiary groups.

Greater emphasis on community development and participatory methods in project planning should be included in future projects, early in implementation. The adaptation of approaches currently being planned for World Bank- and ADB-funded projects, including support for integrated water resource management in a basin context, agricultural intensification and diversification, and user participation in O&M management, are important in order to strengthen IMCs and WUAs and raise their level of self-sufficiency.

Socioeconomic considerations are important in WUA and IMC strengthening programs. Projects should address special needs, such as instruction in family and community financial management, to help ensure local commitment and active farmer involvement. This can be particularly critical when changes in water user fees are part of project design. Social baseline surveys and participatory needs assessments should be routinely included when designing future programs for rural development and poverty reduction.

Contracting the WUA to undertake infrastructure O&M poses both benefits and costs. On the one hand, it can be a cost-effective approach that enables the WUA to select the most capable local contractors and create local employment opportunities; on the other, it may remove the competitive element of procurement and sometimes lends itself to abuse.

Extension service and farmer technical support activities should commence at an earlier stage in future projects, with the active involvement and support of Department of Agriculture & Rural Development (DARDs), Department of Agriculture & Forestry Extension (DAFEs) and the provincial and district agricultural extension offices.

The introduction of new activities (such as financing tertiary system development through loan financing and farmer training at the local level) should be well designed, openly discussed and realistically scheduled. Sufficient lead time is needed in order to educate administrators and potential beneficiaries and to prepare clear guidelines - including administration procedures and reporting formats - in order to raise understanding of program requirements. Training for staff and farmers should be conducted well in advance, with the early involvement of Community Organizers.

Major investments in irrigation system rehabilitation in areas adjacent to urban communities need to be assessed carefully in light of likely land use changes. While currently outperforming the SAR estimates, the sustainability of investments in Hoc Mon-North Binh Chanh subproject on the urbanizing boundary of Ho Chi Minh City are likely to be stressed in the future with agricultural land re-assigned to urban use and agricultural water re-allocated to urban and industrial uses. Growing industrialization also poses challenges for water quality in agricultural areas.

9. Partner Comments

(a) Borrower/implementing agency:

The Project was appraised in 1995. The analysis conducted at the time determined that the investment was justified on the expectations that the objectives stated for the project would be achieved and, in quantifiable terms, the economic rates of return for the 7 subprojects and the project overall would exceed the threshold rate of 12%. These estimates were calculated on assumed costs and benefits over a 20-year period with subproject maturity defined as being reached 5 years after completion of construction.

A Project Impact Assessment was completed by the CPO using the International Consultants to compare the original SAR results with revised estimates based on actual costs and benefits, and updated assumptions of future costs and benefits based on the latest data and information available. The consultants assigned for this purpose conducted quantitative and qualitative analyses based on visits to all 7 subproject sites where actual data was collected and in-field assessments were made. These were followed up by consultations with stakeholders at CPO and other interested agencies. The results of the analyses are contained in this report.

Given some delays in project construction and implementation, all but one of the subprojects, Thach Nham, have still not reached maturity by the definition provided at the time of project appraisal. Nevertheless, economic analyses of the subprojects revealed that all exceed the 12% threshold and overall, the project ERR is 19% compared to 17% previously estimated. This is a satisfactory result, especially given the early stage of subproject development and the non-quantifiable benefits provided by flood damage repair and dam safety which are considerable.

The stated objectives of the project were to increase agricultural production and farmer incomes, and reduce poverty. Despite the early stage of subproject development, the CPO's Project Impact Assessment has borne out the expectation of these achievements. There is already a significant increase in rice and corn production, in most cases above the levels estimated at the time of Project Appraisal. Farmers' incomes have also increased with such increases ranging at the various subprojects from 96% to 140% of those estimated without the project.

Other benefits of the project include:

- Increased irrigated area;
- Increased cropping intensity;
- Improved land and labor efficiency;
- Increased yield of rice and other crops on irrigated areas;
- Increased yield of other crops on non-irrigated areas;
- Improved groundwater conditions;
- Improved drainage; and
- Improved transport infrastructure.

In combination, these benefits have contributed to a reduction in rural poverty levels, which is borne out by improved poverty, health and education statistics compared to those evident before the Project.

The environmental impact of the project is generally positive with improved drainage and groundwater, and decreased water and soil salinity at the project sites. However, there were also some potential negative

impacts reported, including the potential for the pollution of wells in close proximity to canals and drains, and polluting and unsanitary conditions caused by disposal of waste into the canals. This is a result from human behavior and beyond the control of IMCs. However, none of these reported potentially detrimental environmental impacts could be substantiated and are considered as anecdotal information for the purpose of this report only. Verification of anecdotal information was not always possible and beyond the scope and resources of the impact study. Therefore, while reported as potential negative impacts, confirmation would have to be the subject of further study.

In most subprojects, project activities focused on the rehabilitation of existing irrigation schemes and therefore, the requirements for land acquisition and resettlement at appraisal stage were considered small or nonexistent. However, in some subprojects, particularly Thach Nham and Hoc Mon - North Binh Chanh subprojects, there was major construction and expansion of the irrigation schemes for which the acquisition of land required substantial resettlement and compensation programs.

Besides Thach Nham and Hoc Mon - North Binh Chanh, the compensation requirements of the other 5 subprojects were also greater than expected at the time of Project Appraisal. However, it was found that implementation of the resettlement and compensation programs were carried out about as smoothly as could be expected given the complexities involved. The principles of the Resettlement Action Plans and other criteria required by the National and local governments were largely complied with in a timely and efficient manner by the organizational structures and systems established for this purpose. Eligibility criteria for beneficiaries were followed and only a few complaints and grievances were deferred.

There probably could have been more participation in the resettlement and compensation programs by those ultimately affected in the planning and establishment of various aspects of the program and coordination between project construction and these programs could have been improved. However, all in all, it was determined that the resettlement and compensation programs were successfully formulated and effectively administered for the benefit of the Project Affected Families.

In conclusion, the project has had a positive overall impact on the lives of beneficiaries and the Vietnam economy. However, in many cases the subproject development is not yet mature enough for impacts to be fully realized. Therefore, the benefits will continue to grow and possibly exceed original expectations as the project matures. The Government is committed to completing the one remaining subproject where some contracts are less than 100% complete (Duy Thanh Sluice).

MARD appreciates highly the cooperation shown by the World Bank in the flexible implementation of IRP especially: (i) the extension of the project to cover flood damage repair and additional subprojects; and (ii) the attention given to the project by the World Bank task team. The CPO appreciates highly the support provided by the World Bank and especially its office in Hanoi that enabled implementation to proceed effectively.

(b) Cofinanciers:
n/a

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

10. Additional Information

The draft ICR was sent to GoV for comment. The Borrower ICR was prepared by the CPO and submitted to the World Bank as required. Borrower comments on the Bank ICR are included as required in Section 9.

Annex 1. Key Performance Indicators/Log Frame Matrix

Outcome/ Impact Indicators:

Indicator/Matrix	Projected in SAR	Actual achieved at ICR	Percentage
A. Increase agricultural production			
Irrigated area treated	130,353 ha.	133,889 ha	102.7
Paddy area developed/cropped	195,115 ha	193,497 ha	99.1
Maize area developed/cropped	10,909 ha	15,202 ha	139.3
Additional rice production pa	283,293 ton	406,881 ton	143.6
Additional maize production pa	38,317 ton	57,433 ton	149.9
Cropping intensity	217%	176%	81.1
B. Increase farmer income & reduce poverty			
Number of project beneficiaries	312,892 families	338,388 families	108.2
Project area covered by province	7 Provinces	12 Provinces	
Net annual farm households income	US$59.3 per hh at full development	US$66.8 per hh at ICR	112.7
C. Resume agricultural activities following floods	Agricultural activities, disrupted by floods.	Agricultural activities resumed in affected areas.	
D. Detailed impact indicators			
a. Cropped area (ha)			
Rice	195,115	193,497	99.2
Sweet potatoes	36,305	6,053	16.7
Maize	10,909	15,202	139.3
Peanuts	7,189	4,793	66.7
Soybeans	3,300	1,765	53.5
Sugarcane	13,940	9,975	71.6
b. Crop Yield (ton/ha)			
Rice	4.0	4.8	119.7
Sweet potatoes	9.2	6.3	69.1
Maize	3.6	3.8	104.7
Peanuts	1.8	2.5	142.1
Soybeans	0.8	1.8	242.6
Sugarcane	57.4	54.1	94.3
c. Crop production (ton)			
Rice	802,541.0	926,229.2	115.4
Sweet potatoes	332,762.0	38,335.6	11.5
Maize	39,349.0	57,433.5	146.0
Peanuts	12,589.0	11,933.9	94.8
Soybeans	2,495.0	3,237.0	129.7
Sugarcane	799,720.0	539,437.5	67.5
Total	**2,064,541.0**	**1,766,506.6**	

Output Indicators:

Component/Item/Unit	Unit	SAR estimated	ICR	%
			Actual/Latest Estimate (2)	**Actual/Latest Estimate**
A. Irrigation and Drainage System				
Rehabilitation Works				
Dams/weirs, sluices, spillways	no	9.0	42.0	366.7
Main canals	km	174.0	452.2	259.9
Primary canals	km	98.0	480.3	490.1
Secondary canals	km	512.0	650.0	127.0
Tertiary canals	ha	41,135.0	48,152.0	117.1
Dredging	1000 m3	740.0	2,449.6	331.0
Dykes	km	n.a.	80.4	
Pumping stations	no	97.0	101.0	104.2
New Works (1)				
Dams/weirs, spillways, sluices	no	14.0	31.0	121.4
Main canals	km	13.8	127.2	921.7
Primary canals	km	94.0	136.8	145.5
Secondary canals	km	340.0	405.0	119.1
Tertiary canals	ha	33,700	45,150.0	134.0
Dredging	1000m3	0.0	1,086.1	
Dykes	km	n.a.	27.1	
Pumping stations	no	3.0	11.0	366.7
B. Flood Protection (1)				
Dams/weirs and spillways	no	n.a.	10.0	
Canals	km	n.a.	13.8	
Dykes	km	n.a.	6.1	
C . Resettlement				
Affected families	no	8,451.0	22,104.0	261.6
Houses compensated	no	178.0	312.0	175.3
Land acquired	ha	582.0	9,651.0	1,658.2
D. Agriculture Support				
District extension centers	no	20.0	25.0	125.0
Office equipment	no	120.0	475.0	395.8
Farmer 1-day training seminars	no	1,600.0	1,885.0	117.8
E. Operation and Maintenance (IMC)				
O&M vehicles and equipment	$'000	2,900.0	1,167.0	40.2
F. Training, Technical assistance and Consultant				
National Training course, workshop	no	n.a.	20.0	
International Training course, workshop	no	n.a.	10.0	
Participant	person day	6,000.0	8,862.0	147.7
Irrigation extension adviser in CPO	mm	3.0	3.0	100.0
International experts	mm	194.0	184.0	94.8
National experts	mm	504.0	498.0	98.8

Notes:
(1) The percentage of completion at ICR is calculated based actual versus new subproject designs and flood repair proposals.
(2) Column 4 includes changes made under MTR (with flood damage repair and 7 additional, new subproject areas for each component)

Annex 2. Project Costs and Financing

Project Cost by Component (in US$ million)

	PROJECT COST BY COMPONENT	Appraisal Estimate	Actual/latest Estimate	Percentage of Appraisal
A	**Subprojects**			
	a Cam Thuy	2.7	2.1	76.2
	b South Nghe An	18.6	16.7	89.5
	c Linh Cam	11.5	10.1	87.5
	d An Trach	4.4	7.2	164.8
	e Thach Nham	29.5	26.2	89.0
	f Dong Cam	10.2	6.4	63.2
	g Hoc Mon-North Binh Chanh	31.2	11.1	35.5
	Sub-total:	**108.1**	**79.8**	**73.8**
B	**Flood damage repair**		**5.5**	
C	**Expansion of works and rehabilitation**		**10.0**	
D	**Consultants and training**			
	Technical Advice	1.7	4.2	247.7
	Project Administration	2.9	2.8	96.3
	Sub-total:	**4.6**	**7.0**	**152.2**
E	**Total Baseline Costs**	**112.7**	**102.3**	**90.7**
	Physical Contingencies	16.8		
	Price Contingencies	6.2		
F	**Total Project Costs**	**135.7**	**102.3**	**75.4**
	Taxes and Duties	7.0		
	Total Costs Net of Taxes and Duties	**128.7**	**102.3**	**79.5**

Project Costs by Procurement Arrangement (Appraisal Estimate) (US$ million)

	Expenditure Category	Procurement Method				Total Cost
		ICB	NCB	Other	N.B.F	
1	**Civil Works**					
	Major Civil Works	55.0	37.2	5.0	13.6	110.9
	IDA share	50.0	33.2	5.0	0.0	88.2
2	**Goods**					
	Equipment and vehicles	9.1		0.5		9.6
	IDA share	7.0		0.5		7.5
3	**Consultants and Training**					
	Consultants			3.6	0.2	3.8
	IDA share			3.6		3.6
	Training			0.7		0.7
	IDA share			0.7		0.7
4	**Engineering/Administration**				3.4	3.4
	IDA share					0.0
5	**Resettlement/Environment/Mitigation**				7.3	7.3
	IDA share					0.0
	Total	**64.1**	**37.2**	**9.8**	**24.5**	**135.7**
	Total IDA share	**57.0**	**33.2**	**9.8**	**0.0**	**100.0**

Project Costs by Procurement Arrangements (Actual) (US$ million)

	Expenditure Category	Procurement Method				Total Cost
		ICB	NCB	Other	N.B.F	
1	**Civil Works**					
	Major Civil Works	0.0	61.1	24.2	2.1	87.3
	IDA share	0.0	51.7	20.5		72.2
2	**Goods**					
	Equipment and vehicles	3.2	0.9	0.0	0.0	4.1
	IDA share	2.3	0.6			2.9
3	**Consultants and training**					
	Consultants	3.4	0.0	0.0	0.0	3.4
	IDA share	3.4	0.0	0.0		3.4
	Training			0.8		0.8
	IDA share			0.8		0.8
4	**Engineering/Administration**				2.8	2.8
	IDA share					
5	**Resettlement/Environment/Mitigation**				3.9	3.9
	IDA share					0.0
	Total	**6.7**	**61.9**	**25.0**	**8.8**	**102.3**
	Total IDA share	**5.7**	**52.3**	**21.2**	**0.0**	**79.3**

Notes:

Civil works - others:

South Nghe An sub. -direct appointment	0.9
Thach Nham sub. -direct appointment	0.6
Project Retroactive financing	9.5
Tertiary canal	9.4
Subtotal	20.5

There are no ICB packages because they were not relevant given the original project design which mainly rehabilitated and upgraded canal systems which were located over a wide area and where the scope of works was modest and unlikely to attract international bidders. During implementation, MARD discussed and agreed with the Bank to divide potential ICB packages into NCB.

Project Financing by Component (in US$ million)

	Component	Appraisal Estimate				Actual/Latest Estimate				Percentage of Appraisal		
	Subprojects	***Total***	***IDA***	***Govt.***	***Farmers (1)***	***Total***	***IDA***	***Govt.***	***Farmers***	***IDA***	***Govt.***	***Farmers***
1	Cam Thuy	2.9	2.3	0.3	0.3	2.1	1.5	0.5	0.0	65.2	166.7	0.0
2	South Nghe An	19.4	15.1	2.2	2.1	16.7	13.8	2.9	0.0	91.4	131.8	0.0
3	Linh Cam	12.0	9.3	1.4	1.3	10.1	8.6	1.5	0.0	92.5	107.1	0.0
4	An Trach	4.9	3.8	0.6	0.5	7.2	5.3	1.9	0.0	139.5	316.7	0.0
5	Thach Nham	29.9	23.2	3.4	3.3	26.2	19.0	7.3	0.0	81.9	214.7	0.0
6	Dong Cam	11.2	8.7	1.3	1.2	6.4	5.4	1.0	0.0	62.1	76.9	0.0
7	Hoc Mon-North Binh Chanh	30.0	23.4	3.4	3.2	11.1	8.2	2.9	0.0	35.0	85.3	0.0
	sub-total	***110.3***	***85.8***	***12.6***	***11.9***	***79.8***	***61.8***	***18.0***	***0.0***	72.0	142.9	0.0
8	Flood damage repair		0.0	0.0	0.0	5.5	4.8	0.8	0.0			0.0
9	Additional works		0.0	0.0	0.0	10.0	8.5	1.4	0.0			0.0
	Sub-total subproject cost	***110.3***	***85.8***	***12.6***	***11.9***	***95.3***	***75.1***	***20.2***	***0.0***	**87.5**	**160.3**	***0.0***
	Consultants and training											
	Technical Advice					4.2	4.2	0.0	0.0			
	Project Administration					2.8	0.0	2.8				
	Subtotal	***5.5***	***4.3***	***0.6***	***0.6***	***7.0***	***4.2***	***2.8***	***0.0***	***108.0***	**466.7**	***0.0***
	Total baseline cost	**115.8**	**90.1**	**13.2**	**12.5**	**102.3**	**79.3**	**23.0**	**0.0**	**88.0**	**174.2**	**0.0**
	Unallocated	**12.9**	9.9	1.6	1.4	0.0	0.0	0.0	0.0			
	Total project cost	**128.7**	**100.0**	**14.8**	**13.9**	**102.3**	**79.3**	**23.0**	**0.0**	**79.3**	**155.4**	**0.0**

Annex 3. Economic Costs and Benefits

Major economic benefits achieved by the project include the increase in agricultural production and farmers' incomes, and the reduction of poverty in the project area through restoration, rehabilitation and/or completion of 14 irrigation schemes, improvement of operation and maintenance practices, and strengthening of agriculture services in project areas.In addition, the project accelerated the repair of irrigation schemes damaged by acute floods in 1998, 1999 and 2000. This contributed to the restoration of livelihoods of numerous rural communities.

Agricultural Benefit

The project has made a significant impact on agricultural production in the project area, compared to the "without" case and quantitative targets set at project appraisal. The total project developed/rehabilitated irrigation area has increased from 67,700 ha (without project) to about 133,889 ha (103% of SAR, with additional 24,015 ha in seven new subproject areas). At the ICR, the average crop yields in project area has increased from 3 ton to 4.8 ton for rice (116% of SAR), from 1.2 ton to 3.6 ton for maize (105% of SAR), from 1.3 ton to 2.5 ton for peanut (142% of SAR), from 0.7 ton to 1.8 ton for soybean (243% of SAR), from 36.5 ton to 54.1 ton for sugarcane (94% of SAR, 148 % of the without project scenario), and from 6.2 ton to 6.3 ton for sweet potatoes (70% of SAR, 102 % of the without project scenario).

There is already a significant increase in rice, corn, peanut and soybean production. Total rice production has already increased by 407,982 tons (116% of SAR), from 518,000 tons to about 926,229 tons per year; the annual corn production has increased from 1,032 tons to 57,433 tons (almost 5,565% over the "without project" case, and 160% of SAR); the annual production for peanut increased from 6,882 tons to 11,934 tons (104% of SAR, or 173% of the without project scenario); and annual soybean production increased from 2,310 tons to 3,237 tons (about 123% of SAR). Overall, total incremental annual production is valued at VND475.7 billion. Incremental production of various crops in 14 subproject areas are shown below:

Incremental Crop Production at ICR

(Unit: Ton)

Crop production	Without project in 1995 (1)	SAR estimate at full development (2)	Actual production at ICR (3)	Actual Incremental production (3-2)	Actual Incremental production (3-1)	Incremental percentage (3/1)	Incremental percentage (3/2)
Rice	518,247	799,972	926,229	126,257	407,982	179%	116%
Sweet potatoes	236,418	334,006	38,336	-295,670	-198,082	16%	11%
Corn	1,032	35,892	57,433	21,541	56,401	5565%	160%
Peanuts	6,882	11,502	11,934	432	5,052	173%	104%
Soybean	2,310	2,640	3,237	597	927	140%	123%
Sugarcane	410,701	900,524	539,438	-361,087	128,737	131%	60%
Fruit	n.a.	n.a.	14,400	14,400	14,400		
Wood	n.a.	n.a.	175,500	175,500	175,500		

Sources: Subproject SIOs, IMCs and DARDs

Note: (1) At the full development defined as 5 years after completion of construction

(2) With the project, farmers no longer cultivate mung beans.

Compared to the "without project" scenario and expected targets at SAR, the total crop area and crop intensity have been decreased from 250,090 ha to 235,035 ha (94% of the without project scenario) and

from 192% to 175% respectively at the ICR, due to the decreased crop land for urban development in local area and the reallocated administrative area at county level. In addition, the cropping area of third season rice was reduced significantly in most area due to a substantial increase in crop yields, and one season crop area for corn (almost 1,700% over the "without project" case, and 139% of SAR).

As shown above, achievements of the subprojects and the project overall have had a significant impact on agricultural production compared to the case without the project and, despite the early stage of development, some indicators approach and even exceed the targets set at the time of project appraisal. The details for irrigated land, crop intensity, crop area and yield, and total production in each subproject area are presented in attached Table 1 for original seven subprojects, Table 2 for the seven additional subprojects, and Table 3 for the overall project.

Rural Incomes and Impact on Poverty (Financial analysis)

Although financial analysis, strictly speaking, is not relevant to public irrigation schemes financed under the project, farm level financial analysis was carried out to assess the project's impact on beneficiary farmer incomes. The project at ICR is benefiting about 338,388 farm families (about 205,000 in the seven original subprojects area and 133,388 in new area), who are poor rural farmers in 12 provinces, that is about 108% of the SAR estimate of some 312,892 family beneficiaries. The farm model analysis shows a substantial increase in beneficiary farmers' income with the comprehensive improvement in irrigation and drainage facilities, crop production and agricultural support services.

Representative farm households were selected in the seven original subproject areas. The following assumptions were made to assess the financial impact of the project on household incomes: (a) average farm holdings of 0.31 ha in Cam Thuy, 0.35 ha in South Nghe, 0.39 ha in Linh Cam, 0.35 ha in An Trach, 0.5 ha in Thach Nham, 0.25 ha in Dong Cam, and 1.0 ha in HM-NBC subproject, combined with the actual cropping intensity in each subproject area due to the change from dry and partially irrigated land to fully irrigated land; (b) the average 2000 financial farm gate prices were used to value outputs and inputs; and (c) from 1996 to 2003, actual cropping pattern, intensity and the per ha crop budgets (with and without the sub-project) were applied for annual and perennial crop production in each subproject area, with increased crop yields derived from the development of irrigation and drainage and changes in agricultural technology. The results including incremental farm households income are presented below for seven, typical household farm models.

Income Impact on Farm Household

Sub-project	Average farm size (ha)	Cropping Intensity (percent)	Farm Families (No.)	Incremental annual net income at SAR at full development (USD)	Incremental annual net income at ICR (USD)	Incremental Percentage (ICR/SAR)
Cam Thuy	0.31	224.0	3,890	35	86.0	245.7
South Nghe An	0.35	231.4	45,586	72	12.4	17.2
Linh Cam	0.39	200.0	18,351	69	52.1	75.6
An Trach	0.35	161.7	16,534	84	69.0	82.1
Thach Nham	0.50	129.6	53,922	87	152.0	174.7
Dong Cam	0.25	202.7	55,980	9	17.0	188.9
Hoc Mon	1.00	135.6	10,710	n.a.	78.9	n.a.
Total Project	0.45	172.0	204,973	59.3	66.8	112.0

The impact of the project on farm incomes has been substantial and helped to raise farm incomes for some 338,388 farm families benefiting directly from the project. At the ICR, the incremental net annual income of farm households which adopted improved irrigation and technology under the project has been raised by US$86 (about 246% of SAR) in Cam Thuy, US$12.4 (about 17.2% of SAR) in South Nghe An, US$52.1 (about 75.6% of SAR) in Linh Cam, US$69 (about 82.1% of SAR) in An Trach, US$152 (about 175% of SAR) in Thach Nham, US$17 (about 188.9% of SAR) in Dong Cam, and US$78.9 (not available in SAR) in the Hoc Mon - North Binh Chanh subproject area. The overall average net farm income for farm households in 7 original subproject areas has increased about US$66.8 (about 112% of SAR). This indicates strong financial incentives for farmers to participate in the project and the direct poverty alleviation effects. The full set of farm models representing all the subprojects are provided in the project file.

Net Present Value/Economic rate of return

The economic rate of return (ERR) was re-estimated for the original seven subprojects, the seven additional subprojects, and the project as a whole. The ERR for the project is estimated at 19.2% (NPV: VND 281 billion), higher than the 17% estimated at appraisal. The main reasons for this are: (i) an increase in developed/ rehabilitated irrigated land (an increase of some 3,536 ha) for total project area; (ii) large project cost saving (total of US$18.3 million for 14 irrigation subprojects, i.e. about 17% of the total original subproject costs at SAR) due to the savings attributable to the introduction of competitive bidding in procurement of works and goods; (iii) devaluation of the VND that resulted in a substantial increase of IDA funds in local currency terms; and (iv) substantial increases in main crop yields, e.g., increases in yield of rice and corn of more than 30 percent in most subproject areas. A comparison of ERRs by subproject is shown below:

Original subproject	ERR at SAR	ERR at ICR	New subproject	ERR at SAR	ERR at ICR
Cam Thuy	16%	15.0%	**South Truoi**	n.a.	19.3%
South Nghe An	12%	19.6%	**Kieu**	n.a.	29.7%
Linh Cam	21%	16.5%	**Kinh Mon**	n.a.	18.1%
An Trach	27%	17.5%	**Da Mai**	n.a.	11.0%
Thach Nham	24%	20.6%	**Vuc Tron**	n.a.	13.8%
Dong Cam	12%	16.5%	**Liet Son**	n.a.	16.6%
Hoc Mon - North Binh Chanh	12%	17.7%	**Hoa My***	n.a.	3.0%
Subtotal original subproject	17.0%	19.0%	**Subtotal new subproject**	n.a.	20.5%
Total project	17.0%	19.0% NPV: VND 281 Billion			

* The Hoa My new area was mainly for flood damage repairs and reinforcement works with high investment cost and small irrigation area.

At the time of project appraisal the economic analysis included only the seven original subprojects. However, at ICR separate economic analyses have been carried out for the additional seven new subprojects (see above table), which were approved at the MTR, and accounted for 11% of the total civil works costs and 18% of the total developed/rehabilitated irrigation areas. The analysis compared “with project” and “without project” scenarios, and the quantifiable benefits derived from improvements to irrigation and drainage facilities, low yield farmland, and agricultural services, and the estimated economic costs. The ERRs of individual subprojects range from about 11% in Da Mai irrigation area to 29.7% in Kieu irrigation area (excluding Hoa My), depending on the actual crop yields, cropping intensity and

cropping pattern, the size of the irrigation and planted area, and the investment and O&M costs for each scheme at the time of implementation. The overall ERR for the seven new subprojects is estimated at 20.5% with a net present value of about VND 37.4 billion.

For the original seven subprojects, the ERRs range from 15% for Cam Thuy to 20.6% for Thach Nham. For South Nghe An, Dong Cam, and Hoc Mon - North Binh Chanh subprojects, the actual ERRs are higher than those estimated at SAR, mainly due to significantly increased yields of paddy (about 131-136% of SAR), maize (about 160% of SAR) and peanuts (about 140% of SAR) and to more diversified crop production in these subproject areas. In Hoc Mon- North Binh Chanh subproject, for example, the total irrigated land and sown area were reduced by 15% and 35% respectively due to increased local urbanization and crop diversification (with reduced cropping intensity). However, the ERR is still higher than the 12% estimated at appraisal because of the increased production of high value fruit crops (1800 ha) and forests (1950 ha), and increased yields for sugarcane.

For Linh Cam, An Trach, and Thach Nham subprojects, the actual recalculated ERRs are lower than those estimated at the appraisal, because the irrigated land decreased significantly due to the urbanization in these localities and to change in administrative boundaries which affected implementation. In addition, the cropping area of the third season rice was reduced significantly in most area due to the increased yields for maize and winter-spring and summer-autumn rice which are more cost-effective and environmentally more sustainable. Nevertheless, economic analysis of the subprojects shows that the recalculated ERRs are all favorable, with an overall subproject ERR of 19% (NPV: VND 249.6 billion), compared with the 17% estimated at SAR (NPV not available).

This is considered to be a satisfactory result, particularly in view of the early stage of most subproject developments and the numerous non-quantifiable, social and environmental benefits attributable to the project. These include community safeguards under the RAP, the increase in reliability of water delivery brought about by the lined canals, enhanced drainage and salinity intrusion protection, improved road access to communities, and the increases in agricultural production.

Main Assumptions for Financial and Economic Analysis

The ERR estimate was compared with the SAR, using revised estimates based on the latest data and information for actual costs and benefits, and updated assumptions of future costs and benefits provided by SIOs, IMCs and DARDs at 14 subproject sites in 2003, and a summary of the International Consultants' *Financial and Economic Analysis* report (a quantitative and qualitative analyses based on the information collected and assessed for 2001 in the seven original subproject area).

The framework of the analysis follows, to the extent possible, that of the SAR. Key assumptions have been changed only when clearly better estimates are available. The assumptions applied in the financial and economic analyses mainly cover the general concepts and field activities relating to on-farm crop development for the incremental production of crops made possible as a result of the project. The general assumptions are as follows:

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(a) The project implementation period was seven years with 1996 being the first year of the project unless otherwise stated, as was the case for some subprojects. The economic life of subprojects is assumed to be 20 years for field development. The benefits and costs are presented in 2000 prices. Inputs and outputs prices used in the crop budgets are actual 2000 farm-gate prices in project area, and provided by the project authorities.

(b) At the ICR, total actual investment cost for civil works of 14 irrigation schemes was about US$95.3 million of which 83.7 percent (US$79.8 million, 74% of SAR) was invested in the original seven subprojects, 10.5 percent (US$10 million) in the seven additional, new subprojects, and about 7 percent (US$5.5 million) in flood protection works. All above project costs (except flood damage repair), agricultural production cost and O&M costs, have been considered in estimating the economic costs of the project, but the cost of consultants and training component (US$7 million, 152% of SAR), taxes, duties, and other charges were omitted. The basic rural daily wage in Vietnam is assumed to be VND 15,000 per day. The shadow wage rate applied in the economic analysis is 0.8. A discount rate of 12% was applied to approximate the opportunity cost of capital in Vietnam.

(c) The project benefits are best estimated and are based on the actual performance of existing crops in each subproject area. They reflect the actual irrigated land developed/rehabilitated with the actual cropping pattern and intensity by year in each subproject area. The detailed crop budgets reflect actual scenarios for rice, corn, peanut, soybeans, sweet potato, sugarcane, fruit and forest production in each irrigation area. Projected yields are actual yields from 1996 to 2003, and the estimated yields (to full development) are based on the experiences of the existing project in each sub-project area. The amount applied of seeds, fertilizers and farm chemicals are also the actual average and the incremental levels in each area. Flood control benefits - which are likely to be substantial - have not been included in the analysis, because information is not available to quantify them.

(d) The World Bank Commodity Price projections were used to estimate farm-gate prices in constant 2000 terms for traded inputs and outputs (rice and fertilizers) with domestic and international transport and handling**.** A standard conversion factor of 0.9 is applied to all non-traded items.

The details of these and other assumptions applied in the financial and economic analysis are presented in the project files.

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating	
Month/Year	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation				
05/15/1993	*6*	IRRIGATION ENG./ TEAM LDR., AGRICULTURALIST, ECON., IRRIGATION ENG., SOC. SPEC. ; ENV. SPEC.		
01/10/1994	*5*	TEAM LDR., IRRIGATION ENG. (2), SOC. SPEC.; ENV. SPEC.		
04/14/1994	*3*	TEAM LEADER, IRRIGATION ENG., ENV. SPEC.		
Appraisal/Negotiation				
07/05/1994	*9*	TEAM LDR.; IRRIGATION ENG. (3), ECONOMIST, FIN. ANALYST, ENV. SPEC., SOC. SPEC., LAWYER,		
10/08/1994	*10*	TEAM LDR., SOC & ENV. SPEC., IRRIGATION ENG. (2), LAWYER, FINANCIAL SPEC. ECON. (4)		
Supervision				
07/18/1995	*5*	IRRIGATION ENG.; RESETTLEMENT SPEC.; WATER RES. MGMT. SPEC.; PROCUREMENT SPEC.; TEAM LDR./ECON.	S	S
12/08/1995	*4*	PROCUREMENT SPEC.; WATER RES. MGMT. SPEC.; IRRIGATION ENG.; TEAM LDR./ECON.	S	S
02/06/1996	*3*	PROCUREMENT & DISBURSEMENT SPEC., ENV. SPEC., TEAM LDR.	S	S
01/25/1997	*4*	IRRIGATION MGMT. SPEC.; TEAM LEADER; INSTIT. SPEC.; ENG.	S	S
06/17/1997	*4*	TEAM LDR; INSTIT. SPEC.; WATER RES MGMT SPEC.; ENG.	S	S
11/29/1997	*2*	TEAM LDR.; ENG.	S	S
8/14/1998	*3*	TEAM LDR; ECON.; ENG.	S	S
11/15/1998	*6*	TEAM LDR; ECON.; ENG.; RESETTLEMENT SPEC.; PROCUREMENT SPEC.;	S	S

			FINANCIAL SPEC.		
	06/29/1999	*4*	TEAM LDR; ECON.; ENG.; RESETTLEMENT SPEC.	S	S
	06/18/2000	*3*	TEAM LDR/ECON.; ENG.; RESETTLEMENT SPEC.	S	S
	12/12/2000	*2*	TEAM LDR., ECON.; ENG.	S	S
	09/06/2001	*1*	TEAM LDR.ECON./ENG.	S	S
	05/25/2002	*4*	TEAM LDR, ENG.; RESETTLEMENT/SOCIAL SPEC.; PROCUREMENT SPEC.	S	S
	11/22/2002	*7*	TEAM LDR./ECON; ENG.; SOC. DEV. OFFR.; FINANCIAL MGMT. OFFR.; PROCUREMENT ANALYST; ECON.; ENV. OFFICER	S	S
	05/15/2003	*5*	TEAM LEADER/ECON.; CO-LEADER/ENGINEER; FIN MGMT. OFFR.; PROCUREMENT ANALYST; DISBURSEMENT ANALYST	S	S
ICR					
	10/25/2003	*3*	TEAM LEADER/ENG.; ECON.; RD SPECIALIST	S	S

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US$ ('000)
Identification/Preparation	na	708,477(i)
Appraisal/Negotiation		na
Supervision	na	677,809 (ii)
ICR		na
Total	na	1,386,286

The total includes: (i) all Bank preparation costs up to negotiation (LEN) including US$196,745 in consultant trust funds and a contribution of US$52,815 from FAO/CP, i.e. actual Bank preparation costs were US$458,887; (ii) all Bank supervision (SPN) and ICR costs including a contribution of US$23,887 from FAO/CP, i.e. actual Bank SPN and ICR costs over 16 missions was US$653,922, an average of US$40,870 per mission. Overall Bank budget for the project was US$1,112,809, which was 1.5% higher than the Bank budget allocated for LEN, SPN and ICR.

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

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

	Rating
☐ *Macro policies*	○ *H* ○ *SU* ○ *M* ○ *N* ● *NA*
☒ *Sector Policies*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
☒ *Physical*	● *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☒ *Financial*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
☒ *Institutional Development*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
☒ *Environmental*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
Social	
☒ *Poverty Reduction*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
☒ *Gender*	○ *H* ○ *SU* ○ *M* ● *N* ○ *NA*
☒ *Other (Please specify)*	○ *H* ○ *SU* ● *M* ○ *N* ○ *NA*
Agricultural production/ productivity	
☐ *Private sector development*	○ *H* ○ *SU* ● *M* ○ *N* ○ *NA*
☐ *Public sector management*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
☐ *Other (Please specify)*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*

Agricultural extension support program has great potential to enhance the effectiveness of investment in irrigation infrastructure facilities under the project.

Annex 6. Ratings of Bank and Borrower Performance

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

6.1 Bank performance	*Rating*			
☒ *Lending*	○ *HS*	● *S*	○ *U*	○ *HU*
☒ *Supervision*	○ *HS*	● *S*	○ *U*	○ *HU*
☒ *Overall*	○ *HS*	● *S*	○ *U*	○ *HU*

6.2 Borrower performance	*Rating*			
☒ *Preparation*	○ *HS*	● *S*	○ *U*	○ *HU*
☒ *Government implementation performance*	○ *HS*	● *S*	○ *U*	○ *HU*
☒ *Implementation agency performance*	○ *HS*	● *S*	○ *U*	○ *HU*
☒ *Overall*	○ *HS*	● *S*	○ *U*	○ *HU*

Annex 7. List of Supporting Documents

1. Project and subproject feasibility studies
2. Project Staff Appraisal Report dated April 7, 1995
3. Development credit agreement, April 7, 1995 and three DCA amendments
4. Full supervision reports (16), including Form 590/PSR of the project: 1995-2003
5. Environmental impact assessment and environmental monitoring reports
6. MARD/CPO Impact Assessment Report (2003)
7. MARD quarterly monitoring reports
8. MARD/CPO Project Completion Reports for Physical Works TA Components (2003)
9. MARD/CPO Project Completion Report for Agricultural Support Program component (2003)
10. IMC Financial Management Plans
11. PIM plans and workshop proceedings
12. Agricultural Support Program
13. ICR full economic and financial analysis