Performance Evaluation Report

Reference Number: PPE:VIE 2010-31
Project Number: 29529
Loan Number: 1564-VIE(SF)
September 2010

Viet Nam: Rural Infrastructure Sector Project

Independent Evaluation Department

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 31 July 2010)

Currency Unit	–	Dong (D)
D1.00	=	$0.000052
$1.00	=	D19,075

ABBREVIATIONS

ADB	–	Asian Development Bank
AFD	–	Agence Française de Développement
BME	–	benefit monitoring and evaluation
CPMU	–	central project management unit
CWE	–	commune water enterprise
DARD	–	(provincial) department of agriculture and rural development
DMF	–	design and monitoring framework
EIRR	–	economic internal rate of return
FAO/IC	–	Investment Center of the Food and Agriculture Organization
IED	–	Independent Evaluation Department
IEM	–	independent evaluation mission
IMC	–	irrigation management company
ISF	–	irrigation service fee
MARD	–	Ministry of Agriculture and Rural Development
MTR	–	midterm review
O&M	–	operation and maintenance
PCR	–	project completion report
PPC	–	provincial people's committee
PPER	–	project performance evaluation report
PPMU	–	provincial project management unit
RISP	–	Rural Infrastructure Sector Project
SEDP	–	socioeconomic development plan
SES	–	special evaluation study
TA	–	technical assistance
VRM	–	Viet Nam Resident Mission
WRSR	–	water resources sector review

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
m^2	–	square meter

NOTE

In this report, "$" refers to US dollars.

Key Words

adb, agriculture, asian development bank, project performance evaluation, rural development, rural infrastructure, rural roads, irrigation schemes, water supply schemes, markets, viet nam

Director General	H. S. Rao, Independent Evaluation Department (IED)
Director	R. B. Adhikari, Independent Evaluation Division 1, IED
Team leader	C. F. Infantado, Portfolio Evaluation Officer, IED
Team member	B. Q. Cafirma, Evaluation Assistant, IED

Independent Evaluation Department, PE-733

CONTENTS

The guidelines formally adopted by the Independent Evaluation Department (IED) on avoiding conflict of interest in its independent evaluations were observed in the preparation of this report. William Colin Steley, consultant, took part in the evaluation mission. Ganesh Rauniyar, Senior Evaluation Specialist, supervised and guided the team. R. B. Adhikari, Director, IED1, was with the Viet Nam Resident Mission from July 2002 to July 2005 but was not involved in the implementation of the project. To the knowledge of IED management, the persons preparing, reviewing, or approving this report had no conflict of interest.

BASIC DATA

Project Preparation and Institution Building Grant/Technical Assistance

TA No.	Assistance Name	Type	Person-Months	Amount	Approval Date
2635	Rural Infrastructure Sector Project	PP	47	$600,000	28 Aug 1996
2838	Training for Rural Infrastructure Development	AD (grant)	50	$1,000,000	11 Aug 1997

Key Project Data ($ million)	**In ADB Loan Documents**	**Actual**
Total project cost	150.0	151.1
Foreign exchange cost	45.0	41.7
ADB loan amount/utilization	102.9	94.6
ADB loan amount/cancellation		8.3
Amount of cofinancing		
Agence Française de Développement	15.0	14.8

Key Dates	**Expected**	**Actual**
Appraisal		5 May 1997
Loan negotiations		10 September 1997
Board approval		23 October 1997
Loan agreement		23 January 1998
Loan effectivity	30 April 1998	30 April 1998
Completion	31 December 2004	31 December 2004
Loan closing	31 December 2004	28 September 2005
Months (effectivity to completion)	81.2	81.2

Borrower Government of Viet Nam

Executing Agency Ministry of Agriculture and Rural Development

Mission Data

Type of Mission	**No. of Missions**	**Person-Days**
Fact-finding	1	60
Appraisal	1	40
Inception	1	3
Project administration		
Review	7	183
Midterm	1	60
Special loan administration	1	28
Project completion	1	10
Operations evaluation	1	30

AD = advisory, PP = project preparatory, TA = technical assistance.

EXECUTIVE SUMMARY

Agriculture and rural development are critical to Viet Nam's development, as 80% of the country's poor live in the rural areas, and the greater part of the rural population is primarily engaged in farming. At the time the project was formulated in the late 1990s, agricultural production in Viet Nam had significantly grown. But the growth was uneven and much of the rural population was still poor. Linked to the high degree of rural poverty was the generally poor condition of rural infrastructure, which had been greatly damaged by the war or had deteriorated over time. Also, capital investment in infrastructure had been limited by economic isolation and by long periods of fiscal constraint.

The Government of Viet Nam began to give priority to poverty reduction programs, and thus to the rural areas. Sustainable growth with equity was the goal of the country operational strategy of the Asian Development Bank (ADB) for Viet Nam in 1995. Rapid economic growth, the most important means for reducing poverty in Viet Nam, had to include the rural areas, where poverty was most intense. The government and ADB therefore prepared a rural infrastructure sector project, particularly for the poorer provinces.

The Rural Infrastructure Sector Project (RISP), with an estimated cost of $150 million, was approved in October 1997 and completed as scheduled in December 2004. An advisory technical assistance grant of $1 million was also approved separately to help the government strengthen the capacity of national and provincial staff to plan, design, build, operate, and maintain rural infrastructure. The project executing agency was the Ministry of Agriculture and Rural Development (MARD).

The project was meant to improve basic rural infrastructure to increase agricultural and off-farm production, raise personal incomes, facilitate access to markets and basic services, and reduce poverty in wide areas of the Viet Nam countryside. It had three components: (i) rural civil works, (ii) project management support, and (iii) subproject preparation assistance.

The project was rated *successful*. It was (i) relevant to the government's development priorities and ADB's country and sector strategies at the time of appraisal, implementation, and evaluation; (ii) effective in achieving the objectives of improving basic rural infrastructure to remove some constraints on agricultural and off-farm production, and raise standards of living; and (iii) efficient in using project resources. At the same time, however, the subproject benefits were rated *less likely to be sustainable*.

The project was *relevant* as it was consistent with Viet Nam's country development priority and ADB's operational strategies for Viet Nam during appraisal and evaluation. Through the sector approach and decentralization, the provinces were assisted in selecting subprojects appropriate to local needs and provincial development plans. But the project coverage (23 provinces) was too ambitious. Project resources were spread too thinly. Disadvantaged groups, in particular, would have benefited more from assistance with an area focus. The bottom–up approach of the project enabled the provincial project management units to identify need-based local rural infrastructure improvements that the provinces could support. But the subprojects selected from the provincial plans were too widely dispersed. Project management by the central and provincial project management units was significantly strained, as a result. Also, there were no synergies or links between subprojects to maximize the project benefits.

The project was *effective* as it achieved its objectives. It improved, mainly by surfacing, 1,887 km of rural roads, 126% of the 1,500 km target in the design and monitoring framework. These improvements (i) lowered the cost of transporting agricultural goods; (ii) shortened the travel to key social infrastructure like schools, hospitals, and markets; and (iii) increased the percentage of households owning transport vehicles like motorbikes and bicycles. The

completed irrigation subprojects served 60,314 hectares and increased the crop areas by 25%. The completed water supply systems served 1.53 million, versus the appraisal estimate of 500,000 people. Fifteen rural markets were established, giving farmers better access to markets and higher farm-gate prices for their produce, among other positive outcomes.

The project was *efficient* in using the given resources. The actual costs of constructing the subprojects were significantly less than estimated during subproject preparation. The resulting loan savings were used for other subprojects. Investment returns were higher in irrigation projects mainly because of the higher price of rice.

However, the project is deemed *less likely to be sustainable* unless the government provides adequately for infrastructure repair and maintenance. The rural roads visited by the independent evaluation mission were generally in good condition but have begun to show the need for regular maintenance. The provinces do not allocate adequate funds for long-term road maintenance. Heavy trucks on rural roads that were not really meant for heavy vehicles also present an increasing problem.

The project had positive institutional development impact. Its capacity building initiatives allowed decentralized project implementation and equipped the project staff with the skills they needed to identify, implement, and supervise projects. Decision making was effectively decentralized to the provinces. The subprojects identified conformed to provincial socioeconomic development plans and the actual needs of the local people.

The benefit monitoring and evaluation program under RISP reported a range of socioeconomic benefits to the target provinces. Agricultural production increased, rural incomes improved, and the number of poor households was reduced. Among the RISP benefits confirmed by the Special Evaluation Study on Asian Development Bank's Contribution to Inclusive Development through Assistance for Rural Roads, geographically disadvantaged people gained better access to major roads and markets, opportunities to increase production, links to employment centers and marketing agents, and higher household incomes.

The performance of ADB and the borrower was *satisfactory*. ADB and MARD, the executing agency, coordinated efficiently and effectively in implementing the project. Delegating the project to the Viet Nam Resident Mission resulted in better and timely coordination with MARD.

Project issues included (i) the lack of adequate focus on operation and maintenance (O&M) issues in the project design, and (ii) the limited participation of beneficiaries in project implementation.

Lessons identified were the need for (i) more attention to management planning for O&M, (ii) beneficiary participation throughout the project cycle, (iii) project coverage that does not spread resources too thinly, and (iv) advance recruitment of consultants to facilitate start-up.

For follow-up action, the government must continue to support institutional strengthening and the capacity building of provincial and commune staff. It must also allocate enough O&M funds yearly to preserve the rural infrastructure from further deterioration, and to keep the expected benefits flowing. ADB should promote the concept of asset management during the design as well as the implementation of rural road projects.

H. Satish Rao
Director General
Independent Evaluation Department

I. INTRODUCTION

A. Evaluation Purpose and Process

1. The Rural Infrastructure Sector Project (RISP) was selected for evaluation within the annual sample of completed projects post-evaluated by the Independent Evaluation Department (IED) of the Asian Development Bank (ADB). The purpose of the evaluation was to draw lessons from the project's experience, to be used in formulating new projects and in improving the implementation of ongoing assistance in Viet Nam as well as in ADB's other developing member countries. An independent evaluation mission (IEM) visited Viet Nam in December 2008, 4 years after the project loan was closed. The IEM visited 12 of 180 subprojects to observe and assess the operation and management of the completed subprojects.[1] Appendix 1 lists the subprojects visited.

2. This project performance evaluation report (PPER) follows IED's project evaluation guidelines.[2] The evaluation draws on a review of project documents and other relevant studies, as well as on discussions with ADB staff, and with officials of government executing and implementing agencies. It incorporates the results of the IEM's field visits to sample subprojects, which involved visual inspections of subproject facilities and discussions with officers and staff of the provincial departments of agriculture and rural development (DARDs), provincial project management units (PPMUs), irrigation schemes, water supply companies, and rural markets. This PPER also includes the results of case studies under the IED Special Evaluation Study (SES) on ADB's Contribution to Inclusive Development through Assistance for Rural Roads.[3] A copy of the draft PPER was shared with relevant ADB and government departments and agencies, and their views have been incorporated and acknowledged where appropriate.

3. The project completion report (PCR) circulated to the ADB Board of Directors in October 2006 (13 months after loan closing) rated the project *highly relevant*, *highly effective*, *efficient, likely to be sustainable*, and with positive impact on socioeconomic conditions. Overall, according to the PCR, the project was *successful*.[4] The project design was *highly relevant* to the Government of Viet Nam's and ADB's strategic development objectives of poverty reduction through economic growth and improved human resource development. The project was highly effective as it achieved the overall objective of improving basic infrastructure in rural areas to (i) increase agricultural and off-farm production, (ii) raise personal incomes, (iii) improve access to markets and basic services, and (iv) reduce poverty. The PCR re-estimated the economic internal rate of return (EIRR) of four subprojects (two in road rehabilitation, one in irrigation rehabilitation, and one in water supply). The EIRRs for the rehabilitated roads and irrigation schemes ranged from 12% to 23%, which compared favorably with the appraisal estimates ranging from 12% to 28%. For the water supply scheme, the EIRR was 10.3%, well below the appraisal estimate of 29% because of the lower-than-expected number of beneficiaries. According to the PCR, project support in building capacity for operation and maintenance (O&M) helped make the project initiatives more *likely to be sustainable*.

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[1] The subprojects were in rural roads (four), irrigation (three), water supply (three), and markets (two) in four of the 23 provinces covered by the project. These subprojects were in the provinces of Bac Giang, Ben Tre, Kon tum, and Quang Tri.

[2] ADB. 2006. *Guidelines for Preparing Performance Evaluation Reports for Public Sector Operations.* Manila. Available: http://www.adb.org/evaluation

[3] ADB. 2009. *Special Evaluation Study on Asian Development Bank's Contribution to Inclusive Development through Assistance for Rural Roads*. Manila. The findings of the SES case studies on irrigation and drainage, water supply, and market subprojects, which form part of this PPER, were summarized in the supplementary appendix of the SES.

[4] ADB. 2006. *Completion Report: Rural Infrastructure Sector Project in the Socialist Republic of Viet Nam*. Manila.

4. ADB administered advisory technical assistance (TA), financed with a grant from the Japan Special Fund, [5] to help the government prepare and test training modules that would enable national and provincial government staff to plan, design, build, operate, and maintain rural infrastructure. This objective was not fully achieved. Though the TA contributed relevant training materials for the project, the training had less impact than expected. The PCR therefore rated the TA only *partially successful.*

B. Expected Results of the Project

5. The RISP was expected to (i) improve access to and from rural areas in 23 provinces of Viet Nam,[6] (ii) increase agricultural production, (iii) reduce disease and nonproductive household labor, and (iv) stimulate economic activity. Appendix 2 lists the 23 project provinces with the number of interventions in each one. The outcomes stated in the report and recommendation of the President were: (i) an increase in annual per capita income in the rural areas from about $200 to $1,000 in constant dollars by 2010; (ii) a reduction in the number of poor households from more than 50% of the population to 25%; (iii) the provision of basic infrastructure such as passable roads, electricity, schools, and clinics in all communes by 2010; and (iv) an increase of 40 million–50 million tons in food production by 2010.[7]

6. The project had three components: (i) rural civil works, (ii) project management, and (iii) subproject preparation assistance. Rural roads (1,500 kilometers [km]) would be upgraded; irrigation and drainage on 20,000 hectares (ha) improved; safe drinking water provided to half a million people; and 50 district markets built or rehabilitated. The subprojects would be those that had priority in provincial rural development plans and were confirmed to be commune or district priorities by the potential beneficiaries themselves. Under project management support, the national government would be assisted particularly in guiding and monitoring project implementation by the provincial governments. Assistance in subproject preparation was to be provided to backward and isolated provinces.

II. DESIGN AND IMPLEMENTATION

A. Formulation

7. The RISP was formulated under a project preparatory TA financed with a grant from ADB and the Investment Center of the Food and Agriculture Organization of the United Nations (FAO/IC).[8] The project was prepared by an FAO/IC team working closely with and supervised by ADB. At the project preparatory TA stage, 12 subprojects were identified by the government. Of these 12, six underwent feasibility evaluation by FAO/IC. The first subproject to be taken up under the project was one of these six. Also under the project preparatory TA, guidelines and criteria for subproject selection and preparation were set up and an economic analysis of the selected subprojects was carried out.

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[5] ADB. 1997. *Technical Assistance to the Socialist Republic of Viet Nam for Training for Rural Infrastructure Development*. Manila.

[6] These 23 provinces were: Bac Can, Bac Giang, Ben Tre, Binh Dinh, Binh Phuoc, Cao Bang, Dien Bien, Ha Tinh, Hoa Binh, Kon Tum, Lao Cai, Lang Son, Ninh Thuan, Phu Tho, Phu Yen, Quang Nam, Quang Ngai, Quang Tri, Soc Trang, Son La, Thai Nguyen, Tra Vinh, and Yen Bai.

[7] ADB. 1997. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Socialist Republic of Viet Nam for the Rural Infrastructure Sector Project.* Manila (p. 30).

[8] ADB. 1996. *Technical Assistance to the Socialist Republic of Viet Nam for the Rural Infrastructure Sector Project*. Manila.

8. The sector loan for the project was designed to maximize the positive impact on the economy and on poverty reduction. A wide range of rural infrastructure works from as many provincial development plans as possible were to be implemented, given the resources available. In the provinces that were included in the project, provincial gross domestic product (GDP) per capita was among the country's lowest, the need for rural infrastructure was most urgent, and no major rural development project had recently taken place.

B. Rationale

9. Agriculture and rural development are critical to Viet Nam's development, as 80% of the country's poor live in the rural areas and the greater part of the population is primarily engaged in farming. At the time the project was formulated in 1997, agriculture accounted for 34% of GDP and 74% of employment.[9] Agricultural production had significantly grown between 1991 and 1995, but the growth was uneven: the central, coastal, and mountainous areas lagged behind the south and delta areas.[10] Much of the rural population was still poor. Linked to the high degree of rural poverty was the generally poor condition of rural infrastructure, which had been greatly damaged by the war or had deteriorated over time for lack of maintenance. Also, capital investment in infrastructure had been limited by economic isolation and by long periods of fiscal constraint.

10. Sustainable growth with equity was the goal of ADB's country operational strategy for Viet Nam in 1995.[11] To this end, (i) the economy had to grow efficiently, (ii) poverty had to be reduced, and (iii) development had to be environmentally sound. Rapid economic growth, considered the most important means for reducing poverty in Viet Nam, had to include the rural areas, where 80% of poverty occurs. The government also placed priority on poverty reduction, particularly in the rural areas, in its Eighth Party Congress Decision of July 1996,[12] and sought ADB's assistance in preparing a rural infrastructure sector project with a special focus on the poorer provinces.

11. Since Viet Nam's poorest people depend on land and water for their livelihood, the rationale of the project was sound throughout formulation, implementation, and evaluation. The government recognized the role of infrastructure in development and poverty reduction in both the Comprehensive Poverty Reduction and Growth Strategy[13] and the Five-Year Socioeconomic Development Plan (SEDP).[14] Likewise acknowledging the role of rural infrastructure in poverty reduction, ADB's country strategy and program[15] strove to link the rural areas to emerging economic corridors and supported the provision of physical and social infrastructure like rural water supply and sanitation. The approval of a similarly designed project after the RISP shows that investment in rural development in Viet Nam remains high.[16]

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[9] At project completion in 2006, agricultural activities accounted for 22% of the GDP and 60% of employment. World Bank. 2006. *Accelerating Rural Development in Vietnam.* Washington, DC.

[10] ADB. 1997. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Socialist Republic of Viet Nam for the Rural Infrastructure Sector Project.* Manila.

[11] ADB. 1995. *Country Operational Strategy Study: Viet Nam.* Manila.

[12] The Eighth Party Congress Decision of July 1996 directed 70% of public investments toward the country's rural areas.

[13] Government of Viet Nam. 2003. *Comprehensive Poverty Reduction and Growth Strategy.* Ha Noi.

[14] Government of Viet Nam. 2006. *Five-Year Socioeconomic Development Plan: 2006–2010.* Ha Noi.

[15] ADB. 2005. *Country Strategy and Program Update: Viet Nam, 2006–2008.* Manila.

[16] ADB. 2007. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Socialist Republic of Viet Nam for the Integrated Rural Development Sector Project in the Central Provinces*. Manila.

C. Cost, Financing, and Executing Arrangements

12. At the time of appraisal, the total project cost was estimated at $150 million—$45 million in foreign currency and $105 million in local currency. ADB was to finance $105 million from its Special Funds resources to cover 70% of the total cost, including the entire foreign currency cost. Cofinancing of $15 million from Agence Française de Développement (AFD)[17] would pay for rural civil works and equipment. The remaining $30 million of the local currency cost would be shared equally by the government and the project beneficiaries.

13. At project completion in December 2004, the total project cost had reached $151.06 million—$41.69 million in foreign currency and $109.37 million in local currency (Appendix 3). This total was higher than the appraisal figure despite the lower-than-anticipated cost of civil works (by 10%–20%), the depreciation of the special drawing rights (SDR) against the United States (US) dollar, and the declining value of the dong.[18] ADB financed $96.68 million (64% of the total project cost); the unused portion ($8.9 million) was canceled in September 2005. The government provided $39.60 million (26%), and AFD, $14.78 million (10%).

14. Rural roads construction was foreseen at appraisal to account for 50% of the project cost; irrigation and drainage rehabilitation, 25%; and water supply, market improvements, and other miscellaneous rural works, 25%. At completion, 50% of the project cost had been incurred for rural roads, 33% for irrigation and drainage, 16% for water supply, and 1% for markets (Table 1). In general, according to the Ministry of Agriculture and Rural Development (MARD), the provinces placed more importance on the rehabilitation and upgrading of irrigation works than planned.

Table 1: Summary of Civil Works Completed

Type	No. of Subprojects	Design Capacity		Cost (D million)	Total Cost % Share
Rural roads	83	1,887	km	1,022,261	50
Irrigation schemes	63	60,314	ha	670,535	33
Water supply	31	1,532,537	people	321,796	16
Markets	3	18,625	sq. m	19,825	1
Total	**180**			**2,034,417**	**100**

ha = hectare, km = kilometer, sq. m = square kilometer.
Source: ADB. 2006. *Completion Report: Rural Infrastructure Sector Project in Viet Nam*. Manila.

15. The implementation setup for RISP was generally as planned. MARD was the executing agency, primarily responsible for the loan funds. The central project management unit (CPMU), created under MARD, was responsible for overall project management and liaison with ADB, and for the technical appraisal of subprojects, the management of subproject financing, and the monitoring of subproject implementation. It was headed by a project director,[19] and had 8 technical and 14 finance and administration staff members. The CPMU did not have the full

[17] This was known as Caisse Française de Développement at the time of loan approval in 1997.
[18] The SDR–US dollar exchange rate at appraisal was SDR1.36089, compared with SDR1.47007 at project completion. The dong–US dollar exchange rate at appraisal was D11,130, compared with D15,893 at project completion.
[19] During the life of the project, two project directors were appointed. A change in project directors occurred in February 2002.

complement of staff specified in the loan agreement.[20] It was led and supervised by a national project steering committee, which concerned itself solely with policy and implementation matters.[21] The committee met five times after the loan took effect.

16. Each of the 23 provincial people's committees (PPCs) in the project provinces appointed a provincial steering committee, which served as the provincial implementing agency tasked with overseeing provincial finances and resolving issues related to the project.[22] PPMUs, established within the provincial DARDs by the PPCs, directly managed the preparation, bidding, and implementation of subprojects. At appraisal, a PPMU headed by a full-time provincial coordinator and a full-time accountant, and supported by technical staff, was envisioned. However, only half of the accountants and coordinators were appointed, and the appointments were only part time, contributing to the slow disbursement in the early stages of the project.[23]

17. The RISP was one of Viet Nam's first internationally funded projects where the full range of implementation responsibilities was decentralized to the provinces. Understandably, unfamiliarity with the procurement and disbursement procedures of the government, ADB, and AFD caused administrative difficulties at the start, since the PPMUs were staffed mainly from the provincial DARDs and departments of transport. The fact that not all the PPMU staff members had full-time appointments was an added constraint on the smooth implementation of the project in the provinces. However, the training provided to PPMU staff in project implementation enabled them to complete the project as scheduled.

D. Procurement, Construction, and Scheduling

18. Consulting services (for subproject feasibility studies and technical designs, bid appraisal, and construction supervision), civil works, and equipment were procured by the PMUs according to ADB's Guidelines on the Use of Consultants (2007, as amended from time to time). During the early years of project implementation, variances between ADB's and the government's procurement guidelines regarding the tendering period, prequalification, direct award of contracts for small packages, and eligibility of contractor bidders caused confusion and delayed contract awards. The CPMU later trained PPMU and provincial staff in the bidding procedures of ADB and the government.

19. The PCR noted that 3,136 contract packages were prepared—1,533 for civil works, 14 for equipment supply, and 1,589 for other construction and consulting services (footnote 16 of the PCR). Though bidding was opened to both local and international contractors, no international contractors bid for the civil works because of the small size of the contract packages. Bidding was nonetheless competitive locally, with as many as 100 bids and an average of 15 bids per contract. The contracts that were awarded were therefore generally priced lower than anticipated at the feasibility stage. The contract packages ranged from about $10,000 to $900,000.

[20] The CPMU's technical section did not have an economist, a sociologist, an agriculturalist, an environmentalist, or a benefit monitoring and evaluation specialist (as required under schedule 6, para. 1b of the loan covenants). Some of these skills were provided by the consulting team. The finance and administration section did not have a vice director (as required under schedule 6, para. 3b).

[21] The national project steering committee was chaired by a vice minister from MARD and had representatives from the Planning and Investment, Transport, and Finance ministries, and from the State Bank of Viet Nam.

[22] The provincial steering committee was headed by a vice chairman of the province, who was supported by a director or vice director of the provincial DARD. The provincial departments of transport, finance, planning and investment and other relevant departments were represented.

[23] ADB. 2006. *Completion Report: Rural Infrastructure Sector Project in Viet Nam*. Manila (Appendix 8).

20. Though the project began slightly behind schedule and initial progress was slow, the project was completed as scheduled on 31 December 2004. Financial closure took place on 28 September 2005.

E. Design Changes

21. ADB did not make any major changes in scope or implementation arrangements after appraisal. But minor changes in project components facilitated the use of project savings and allowed provinces that were weak in subproject implementation to get assistance. At appraisal, it was estimated that only 60 subprojects at an average cost of $2.0 million–$2.5 million would be developed. During implementation, the provinces selected 107 subprojects that cost $0.5 million–$3.2 million each, for an average cost of $1.3 million. The selection was based on the criteria stated in the loan agreement.

22. The midterm review (MTR) of the project in June 2001 identified significant savings of $20.0 million in the development costs of stage 1 and 2 subprojects.[24] The savings came partly from value-added tax payments recovered from paid invoices of consultants and contractors that included the value-added tax.[25] These savings were later applied to 73 stage 3 subprojects selected because they complemented stage 1 and 2 subprojects (e.g., rehabilitation of an access road to an irrigation scheme funded earlier, extensions of water supply systems, or additional water control facilities for an irrigation system). Stage 3 subprojects (at an average cost of $0.3 million) significantly increased the number of subprojects to 180 at project completion. This increase added a considerable management and administrative burden that was unforeseen at appraisal.

23. Under component 3 of the RISP, less-advanced provinces were to be assisted in preparing subproject proposals. The funds set aside for this component ($2.0 million) were not used as originally intended, as project preparation assistance was provided by CPMU staff and project consultants. After a minor change in scope in 2002, the funds were used instead for a provincial assistance program (see para. 33).

F. Outputs

24. The RISP components were (i) rural civil works, with funding for priority provincial subprojects; (ii) project management support to the national government in administering, guiding, and monitoring project implementation by the provincial governments; and (iii) subproject preparation assistance, which would fund the preparation of subprojects by the provincial governments for inclusion in the project.

1. Rural Civil Works

25. At appraisal, the RISP was expected to develop 60 subprojects in 23 provinces. The PPCs identified the subprojects from the provincial development plans, giving priority to subprojects in more remote and poorer areas of the provinces. A total of 180 stage 1, 2, and 3 subprojects were developed from 1998 to 2004. At completion, the RISP had (i) rehabilitated 83 rural roads, (ii) restored 63 irrigation systems, (iii) installed 31 water supply systems, and (iv) built 15 rural markets. In all these cases, substantially more was

[24] Subprojects approved before the MTR were in stage 1, those approved after the MTR were in stage 2, and subprojects financed from the loan savings were in stage 3.
[25] The loan agreements with ADB and AFD did not allow Vietnamese taxes to be paid from loan funds.

achieved than planned. Table 2 presents the scope of project works and the achievements at completion.

Table 2: Scope of Project Works

Type of Civil Works	Parameter	At Project Design	Actual
Road	Road length (km)	1,500	1,887
Irrigation	Irrigated area (ha)	20,000	60,314
Water supply	Population served	500,000	1,527,191
Markets	Number of markets	50	15

ha = hectare, km = kilometer.

Source: ADB. 2006. *Completion Report: Rural Infrastructure Sector Project in Viet Nam*. Manila.

26. **Rural roads.** Rural roads were rehabilitated and upgraded to connect communes to each other, to district towns, or to the national or provincial road network. Rehabilitation involved all-weather surfacing and the construction of associated structures, such as bridges, spillways, and culverts. The capital investment per kilometer was about $10,000–$60,000. In all, 83 rural road subprojects totaling 1,887 km were completed, and 153 bridges were rehabilitated or upgraded. The road subprojects cost a total of $67.97 million, versus the $63 million originally estimated (see Table A3.4 of Appendix 3). The roads were designed for small volumes of light and low-speed traffic.[26] However, many of the roads drew heavy vehicular traffic. A road visited by the IEM in Kon Tum had deteriorated through heavy use, especially by trucks weighing more than 40 tons.[27] Businesses had opened along the road after it was upgraded; these included a quarrying plant, an agricultural processing station, and a hydraulic plant, all of which required heavy truck use. On the other hand, road rehabilitation had beneficial impact in the community. It (i) shortened the travel time between the commune and the district center (from 24 hours to 2–3 hours); (ii) enabled community members to share agricultural produce; (iii) made education and health care more accessible with the construction of schools and health centers along the road; and (iv) gave farmers easier access to extension services.

27. The provincial departments of transport manage the O&M of roads under their direct control, through their road management units or through O&M contracts with road management companies. The beneficiaries were expected to contribute labor[28] but are reluctant to do so. The PPC therefore has a partial allocation for routine road maintenance in the annual budget of the province. The allocation would, however, be enough only to maintain the quality of the roads. To maintain their efficiency, additional allocations will be needed in the longer term.

28. **Irrigation systems.** Small- to medium-scale irrigation and drainage systems, each one covering an area of up to 1,500 ha, were rehabilitated and upgraded at an investment of $500–$2,500 per hectare, for a total cost of $43.40 million (see Table A3.4 of Appendix 3). The 63 irrigation subprojects that were completed involved the rehabilitation, upgrading, or rebuilding of 930 km of canals, 180 dams, 2,285 culverts, 39 reservoirs, and 35 pumping stations, and watered 60,314 ha of cultivated land (against the appraisal target of 20,000 ha). The higher coverage reflected the importance placed by the provinces on the irrigation subprojects.

[26] The RISP criteria for investment in rural roads specified all-weather surfacing, within the $10,000–$60,000 range. The rural road subprojects complied with Viet Nam's construction standards for rural roads in 1998.

[27] Tan Canh–Mang Xang Road (67.5 km upgraded) in Kon Tum province. The road construction started in March 2000 and was completed in October 2001.

[28] In Viet Nam, the local people are required to contribute a certain number of hours of labor each year.

29. The majority of the irrigation subprojects under the RISP were handed over to the provincial irrigation and water supply management companies. These companies had long experience in O&M, and experienced and qualified staff trained by the national and provincial governments. The staff of commune-based organizations like water user groups, on the other hand, had limited experience and minimal training. As designed, O&M training was provided to beneficiaries of small-scale irrigation systems managed by communities.

30. **Water supply systems.** The water supply subprojects were mostly in rural villages and small district towns that were unlikely to be covered by other projects. Populations of 1,000–5,000 were to be served at a maximum supply cost of not more than $22 per capita. The appraisal estimate of $15 per capita was increased to $22 in 2001 after the CPMU decided that $15 per capita was not enough to complete a water supply subproject, considering the performance of completed subprojects.[29] A total of 31 water supply subprojects, including 128 water supply stations built to serve 1.53 million people, were completed under the RISP. The water supply operations are being managed by water management companies. As reported in the project documents, the coverage of consumers within the distribution systems has been significantly below the figures quoted in the feasibility studies. The IEM also noted discrepancies in the actual coverage data (para. 47). Some households did not connect to the systems at the start because they were uninformed about the connection charges and water fees and about the health benefits of using clean water. The low consumption rates have made it difficult to recover O&M costs from water fees in the early years of operations. However, the consumption rates should increase over time as more people become aware of the benefits of having a regular supply of potable water.

31. **Markets.** Small- to medium-size markets ranging in size from 10,000 square meters (m^2) to 20,000 m^2 were to be developed. Fifteen markets with a total area of 36,835 m^2 were built in three subprojects, versus the appraisal target of 50 markets. The establishment of rural markets was less of a priority in the provincial developmental plans than anticipated at appraisal.

2. Project Management

32. Project funding also went to the establishment and operation of the CPMU to manage project implementation and finance technical support services. A team of national and international consultants gave management and technical support to the CPMU and PPMUs. An amount of $500,000 was set aside for training and capacity building. The project stakeholders—CPMU staff, PPMU staff, provincial government staff, and beneficiaries—were trained in all aspects of the project in 2001–2004. About 500 participants from the CPMU and the PPMUs received training in the technical aspects of project preparation and implementation, financial management, and benefit monitoring and evaluation (BME). Separate training for different disciplines (accounting, project management, engineering design and construction, environment, etc.) would have been more effective, but would have presented logistic difficulties, since the trainees came from 23 provinces. According to the PCR, 202 CPMU and PPMU staff members also went on study tours abroad to assess various ways of developing, operating, and maintaining rural infrastructure. The training reportedly improved project management and enabled the timely completion of the project. Some CPMU and PPMU staff members went on to work on an ongoing ADB project.[30] The RISP training program was substantially completed in 2002 but was extended by the Viet Nam Resident Mission (VRM) on

[29] ADB and AFD approved the increase in specific cases, with adequate substantiation in the feasibility study reports.
[30] ADB. 2006. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Socialist Republic of Viet Nam for the Emergency Rehabilitation of Calamity Damage Project.* Manila.

the strength of savings identified in the training program allocation. More study tours and further training in the O&M of irrigation and water supply systems and in BME followed. The Ba Tri water supply system operators interviewed by the IEM found the training useful and appreciated it. Appendix 4 summarizes the training delivered under the project and the TA. Aside from the training, project management and technical guidelines were produced by the CPMU and its consultants and issued to the PPMUs. These guidelines, which covered all the steps in subproject implementation starting from subproject identification, were used in the training.

3. Subproject Preparation Assistance

33. As part of the project design, subproject feasibility studies in less advanced provinces were to receive funding to ensure that social, environmental, and economic concerns were adequately taken into account during subproject preparation. However, the funds intended for this purpose were not used. According to Viet Nam regulations, funds for subproject preparation had to come from the rural civil works component. During implementation, the 23 provinces were found to have significant disparity in their ability to prepare and implement subprojects. The CPMU was concerned that some provinces might not meet the deadlines for subproject implementation. It was therefore decided during the midterm review by ADB and MARD that the funds set aside for subproject preparation assistance would be used instead for the provincial assistance program,[31] which consisted of (i) providing special assistance to the PPMUs in the five weakest provinces to increase their capacity and speed up the implementation of subprojects,[32] (ii) developing the capacity for BME in the provinces, and (iii) training the operators of community-managed irrigation and water supply systems in participatory O&M. After the funding for this component was approved, CPMU missions were regularly fielded to the five provinces to help them find out what was slowing down the implementation and work out solutions. As a result, according to MARD, one of the five provinces (Ben Tre) managed to complete the subprojects ahead of the other 22 provinces.[33] BME training and capacity building activities were completed in all 23 provinces and equipped the PPMUs, provincial government agencies, and provincial consultants to carry out basic BME surveys for the subprojects. According to the PCR, about 700 irrigation and water supply managers and operators were trained in participatory O&M in 2003. The IEM, however, noted that training the beneficiaries during project preparation would have allowed them to make useful contributions to the design and construction of the irrigation and water supply systems.

G. Consultants

34. A team of international and national consultants were recruited under the project to assist in project start-up and in the establishment of the CPMU, appraise subprojects, and monitor and give technical advice on subproject implementation. Other consultants were hired under the attached TA (footnote 5). The recruitment conformed to ADB's Guidelines on the Use of Consultants. Because of difficulties encountered in the recruitment process by the CPMU and the lengthy government approval procedures, the consultants were recruited 1 year after the project began. The significant delay deprived the PPMUs of support at the start of the project.[34] Once recruited, however, the consultants had appropriate and sufficient inputs. They produced technical guidelines and manuals for project management and technical aspects of the projects. The IEM considers the performance of the consultants satisfactory.

[31] The approved budget for the provincial assistance program was $0.48 million.
[32] These provinces were Ben Tre, Binh Phuoc. Hoa Binh, Lai Chau, and Quang Ngai.
[33] MARD. 2004. *Completion Report: Rural Infrastructure Sector Project in Viet Nam.* Ha Noi.
[34] Consultant recruitment began in July 1998. Contract negotiation was finalized in July 1999 and the consultants started their assignments in August 1999.

H. Loan Covenants

35. There was full compliance with all loan covenants except two, which were only partly complied with. A deputy director who was supposed to head the finance and administration section of the CPMU was not recruited although the section was fully staffed. The responsibility for the section was assumed by the project director (as reported by the ADB missions). No satisfactory explanation was given in the project documents for the failure to recruit the deputy director. Another covenant required full-time accountants to assist the full-time provincial coordinators (heads of the provincial project offices). During project implementation, however, about 50% of the accountants and coordinators served only part time, slowing down disbursement at the early stages of the project. The training in project finance and management that was provided was not enough to improve the efficiency of project implementation. More staff resources were needed.

I. Policy Framework

36. The government remains committed to high economic growth and the structural transformation of the economy. Its poverty reduction strategy and SEDP 2006–2010 (see para. 11) both emphasize the provision of infrastructure at the national level and in the provinces, districts, and communes through bottom–up planning (provincial development plans). Rural transport, irrigation, water supply, and other infrastructure support the achievement of goals for the agriculture sector, according to the SEDP.

37. A decree from the Prime Minister in July 1998 mandated the approval by the PPC, the relevant line minister, and the minister of planning and investment of all provincial development costs up to D200 billion ($15 million). The decree also required all projects funded by official development assistance costing more than $1.5 million to be approved by the foregoing agencies and the Prime Minister. Under the RISP, the government delegated this approval authority to the chairperson of each participating PPC. Line ministry approval was required only for technical issues. This delegation of approval authority set a precedent in Viet Nam for the decentralization of approval powers to the provinces, making it possible for the subprojects to be approved efficiently and promptly.[35]

J. Technical Assistance

38. Grant-financed TA was approved (footnote 5) to help the government prepare and test training modules that would enable national and provincial government staff to plan, design, build, operate, and maintain rural infrastructure. The TA comprised three phases: (i) detailed assessment of training needs, (ii) design of training modules, and (iii) testing of the training modules in the provinces where major rural infrastructure projects were implemented. A team of consultants prepared the training materials that became the basis for continuous training under the RISP.

39. The TA completion report rated the TA only *partially successful*, claiming that, although it contributed valuable training materials for the project, the training had less impact than expected, as evidenced by the inferior quality of the subproject feasibility studies. Some training modules were considered academic and needing modification before large-scale training. The

[35] This devolution of implementation responsibility to the provinces and districts is a special feature that has been adapted in an ongoing project—ADB. 2007. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Socialist Republic of Viet Nam for the Integrated Rural Development Sector Project in the Central Provinces.* Manila (Loan 2357-VIE).

TA completion report considered the training program ambitious. The IEM likewise rated the TA *partly successful*, as it did not achieve the intended outcome. The training program was too ambitious: its wide coverage made assimilation more difficult. The IEM noted the low quality of the feasibility studies in the subprojects visited, particularly in environment, social, and impact assessments and in compensation and site preparation details. During implementation, the CPMU consultants suggested improvements in the following aspects of the feasibility studies: (i) presentation of the rationale, (ii) justification for the integration of the subprojects into the overall provincial development strategy, (iii) links with existing projects, (iv) identification of beneficiaries, (v) presentation of the maintenance plan, and (vi) standardization of unit costs.[36]

III. PERFORMANCE ASSESSMENT

A. Overall Assessment

40. Overall, the project is rated *successful*. It was (i) relevant to the government's development priorities and ADB's country and sector strategies at the time of appraisal, implementation, and evaluation; (ii) effective in achieving the objectives of improving basic rural infrastructure to remove some constraints on agricultural and off-farm production, and raise standards of living; and (iii) efficient in using project resources. At the same time, however, the subproject benefits were less likely to be sustainable.

B. Relevance

41. IED rates the project *relevant* (not highly relevant as rated by the PCR). At the time of appraisal, the project was consistent with the country's development emphasis on the rural areas to reduce poverty (footnote 12). ADB's country operational strategy for Viet Nam in 1995 was aimed at sustainable growth with equity (footnote 11). To reach this goal, the economy had to grow efficiently, poverty had to be reduced, and development had to be environmentally sustainable. The project design was appropriate: the sector approach and decentralization allowed the provinces to select subprojects that suited local needs and provincial development targets. The IEM observed that the irrigation rehabilitation subprojects in particular were highly relevant to the outcome of the 1996 Water Resources Sector Review (WRSR), which was prepared with donor assistance.[37] Of the 4 million ha of cultivated rice land, 3 million ha had some kind of irrigation but only 2 million ha was actually irrigated (in the dry season),[38] for an overall cropping intensity of 150%. The strategies proposed under the WRSR, subject to water supply constraints, were to (i) rehabilitate and complete existing irrigation systems to increase cropping intensity from 150% to 175%, and (ii) develop new irrigation systems to increase cropping intensity from 175% to 200%. In both cases, the intention was to increase the national dry-season rice area, by up to 2 million ha (from 2 million ha to 4 million ha).[39] However, the project design was overambitious in its coverage. Project resources were spread too thinly across the 23 provinces. An area focus would have led to more effective assistance to disadvantaged groups in particular.

[36] As reported in ADB. 2000. *Back-to-Office Report*. Manila (16 November, review mission).
[37] World Bank. 1996. Viet Nam Water Resources Sector Review*. Report No. 15041-VN*. Washington, DC.
[38] Because of incomplete systems, planning or design deficiencies, deterioration, lack of water, or poor operation.
[39] The WRSR strategy is consistent with Viet Nam's seasonal water regimes and cropping constraints. Land is the limiting factor in the wet season; water, in the main dry season. Farmers also grow subsistence non-rice crops during the secondary dry season, but the areas are smaller and have generally been declining as dry-season rice areas have increased. This indicates that, rather than water, the return to labor is the limiting factor at that time.

42. The bottom–up approach adopted in the project enabled the PPMUs to identify the rural infrastructure improvements that their provinces needed and could support. However, the subprojects, which the PPCs selected from the provincial development plans, were scattered throughout the provinces. This geographic spread significantly strained the management of the project by the CPMU and the PPMUs. Also, there were no synergies or links between the subprojects to maximize the project benefits. For example, in any given community only one subproject was selected although more than one might have been called for.

C. Effectiveness

43. The project is rated *effective* as it met its objectives (but not highly effective as rated by the PCR). According to the design and monitoring framework (DMF) the intended outcomes and targets were (i) better rural access, through 1,500 km of improved rural roads; (ii) higher agricultural production, with the help of irrigation systems built or rehabilitated on 20,000 ha;[40] (iii) a reduction in non-productive household labor, through the supply of clean drinking water to 500 rural villages; and (iv) more economic activity, stimulated by the construction or upgrading of 50 district markets. Unit cost ceilings were also defined: $60,000 per kilometer for roads, $2,500 per ha for irrigation, and $22 per person for water supply.

44. The PCR indicated that the project improved, mainly by surfacing, 1,887 km of rural roads, representing 126% of the DMF target. In the sample road subprojects it visited, the IEM confirmed the road lengths stated in the PCR and observed that the road surfaces were generally in good condition and showed few signs of erosion from heavy use as in Tanh Canh–Mang Xiang in Kon Tum province. As these roads are now some 5 years old, the findings indicate the general adequacy of the design and construction standards (including those for cross-drainage). Moreover, according to the beneficiaries interviewed, the rural road improvements had (i) lowered the costs of transporting agricultural goods; (ii) shortened the travel to key social infrastructure like schools, hospitals, and markets; and (iii) increased the percentage of households owning transport vehicles like motorbikes and bicycles.

45. As the project documents do not specify whether the DMF target and cost ceiling relate to total or incremental crop areas, the effectiveness of the irrigation subprojects is unclear. The PCR indicated that the subprojects served 60,314 ha at a cost of $43.40 million and increased the crop areas by 25%. Therefore, the subprojects served either (i) 60,314 ha, at an average unit cost of $720 per hectare of total area; or (ii) 15,000 ha, at an average unit cost of $2,800 per hectare of incremental area. The latter interpretation is consistent with the 1996 WRSR (para. 41) and is therefore adopted here. This indicates that the project reached only 75% of the intended DMF target despite added importance on rehabilitation and upgrading of irrigation schemes and 33% cost increase in irrigation works (para. 14).

46. The intended outcome of the water supply subprojects, according to the DMF, was a reduction in non-productive household labor and disease in 500 rural villages. The PCR indicated that the village systems would serve 500,000 people, but the subprojects ended up serving 1.53 million. The DMF outcome was, however, based on the assumption that the systems would be small and would serve an average of only 1,000 people in each village, whereas the subprojects served an average of 50,000 per commune center or small town. Poverty is generally much higher in the rural villages than in commune centers and small towns. The RISP may have benefited the people living in commence centers and small towns rather than targeted rural villages. The project did not record the impact of water supply on the

[40] The irrigation systems included works to improve drainage and protect against flooding and saline intrusion.

incidence of waterborne diseases or other health benefits. Without such records IED cannot say whether the intended reduction was achieved or not.

47. There are discrepancies in water supply coverage data between the PCR and the reports submitted by commune water enterprises (CWEs) during the IEM.[41] For all the water supply subprojects visited by IEM including Ngoc Hoi (in Kon Tum), the PCR reported coverage of 54,600 people, but the CWEs reported only 14,100 (26% of the PCR figure). According to the PCR, the Thanh Phu and Ba Tri systems (in Ben Tre) served 169,270 people and the feasibility study report implied that Ba Tri would have the capacity to serve 118,489. The CWE report on Ba Tri mentioned only 7,500 fee-paying house connections, representing coverage of about 37,500 (32% of PCR).

48. In the case of the Ngoc Hoi water supply dam, one explanation could be a mismatch between water supply capacity and the present distribution system. The pumping station and treatment works have more capacity than the distribution system. The CWE reported a high demand for more connections.

49. Fifteen rural markets were put up, as provided in provincial development plans. The appraisal target was 50 rural markets. The difference seemed to support the argument that the demand for rural markets in provincial development plans was less than assumed at appraisal. The IEM was not convinced of this, however. Abundant farm produce was available for sale in various communes. Markets in strategically convenient locations would have helped secure better prices for the produce.

50. The decentralization of decision making to the provinces was effective. The subprojects matched the rural infrastructure priorities of the provincial governments. But the provincial governments had weaker technical and administrative capacity than central government departments such as MARD, the Ministry of Finance, and Ministry of Transport, which had implemented internationally funded projects. Likewise, engineers and contractors in the provinces had less capacity than their national counterparts. Project delivery and quality standards, and therefore the economic life of the assets, were affected.

D. Efficiency

51. IED rates the project *efficient* in resource use to achieve its purpose. The project met, if not exceeded, most of its appraisal targets. The economic reevaluation of two irrigation subprojects by IEM, using before-project and after-project scenarios, showed EIRRs ranging from 44% to 166%.[42] These were very much higher than the appraisal estimates of 20% and 18%. A major factor was the increase in the price of rice since the completion of the project. With the recent world "food crises," the long-term economic price of rice used in the PCR had increased from $148 per ton to $343 per ton.[43] There is no guarantee, however, that this high price can be sustained. Appendix 5 presents the economic reevaluation of the two subprojects.

[41] Commune water enterprises are responsible for system management and fee collection.

[42] These were for the Truc Kinh subproject (in Quang Tri province) and the Hong Thai and Bao Son subprojects (in Bac Giang province). The Hong Thai and Bao Son subprojects were separate subprojects but were appraised together. The intention was to carry out the economic reevaluation of two other visited subprojects, but this was not done for lack of data.

[43] Available: http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/EXTGBLPROSPECTS/0,,contentMDK:20675357~menuPK:627723~pagePK:2904583~piPK:2904598~theSitePK:612501,00.html

52. The project was efficient in using available funds. The actual unit costs of construction of the subprojects were significantly lower than the estimated costs during subproject preparation (Appendix 6). The project identification and feasibility study estimates were based on standard government unit rates for construction and were generally 10%–20% lower than the original estimates. As explained in the project documents, the rates were lower because the PPMUs prepared very conservative cost estimates for the project feasibility studies to make sure that subproject budgets were never exceeded during bidding and construction. Compared with the appraisal estimates, the average cost of completing a subproject was 44% lower on average (Table 3). The resulting loan savings were used for other subprojects (para. 22). On the other hand, the unit cost assumptions at the time of project formulation are also brought into question.

Table 3: Unit Cost, by Subproject

	Unit Cost according to Design Capacity ($)		
Civil Works	**Cost Range At Appraisal**	**In the Feasibility Study[a]**	**At Completion[a]**
Rural roads (per kilometer)	10,000–60,000	40,174	34,755
Irrigation schemes (per hectare)	2,500	1,143	915
Water supply (per capita)	15–22	17	16
Market (per square meter)	100,000–300,000[b]	84	72

[a] Average cost computed using annual average exchange rates.

[b] Cost per market, with market sizes ranging from 10,000 square meters to 20,000 square meters.

Sources: ADB. 2006. *Completion Report: Rural Infrastructure Sector Project in Viet Nam*. Manila data and independent evaluation mission.

E. Sustainability

53. The project is rated *less likely to be sustainable* (as opposed to likely sustainable rated by the PCR), unless the government provides adequately for the repair and maintenance of the infrastructure. Rural roads are generally in good condition, but have begun to show the need for regular maintenance. The key issue related to the sustainability of the road subprojects is that, unlike fees for water and irrigation, road user fees are difficult to collect. The district road enterprises in Quang Tri and Ben Tre, which are responsible for district road maintenance, reported receiving annual maintenance allocations of only 1.0% of the capital cost ceiling of $60,000 per kilometer, indicating that the maintenance of rural roads is grossly underfunded. Furthermore, the growth in economic activity and road traffic reportedly exceeded original expectations and design standards (axle load). While extra economic benefits will be generated, the increasing deterioration and maintenance requirements will also be amplified. PPMU officials of PPMU in Kon Tum who were interviewed by the IEM said that the type and weight (e.g., axle load) of vehicles was not considered in the rehabilitation of the Tan Canh–Mang Xang road in province, as high use of the road by heavy trucks was not anticipated. If the heavy vehicular traffic had been anticipated, appropriate measures to mitigate the impact could have been taken during design and construction. Since the road is an important link between remote ethnic communities and social and economic infrastructure in the urban areas (see para. 26), its deterioration is affecting the sustainability of benefits. Though the institutional arrangements appear suitable, the PPCs must allocate substantially more funds for road maintenance in the longer term to keep the road subprojects in good condition and the benefits sustainable. Such an increase in allocation in the near future is, however, uncertain.

54. The irrigation management companies (IMCs) in Quang Tri and Kon Tum both reported receiving, until recently, about $60 per hectare from irrigation service fee (ISF) collections. This amount represents only 2.4% of the capital cost ceiling of $2,500 per kilometer. But high ISF

collection efficiencies (above 90%) and low PPC subsidies (less than 10%) are indicative of farmer satisfaction with the IMC's O&M services. Furthermore, the irrigation systems are in good condition and show few signs of deferred maintenance. Previous O&M arrangements and financial allocations appear to have been sufficient to sustain the O&M of the irrigation systems. The government has, however, abolished the collection of ISFs. The continued effectiveness of IMCs and their O&M services will therefore have to depend on government subsidies, which may not be adequate.

55. In Kon Tum, the Ngoc Hoi district water enterprise reports that it charges an average of about $0.125 per cubic meter ($m^3$) and its annual revenue is about $18,000 from 500 fee-paying connections (2,000 people). This implies an average consumption of 200 liters per capita per day. In Ben Tre, the Ba Tri CWE charges $0.20 per m^3 and its annual revenue is about $80,000 from 7,500 connections (37,500 people), representing an average consumption of only 30 liters per capita per day. These figures imply an annual collection of $2 per person in Ben Tre (9% of the capital cost ceiling of $22 per person) and $9 in Kon Tum (41%). However, both enterprises report, these large amounts cover only O&M expenditure without provision for any capital cost recovery. Presumably as a consequence, pumping stations and treatment works are in good condition and there are few indications of either deferred maintenance or future sustainability issues. Project sustainability is therefore deemed likely.

56. Market operations are sustained by fee collections from shop owners and temporary vendors and parking. The market management board (responsible for the O&M of markets in a particular district or commune) of a market visited by IEM indicated that the operation is fairly sustainable, with adequate fees collected from sellers and parking area users.[44]

IV. OTHER ASSESSMENTS

A. Impact on Institutions

57. The project had a positive institutional development impact, as per the assessment of the IEM. The capacity building initiatives in the project provided a venue for decentralized project implementation and equipped the staff of MARD and DARD with skills to identify, implement, and supervise projects. CPMU and PPMU staff showed significant improvements in project management after the project began in 1998, resulting in the timely completion of the project in 2004. After the poor disbursement performance in 1998 and 1999, the records show significant improvements in financial management from 2000, when disbursement targets were exceeded for the first time. From then on, the CPMU consistently met annual expenditures and disbursement targets.

58. The decentralization of decision making to the provinces worked effectively under this project. The subprojects identified were in accordance with the provincial socioeconomic development plans and with the actual needs of the local people. Mechanisms were in place for local community representations before higher authorities in project identification and selection. The preparation of model subprojects during project preparation set the project preparation standards and provided a quick start-up for project implementation. The development and use of procedural guidelines, technical guidelines, and training materials were important factors in the decentralization of the majority of the responsibilities for project implementation.

[44] The average income of the Voi market is D53 million per month. This amount goes to pay salaries (30%), district government operations (60%), and security and cleaning operations (10%).

B. Socioeconomic Impact

59. The project resulted in a range of socioeconomic benefits to the target provinces. BME under the project reported that each sector created a number of different benefits which, overall, contributed positively to improving income, reducing the number of poor households, and increasing agricultural production. Other benefits recorded in the BME for roads were lower transport costs, better access to health-care and social services, more commercial opportunities, increased incomes and employment opportunities, and lower cost of household necessities. For irrigation and drainage subprojects, other benefits were increased incomes, greater diversity of crops, more time for other economic and household activities, increased employment opportunities, and improved nutrition due to food security and diversity. For water supply, improved health security, increased household incomes as a result of reduced household illness allowing people to spend more time in economic activity, and increased time for education and employment due to the time saved in collecting water (mostly by women) were among the other benefits.

60. Case studies undertaken under the SES (footnote 3) confirmed a number of benefits reported under the RISP. These include improved access for geographically disadvantaged people to major roads and markets, new opportunities to increase production, links to employment centers and marketing agents, and an increase in household incomes and expenditures. There has been a 20%–50% decrease in transportation costs, depending on the location and nature of economic opportunities, and a 40%–50% reduction in travel time. The improved access provided by the project roads has significantly enhanced the mobility of the rural people, including disadvantaged groups. There are more opportunities for ethnic people to integrate with the rest of society. Access to social services such as education and health has also improved, and the rural road improvements have contributed to a 50% increase in the number of provincial delegations to commune people's committees.

61. A positive impact on crop intensification was identified in the Truc Kinh irrigation scheme in Quang Tri province. Before the irrigation system was upgraded, only 100 ha of paddy field, out of the commune's 270 ha total, were used for two main crops. Now the total area of 175 ha is used for two paddy crops each year. Household incomes have increased by at least 100%. Reliable irrigation service was the key factor in motivating farmers to explore and adapt new varieties of paddy crop. These varieties could increase productivity by 300%. In addition, good harvests and an increase in the total volume of agriculture products have encouraged households to invest in commercial livestock, which provides them with another important source of income. Pigs and cattle are the second most important source of income for almost all households. On average, households earn D10 million–D15 million per year from livestock raising.

62. The economic opportunities that have opened up as a result of the rural water supply subprojects vary widely across provinces. Often the water system runs along the main road of the commune or the residential, business, or administrative area. Businesses and better-off households receive more benefits than those who live far from the center. For these households, access to clean water has a significant role in the development of their businesses and their quality of life. A number of businesses have been set up and developed in areas where clean water is available. These include hair salons, and motorbike washing and ice and ice cream production establishments. However, in spite of the access to clean water, utilization is limited. Water from pipes is used only for drinking and cooking. Many households still use water from the river or canal for bathing and washing. Access to clean water has done little to change the sanitation and hygiene practices of the local people.

63. An important impact of the markets has been the development of business intermediaries who trade in the market and return to their communes or villages to resell items and products. More products such as agricultural inputs have thus become available in remote areas. The principle of commercial activity has also been introduced to the local people, especially the poor and ethnic minorities with no opportunities to travel. Goods available to the local people are more varied and of better quality. Commodities have also become cheaper since the markets were upgraded because of competition between traders. For example, bicycles now sell for D30,000 less. Support services have also improved, as evidenced by the increase in the number of transportation services such as local buses and motorbikes. The case study findings on the rural road, irrigation and water supply, and market subprojects are summarized in Appendix 7.

64. Under the RISP, two subprojects—an irrigation scheme and rural road in Ben Tre province and a water supply scheme in Binh Phuoc province—required the resettlement of affected local people. The resettlement action plan for these subprojects, which required significant land acquisition, was prepared according to ADB guidelines and approved by ADB. As indicated in the PCR, the households affected by these resettlements confirmed that they were adequately compensated and were satisfied with the resettlement sites.

C. Environmental Impact

65. At project design, the project was not expected to have significant environmental impact. Subprojects with significant impact on the environment were excluded; hence, environmental mitigation measures were not included in the design, construction, and operation of the subprojects. Cursory consideration was given to the environmental impact of the project, given the lack of understanding and expertise to adequately deal with these aspects at the CPMU and the PPMUs. Also, project staff members were unaware of ADB's environmental regulations relating to the project. Subprojects with the potential to impact the environment in the localities and communes raised concern during project implementation.

66. The environmental review mission fielded in April 2001, as part of the MTR, reported that the rehabilitation of roads in hilly or mountainous and forested areas was more likely to generate adverse environmental impact from the improper handling of soil materials. As the MTR mission reported, the most significant impact resulted from the construction of rural road subprojects in mountainous areas. The solid waste was improperly dumped on the downward slope of the road and into small streams, paddy fields, and forest areas. Also, borrow pits and quarries for sand were not rehabilitated after the work was done. Some gravel and stone quarries were in forest areas. Two subprojects had been developed in buffer zones beside protected areas (in Kon Tum and Ninh Thuan provinces). On the other hand, the irrigation and water supply subprojects and road projects in topographically flat areas did not generate adverse environmental impact and complied with the environmental requirements stated in the loan documents. To address the environmental impact issues, appropriate actions toward environmental assessments (including environmental review and clearance) were undertaken.

D. Asian Development Bank and Borrower Performance

67. From the appraisal stage, ADB conducted a total of 17 missions including one for project completion review.[45] It also fielded special project administration missions, which included

[45] ADB fielded 10 supervisory missions, according to ADB. 2006. *Completion Report: Rural Infrastructure Sector Project in the Viet Nam*. Manila (para. 32).

gender and social assessment and environmental reviews (as part of the MTR). AFD representatives took part in most of these missions. The RISP was administered at first from ADB headquarters, but in June 2001 it was delegated to the VRM after the midterm review. The delegation of the project improved coordination with the CPMU, particularly in the review and approval of proposed subprojects. The MTR mission took place as scheduled, 3 years after loan effectiveness. VRM's close monitoring of the project with the CPMU resulted in the timely identification of loan savings and the effective use of the loan funds, particularly in the development of the additional 73 subprojects. Overall, the performance of ADB was rated *satisfactory*.

68. The performance of the borrower was also *satisfactory*. The conditions for loan effectiveness were met on schedule. The effective relationship between the CPMU, the PPMUs, and the government agencies (MARD, and the ministries of Finance, Planning and Investment, and Transport) contributed to the resolution of implementation issues and difficulties, and to a higher-quality and better-implemented project. The provincial governments filled in the gaps in counterpart funding whenever beneficiaries were unable to pay their share (representing 10% of contractor payments). In these cases, the beneficiaries were instead asked for in-kind contributions to the project such as house connections for water supply subprojects or labor for earthworks in the case of irrigation subprojects.

69. The project documents indicated that, in several instances, local people were not adequately consulted during decision making and during project implementation. For example, the beneficiaries of water supply subprojects were consulted only on the need for water during subproject identification. However, they were not informed of the connection and water fees after the subprojects were completed. In another case, beneficiaries who had not been consulted regarding a road subproject filed a complaint with the PPC. The PPC and the PPMU acted immediately on the complaint and a timely correction was made in the design of the road subproject.[46]

V. ISSUES, LESSONS, AND FOLLOW-UP ACTIONS

A. Issues

70. A distinct weakness in the project design was the lack of focus on O&M issues. Though plans were presented in the feasibility studies for the subprojects, these were generally poor and provided only general details of O&M and indicative annual budgets. O&M programs were not clearly established at the time the works were handed over to the provincial authorities, as noted in the project documents. In the long term, the infrastructure provided under the project will significantly increase the annual maintenance costs of the provinces. For instance, the maintenance of the upgraded rural roads may exceed the capacity of local community user groups. The PPCs must allocate sufficient O&M budgets.

71. The participation of beneficiaries in the RISP subprojects was mostly limited to the initial project requests from the communes and districts that were sent to the PPC. The participation could have been more substantial had the beneficiaries been actively involved in preparing the project and particularly in determining the optimal design for service delivery and O&M. In any

[46] The Phuoc Long–Son Phu–My Thanh An–Nhon Thanh–My Thanh road in Ben Tre province, according to the back-to-office report of 19 December 2003. After the complaint was filed, 15 culverts were added during construction for streams and irrigation channels crossing the road.

project, the meaning of participation must be exactly defined, and calibrated in relation to formal responsibilities and realistic capacity.

B. Lessons

72. More attention should be given to O&M planning and management. A realistic and long-term perspective is needed in addressing O&M issues. Good organization, well-planned budgets, sound financial and reporting systems, and liaison with beneficiaries are important in planning for O&M. Specific covenants requiring detailed functional O&M mechanisms and implementation arrangements should be included in future project loan agreements.

73. Involving beneficiaries in deciding counterpart funding decisions would be valuable in ensuring ownership of infrastructure projects, particularly when community labor and cost contribution have to be enforced for lack of provincial funds to cover maintenance. The participation of beneficiaries throughout the project cycle should be required, particularly since they will be the end users of the project. Project preparations should include beneficiary participation in O&M planning and budgeting, and the training of beneficiaries in O&M. However, the proportional benefits of the infrastructure to the members of the community need to be accurately assessed so that the O&M burden may be equitably allocated. Beneficiaries should also participate in identifying and planning, implementing, monitoring, and evaluating the impact of subprojects. These activities should be incorporated in ongoing and future rural infrastructure projects to ensure their future sustainability.

74. Covering a vast number of provinces spread over almost the entire country may not be an effective way of maximizing the use of resources. Not only were the resources spread thinly over the 23 provinces, but the implementing staff also experienced considerable strains on communication and transportation during project supervision because of the remoteness of many of the subprojects. A focused geographic approach would have provided flexibility for designing better social and economic benefits for the beneficiaries. The effectiveness of the investment in generating development impact, as well as project efficiency, would have improved.

75. Advance recruitment of consultants should be undertaken in development projects to facilitate start-up operations and establish the necessary project management systems. This is to avoid unnecessary delays in implementation particularly if there is training to be conducted to equip project staff with the appropriate project implementation skills.

C. Follow-Up Actions

76 There is a need for the government's continued support for institutional strengthening and for the capacity building of provincial and commune staff. Support should also be provided for technical assessments of ownership and management responsibilities and where they should properly rest given the capacity constraints. In addition, the government should see to it that adequate O&M funds are allocated yearly so that the rural infrastructure does not deteriorate further. ADB should promote an asset management concept during the design as well as the implementation of rural road projects.

LIST OF SUBPROJECTS VISITED BY THE INDEPENDENT EVALUATION MISSION

Province	Roads	Irrigation	Water Supply	Markets
Bac Giang	Ben Tuan–Dong Xuyen roads	Hong Thai–Bao Son Pumping Station	Thang	Voi Market
Quang Tri	Cho Can–Bo Ban	Truc Kinh		
Kon Tum	Tan Canh–Mang Xiang	Dak Nieng	Ngoc Hoi	Sa Thay
Ben Tre	Road 14 Ba Tri district		Ba Tri	

Source: Independent Evaluation Mission.

NUMBER OF COMPLETED SUBPROJECTS, BY PROVINCE

Province	Number of Completed Subprojects				Total
	Roads	Irrigation	Water	Markets	
Northeast	**28**	**23**	**12**	**1**	**64**
Cao Bang	5	3	1		9
Lang Son	2	3	2		7
Lao Cai	3	4	1	1	9
Yen Bai	4	2	2		8
Thai Nguyen	3	1	2		6
Bac Can	5	1	1		7
Phu Tho	4	4	2		10
Bac Giang	2	5	1		8
Northwest	**11**	**7**	**4**	**1**	**23**
Son La	4	3	1		8
Dien Bien	4	3	2	1	10
Hoa Binh	3	1	1		5
North Central Coast	**7**	**9**	**2**	**0**	**18**
Ha Tinh	3	5			8
Quang Tri	4	4	2		10
South Central Coast	**13**	**12**	**3**	**0**	**28**
Quang Nam	3	2	1		6
Quang Ngai	2	4	1		7
Binh Dinh	5	2	1		8
Phu Yen	3	4			7
Central Highlands	**3**	**2**	**2**	**1**	**8**
Kon Tum	3	2	2	1	8
Southeast	**7**	**7**	**1**	**0**	**15**
Ninh Thuan	3	5			8
Binh Phuoc	4	2	1		7
Mekong River Delta	**14**	**3**	**7**	**0**	**24**
Ben Tre	5	1	2		8
Tra Vinh	3		3		6
Soc Trang	6	2	2		10
Total	**83**	**63**	**31**	**3**	**180**

Source: Asian Development Bank. 2006. *Completion Report: Rural Infrastructure Sector Project in Viet Nam*. Manila.

APPRAISAL AND ACTUAL PROJECT COSTS

Table A3.1: Project Cost ($ million)

Cost	Appraisal Estimate	Actual
Foreign exchange cost	45.00	41.69
Local currency cost	105.00	109.37
Total	**150.00**	**151.06**

Source: Asian Development Bank. 2006. *Project Completion Report on Rural Infrastructure Sector Project*. Manila.

Table A3.2: Financing Plan ($ million)

Cost	Appraisal Estimate	Actual
A. Implementation Cost		
ADB-financed	102.90	94.58
AFD-financed	15.00	14.78
Borrower-financed	30.00	39.60
Subtotal (A)	**147.90**	**148.96**
B. Interest during Implementation		
ADB-financed	2.10	2.10
Total	**150.00**	**151.06**

ADB = Asian Development Bank, AFD = Agence Francaise de Developpement.
Source: ADB. 2006. *Project Completion Report on Rural Infrastructure Sector Project*. Manila.

Table A3.3: Cost Breakdown by Project Component ($ million)

Component	Appraisal Estimate	Actual
Part A - Rural Infrastructure		
ADB-financed	96.00	90.46
AFD-financed	15.00	14.78
Borrower-financed	15.00	27.79
Subtotal	**126.00**	**133.03**
Part B - Project Management		
ADB-financed	4.90	2.71
AFD-financed	0.00	0.00
Borrower-financed	15.00	11.81
Subtotal	**19.90**	**14.52**
Part C - Subproject Preparation Assistance		
ADB-financed	2.00	1.41
AFD-financed	0.00	0.00
Borrower-financed	0.00	0.00
Subtotal	**2.00**	**1.41**
Interest during implementation	2.10	2.10
Subtotal (ADB-Financed)	**105.00**	**96.68**
Subtotal (AFD-Financed)	**15.00**	**14.78**
Subtotal (Borrower-Financed)	**30.00**	**39.60**
Total	**150.00**	**151.06**

ADB = Asian Development Bank, AFD = Agence Francaise de Developpement.
Source: ADB. 2006. *Project Completion Report on Rural Infrastructure Sector Project*. Manila.

Table A3.4: Cost Breakdown by Category ($ million)

Category	Appraisal Estimate	Actual
Part A - Rural Infrastructure	**126.00**	**133.03**
Roads	63.00	67.97
Irrigation	31.50	43.40
Water supply and others	31.50	21.66
Part B - Project Management	**19.90**	**14.52**
Salaries and allowances	0.54	0.04
Training	0.42	0.23
Office rental	0.16	0.04
Equipment and supplies	0.20	0.16
Operating expenses	0.53	0.09
Vehicle purchase	0.32	0.53
Vehicle operation and maintenance	0.10	0.02
International consultants	2.10	1.15
National consultants	0.53	0.44
Others[a]	15.00	11.81
Part C - Subproject Preparation Assistance	**2.00**	**1.41**
Service Charge during Implementation	**2.10**	**2.10**
Total	**150.00**	**151.06**

AFD = Agence Francaise de Developpement.

[a] Actual expenses incurred by the Borrower were as follows: Import duty exemption ($0.8 million), compensation ($5.11 million), and other costs incurred on upgraded designs ($5.82 million).

Source: Asian Development Bank. 2006. *Project Completion Report on Rural Infrastructure Sector Project*. Manila.

TRAINING SUMMARY

Training Subjects	Trainees	No.	Duration	No. of Courses	Location
A. Training Provided under Technical Assistance for Training for Rural Infrastructure Development[a]					
Rural Infrastructure Development Management	Reps from all provinces	30	1 month	1	Bangkok
Rural Infrastructure Development	PPMU coordinators accountants and others	160	10 days	5	Yen Bai Bing Dinh Tra Vinh Cao Bang
Financial Management Training	CPMU and PPMU staff	36	2 weeks	1	HCMC
Training of Trainers	CPMU staff		7 days	1	Hanoi
Project Management Study Tour	PPMU representatives	36	10 days	1	Thailand Philippines
Technical Aspects of Implementation	PPMU staff	290	10 days	7	7 Provincial Towns
Computer Literacy Training	PPMU staff	19	9 days	1	Ha Noi
Project Management and English language	CPMU deputy director	1	5 months	1	Brisbane, Australia
B. Overseas Study tours					
Thailand	CPMU and PPMU staff	61	7 days	3	Various
Korea	CPMU and PPMU staff	19	7 days	1	Various
Malaysia	CPMU and PPMU staff	37	7 days	1	Various
China	CPMU and PPMU staff	19	7 days	1	Various
C. Training Provided from Loan Funds					
Operation and Management Systems	Irrigation and water supply managers	462	3 months	6	6 provincial towns
Benefit Monitoring and Evaluation	PPMU and provincial staff	174	3 days	18	18 provinces
Rural Water Supply Operator Training	Water supply operators	200	2 months	2	Vinh Phuoc Quang Nam
English Training	PPMU staff	22	2 weeks	2	Ha Noi

CPMU = Central Project Management Unit, HCMC = Ho Chi Minh City, PPMU = provincial project management unit.

[a] ADB. 1997. *Technical Assistance to the Socialist Republic of Viet Nam for Training for Rural Infrastructure Development*. Manila (TA 2838-VIE).

Source: Asian Development Bank. 2006. *Completion Report: Rural Infrastructure Sector Project in Viet Nam*. Manila.

ECONOMIC REEVALUATION OF IRRIGATION SUBPROJECTS

A. Methodology and Assumptions

1. This economic reevaluation quantifies the project's impact on representative irrigation subproject investments and follows the approach used during project appraisal[1] and completion.[2] The study presents the results of the economic reevaluation of selected irrigation subprojects visited by the independent evaluation mission, for which suitable data were made available by the Ministry of Agriculture and Rural Development, the executing agency. It also compares the results with the economic internal rates of return (EIRRs) of the two noncore irrigation subprojects as estimated at appraisal.[3]

2. Relevant commune agricultural production data (crop areas, yields, and production) were compiled from Government Statistics Office (GSO) district yearbooks, *before* and *after* the subprojects. The main assumption was that the full difference between these two values was solely attributable to the irrigation improvements provided under the project.

3. With the recent world "food crises" the long-term economic price of rice, used in the project completion report, has increased from $148 per ton to $343 per ton.[4] For gravity irrigation systems, like Truc Kinh (Quang Tri), the project completion report estimated a total economic cost of production at $76 per ton. This comprised labor (43%), fertilizer (42%), seed, water, and pesticide. However, the economic cost of fertilizer has increased by 97% and the economic cost of rice production from $76 per ton to about $122 per ton. Thus, the economic gross margin has increased from $72 to $221 per ton.

4. An Asian Development Bank (ADB)–financed pilot study addressed the financial sustainability of the irrigation management company responsible for the Nam Yen Dung irrigation system.[5] This is located next to the Cau Son–Cam Son irrigation system, which includes the Hong Thai and Bao Son pumping stations (Bac Giang) rehabilitated and improved under the project. In 2005, the economic operation and maintenance (O&M) cost for Nam Yen Dung was $102 per hectare (ha), or $10 per ton of rice produced, of which electricity consumption accounted for 47%. However, the cost of energy has since increased by 42% (footnote 4), the cost of rice production from $81 to $129 per ton, and the economic gross margin from $67 to $214 per ton.

5. The actual capital cost of the Truc Kinh (Quang Tri) subproject was $757,000 and that of the Nong Thai and Bao Son (Bac Giang) subprojects was $1,061,000 (footnote 2). During the independent evaluation mission, the Quang Tri IMC reported receiving, until recently, $60 per hectare from irrigation service fee collections. It also reported high collection rates (better than 90%) and low subsidies (below 10%), indicative of farmer satisfaction with the O&M services. Irrigation infrastructure also appeared to be in good condition, with few signs of any deferred maintenance. The adopted capital cost ceiling, of $2,500 per ha, is particularly relevant to more

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1 ADB. 1997. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Socialist Republic of Viet Nam for the Rural Infrastructure Sector Project.* Manila.

2 ADB. 2006. *Completion Report: Rural Infrastructure Sector Project in Viet Nam.* Manila.

3 Government of Viet Nam. 1999. *Feasibility Study Report for Rehabilitating and Upgrading: Hong Thai and Bao Son Pumping Stations (Bac Giang).* Ha Noi; and Government of Viet Nam. 2001. *Feasibility Study Report for Rehabilitating and Upgrading: Truc Kinh Irrigation System (Quang Tri).* Ha Noi.

4 Available: http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/EXTGBLPROSPECTS/0,,contentMDK:20675357~menuPK:627723~pagePK:2904583~piPK:2904598~theSitePK:612501,00.html

5 Shearwater. 2007. *Progress Report 10 on Implementation of the Second Red River Basin Sector Project*. Ha Noi.

expensive pumped systems. Therefore, the recurrent costs of $60 and $102 per hectare per year (paras. 4 and 5) are about 4% of capital cost for sustainable O&M of either gravity or pumped irrigation systems.

6. The 1996 Water Resources Sector Review (WRSR)[6] found that the wet-season crop area (WSCA) was 4 million ha, and 3 million ha was equipped for irrigation, but the dry-season crop area (DSCA) was only 2 million ha.[7] This implies that cropping intensity was 150%. Subject to water availability, WRSR's proposed strategies were to (i) rehabilitate and complete existing irrigation systems, to increase the DSCA to 3 million ha and cropping intensity to 175%; and (ii) develop new irrigation systems on existing rain-fed land, to further increase the DSCA to 4 million ha and the cropping intensity to 200%. Therefore the GSO agricultural production data also provides a basis for the initial diagnosis of production constraints to assess subproject formulation.[8]

7. The WRSR strategy addresses the most common situation where the DSCA is less than the WSCA, indicating that water is the limiting factor in the dry season while land is the limiting factor in the wet season. Subject to water availability, irrigation improvements can increase the existing DSCA up to the existing WSCA when land becomes limiting. Subproject formulation requires an assessment of the water resources (hydrology). Similarly, where the DSCA is more than the WSCA, drainage improvements can increase the existing WSCA up to the existing DSCA. Formulation requires an assessment of the land resources to identify drainage constraints.

B. Truc Kinh Subproject (Quang Tri Province)

8. The feasibility study report (FSR) is not clear but it seems the subproject serves the Cam An and Cam Thanh communes (Cam Lo district), but the system also serves Gio Quang, Gio Thinh, and Gio Mai communes (Gio Linh district), and Dong Giang and Dong Thanh precincts (Dong Ha town). The GSO production data are presented in Table A5.1 together with the FSR values.

Table A5.1: Quang Tri Province Production Data

	Spring Dry Season			Summer Wet Season			Total Production
Year	Area	Yield	Production	Area	Yield	Production	
A. Cam An and Cam Thanh Communes in Cam Lo District							
Before	354	4.43	1,591	270	3.34	932	2,523
After	496	5.30	2,634	401	3.86	1,548	4,182
Increment	142	0.87	1,043	131	0.52	616	1,659
B. All Truc Kinh System Communes in Cam Lo and Gio Linh Districts							
Before	1,191	3.75	4,464	709	3.32	2,352	6,816
After	1,487	5.09	7,560	1,223	3.92	4,792	12,352
Increment	296	1.34	3,097	514	0.60	2,440	5,536

[6] Government of Viet Nam and donors. 1996. Viet Nam Water Resources Sector Review. *WB Report 15041-VN*. Ha Noi.

[7] Because of incomplete systems, planning, design or operation deficiencies, deterioration or lack of water.

[8] R. Bolt. 2005. Improving the Relevance and Feasibility of Agricultural and Rural Development Operations: How Economic Analysis Can Help. *ADB Economics and Research Department Technical Note Series No. 12*. Manila: ADB.

Year	Spring Dry Season Area	Yield	Production	Summer Wet Season Area	Yield	Production	Total Production
C. Feasibility Study Report Economic Evaluation							
Before	538	3.10	1,668	143	2.70	386	2,054
After	946	4.70	4,446	946	3.80	3,595	8,041
Increment	408	1.60	2,778	803	NA	3,209	5,987

Source: 2007 provincial statistical yearbook.

9. The FSR does not include sections on either the diagnosis of agricultural production constraints or the formulation of the subproject to alleviate them. Comparison of the above values raises questions concerning (i) the suitability or relevance of the irrigation subproject, (ii) the exact areas served by the system and subproject, (iii) the reliability of the FSR *before* subproject agricultural production values, and (iv) land development costs.

10. As the existing WSCA was less than the DSCA, the system appears to have suffered from a drainage constraint that was more severe in Gio Linh compared with Cam Lo district. However, an irrigation subproject was formulated mainly to line canals in Cam Lo district. As the FSR economic evaluation area (946 ha) is intermediate, between the subproject (496 ha) and system (1,487 ha) areas (para. 8), the subproject benefit area also remains uncertain.

11. The other *before* subproject GSO data are consistently higher than the FSR values: cropping intensity was 76% (GSO) versus 27% (FSR), dry-season rice yield was 4.4 versus 3.1 tons per hectare, wet season rice yield was 3.3 versus 2.7 tons per hectare, and equivalent total agricultural production value was 7.0 tons per ha (GSO) versus only 3.8 tons per ha (FSR). Therefore, the values, which are unreferenced, appear to have been assumed and the FSR overestimates both the incremental agricultural production benefits and the economic viability of the subproject.

12. Normally, farmers have developed (cleared, leveled, and bunded) most land suitable for paddy rice production. For example, as the *after* subproject area is 946 ha, the FSR values indicate the area developed *before* the subproject was 538 ha and that 408 ha remained to be developed. However, the FSR does not discuss whether this was required. If so, the FSR should have assessed the demand for new land development, included the substantial cost in the economic evaluation, and proposed suitable implementation arrangements.

13. The EIRR increased from 20% at subproject appraisal (footnote 3) to 44% during the project performance evaluation.[9] This increase is attributable to (i) the substantial 24% cost saving achieved during implementation; and, in particular, (ii) the increased price of rice (para. 3). However, incremental agricultural production (1,659 tons) was only 28% of that anticipated at subproject appraisal (5,987 tons). Without the increased rice price the EIRR would have been only 11% at completion.

C. Hong Thai and Bao Son (Bac Giang Province)

14. Hong Thai and Bao Son are separate irrigation systems served by different pumping stations. However, the FSR appraised them jointly. Hong Thai serves the communes of

[9] The present value of a return of $1 per year, discounted at 44% per year over 25 years, is $2.25. Therefore, the EIRR = 44% as 757,000 + (2.25 x 0.04 x 757,000) – (2.25 x 221 x 1,659) = 0.

Hoang Ninh, Tang Tien, and Van Trung (Viet Yen district), and Tan My (Yen Dung district).[10] Bao Son serves the communes of Huong Son, Huong Lac, Quang Thinh, and Tan Thinh (Lang Giang district) and Bao Son, Tam Di, Dong Phu, and Bao Dai (Luc Nam district) (Table A5.2).

Table A5.2: Bac Giang Production Data

	Spring Dry Season			Winter Wet Season			Total
Year	Area	Yield	Production	Area	Yield	Production	Production
A.	**Viet Yen, Yen Dung, Lang Giang and Luc Nam Districts**						
Before	4,606	3.77	17,378	6,172	3.69	22,785	40,163
After	5,044	5.13	25,896	5,612	4.95	27,665	53,561
Increment	438	1.36	8,518	−560	1.25	4,880	13,398
B.	**Feasibility Study Report Economic analysis**						
Before	2,606	3.15	8,203	2,511	3.66	9,192	17,395
After	3,880	3.98	15,434	4,010	4.02	16,136	31,570
Increment	1,274	0.83	7,231	1,499	0.36	6,944	14,175

Source: 2007 provincial statistical yearbook.

15. The FSR does not include sections on either the diagnosis of agricultural production constraints or the formulation of the subproject to alleviate them. Comparison of the above values raises questions concerning the reliability of the FSR *before* subproject agricultural production values including the area served by the system/subproject.

16. The *before* subproject GSO data are all consistently higher than the FSR values. As a result, total agricultural production was 40,163 tons (GSO), versus only 17,395 tons (FSR). The FSR *after* subproject total production value (31,570 tons) was still only 79% of the GSO *before* subproject data. This indicates the unreferenced FSR values are purely nominal but the FSR incremental production benefit (14,175 tons) is overestimated by only 6%.

17. The estimated EIRR increased from 18% at subproject appraisal to 166% during project performance evaluation.[11] As well as the 20% cost saving and increased price of rice (para. 3); this extraordinary value results because the data indicate the annual benefit ($2.867 million) exceeds the capital cost ($1.061 million). Without the increased rice price the EIRR would still have been 81% at completion.

D. Sensitivity Analysis

18. This section considers the sensitivity of the above results to the main assumption that incremental agricultural production, *before* and *after* the subprojects, is solely attributable to the project irrigation interventions. Based on the 1996 WRSR strategy (para. 6), reasonable alternative assumptions are that irrigation improvements: (i) determine the full incremental dry-season crop areas, and (ii) account for 25% of incremental dry-season rice yields.[12] It is also reasonable to assume irrigation improvements benefited the entire Truc Kinh system.

[10] The GSO data indicate that part of the Hoang Ninh commune was reclassified as TT Nenh after the year 2000.
[11] The present value of a return of $1 per year, discounted at 166% per year over 25 years, is only $0.376, and EIRR = 166% as 1,062,000 + (0.376 x 0.04 x 1,061,000) – (0.376 x 214 x 13,398) = 0.
[12] Irrigation water is only one of several rice production inputs that may be the limiting factor.

19. In this case, annual agricultural production is estimated to increase by 1,616 tons (Truc Kinh) and 3,366 tons (Hong Thai and Bao Son).[13] For Truc Kinh, this represents only a small decrease compared with the previous estimate of 1,659 tons. As a result, the estimated EIRR decreases only from 44% to 43%. For Hong Thai and Boa Son, this represents a much larger decrease from 13,398 to 3,366 tons and 166% to 64%. Without the increased rice price the EIRR would still have been 17% on completion.

E. Conclusions and Recommendations

20. The above discussion indicates acceptable economic returns (EIRR >12%). However, neither subproject achieved its agricultural production potential. Therefore, future subprojects would benefit from a diagnosis of limiting factors and the formulation of specific interventions to alleviate them. Improved procedures should involve (i) the use of official GSO commune agricultural production data; (ii) initial diagnosis of, and subsequent focus on, irrigation or drainage constraints; (iii) participatory diagnosis, performance assessment, and subproject formulation, in areas of low rice production; (iv) accurate irrigation service/benefit areas; (v) complementary assessments of land and water resources; and (vi) estimates of the need, farmer demand, and cost of land development where increased service areas are proposed.

21. The analysis also indicates that cropping intensities increased from 60% to 82% (Truc Kinh) and from 75% to 90% (Hong Thai and Bao Son). This indicates the 1996 WRSR strategy (para. 6) was successful. Therefore, returns to rice intensification may be diminishing and it may be time to formulate a new national strategy for irrigated agriculture. Extensive crop diversification is often advocated. However, research has identified the many challenges to diversifying crop production in rice-based cropping systems.[14] This requires separate strategies for: (i) extensive rice production, based on better subproject selection and formulation; and (ii) intensive crop diversification, in limited areas with favorable resources, requiring different types of agricultural projects and new irrigation methods and systems, etc.

[13] 1,487 x 4.09 – 1,191 x 3.75 = 1,616; and 5,044 x 4.11 – 4,606 x 3.77 = 3,366.

[14] M. Giordano. 2006. *More Crop Per Drop: Revisiting a Research Paradigm—Results & Synthesis of IWMI's Research, 1996–2005.* London; and D. J. Merry. 1997. *Expanding Frontiers of Irrigation Management Research: Results of Research and Development at the International irrigation Management Institute, 1984–1995.* Colombo.

SUMMARY OF SUBPROJECT COSTS
(D million)

No.	Type	Phase	Subprojects	Design Capacity		Initial Cost Estimates: MARD	Feasibility Study	Technological Design	Implemented Cost
A. Cao Bang Province						**110,090**	**100,206**	**95,354**	**88,823**
1.	Irrigation	I	Irrigation of Phia Gao, Ban Viet, Ban Na and Khuoi Lai	1,108	ha	19,950	19,950	18,531	16,437
2.	Road	I	Road of Quang Uyen - Cach Linh - Ta Lung	29	km	26,650	22,229	20,029	16,079
3.	Irrigation	II	Irrigation of Na Tau and Thanh Nhat	479	ha	12,000	11,996	11,995	10,757
4.	Road	II	Road Nuoc Hai - Chuong Luong - Luong Can	17.4	km	14,400	14,400	14,399	12,881
5.	Water	II	Water supply for Ha Quang, Tra linh, Ha Lang, Nguyen Binh, Bao Lac and Dao Lam	38,300	people	12,000	11,715	11,715	10,761
6.	Road	III	Inter commune road in Hoa An district	16	km	6,930	6,924	6,830	5,740
7.	Road	III	Inter commune road in Phuc Hoa district	15	km	6,948	6,945	6,824	6,164
8.	Road	III	Inter commune road in Ha Quang district	15	km	5,012	6,048	5,031	5,289
9.	Irrigation/ Water	III	Upgrading Thom Cai reservoir in Hoa Quang district and expansion of water supply network of Ha Quang, Tra Linh, Ha Lang, Nguyen Binh, Bao Lac, and Bao Lam	865 4,525	ha people	6,200	5,864	5,864	4,715
B. Lang Son Province						**92,410**	**89,400**	**83,938**	**86,542**
1.	Irrigation	I	Irrigation of Quyet Thang, Chien Thang	867	ha	8,754	8,754	8,783	8,321
2.	Irrigation	I	Irrigation scheme of Tri Phuong, Quoc Khanh, and Khon Trong	580	ha	11,146	11,146	11,146	10,885
3.	Road	I	Dong Mo - Huu Kien road	28	km	19,600	19,726	19,206	18,982
4.	Road	II	Vu Lang - Nga Hai road	44	km	26,000	25,994	25,405	24,240
5.	Water	II	Water supply scheme for Loc Binh, Van Quan, Huu Lung, Chi Lang, and D.Lap	73,944	people	19,500	19,371	19,398	18,422
6.	Irrigation	III	Irrigation work of Quyet Thang - Chien Thang	300	ha	4,410	4,410	4,355	2,935
7.	Water	III	Connecting the domestic consumption water network for districts of Dinh Lap, Chi Lang, and Van Quan	9,012.00	people	3,000	2,997	2,856	2,757
C. Son La Province						**104,178**	**94,910**	**92,241**	**87,459**
1.	Irrigation	I	Irrigation work of Quang Huy, Muong Hung Ban Lua, Phai Ke, Hua Na, and Na Pan	865	ha	23,000	23,000	22,022	20,304
2.	Road	I	Quyet Thang - Chieng Ban road	12	km	9,000	9,050	9,050	8,373
3.	Water	I	Water supply for Yen Chau, Thuan Chau, Moc Chau, and Song Ma	65,000	people	13,000	12,609	12,611	8,032
4.	Irrigation	II	Irrigation of Muong Chanh, Chieng Chung, Ta Lai, Muong Khoa, and Chieng di	608	ha	10,000	9,355	9,062	8,088
5.	Road	II	Roads of Hat Lot - Chieng Sung, Hat Lot - Chieng Mung and Chieng Sang - Bo Phuong	48	km	30,000	29,997	29,844	26,590

No.	Type	Phase	Subprojects	Design Capacity		Initial Cost Estimates MARD	Feasibility Study	Technological Design	Implemented Cost
6.	Road	III	Upgrading branch - road of Hat Lot - Chieng Sung	9.5	km	4,291	4,291	4,213	3,928
7.	Irrigation	III	Irrigation network of Quang Huy and Muong Hung	295	ha	2,360	2,360	2,344	2,001
8.	Road	III	Quyet Thang - Chieng Ban road	8.5	km	4,248	4,248	3,095	3,075
9.	Irrigation/ Road		Improvement and rehabilitation of irrigation and road networks for rural areas	100	ha	8,279	8,278	8,052	7,068
				6.5	km				
D. Dien Bien Province						**92,926**	**93,258**	**89,831**	**87,429**
1.	Irrigation	I	Then Thau irrigation and 9 small-scale irrigation schemes	1,092	ha	16,000	16,100	15,442	14,136
2.	Road	I	Huoi Loong - Muong Bang road	18	km	12,000	11,999	11,194	10,583
3.	Water	I	Water supply for Muong Ang, Tam duong, Sin Ho, and Phi Nhu	53,160	people	10,500	10,500	9,745	9,174
4.	Irrigation	II	Irrigations of Ang Cang, Hong Ho, and Nam Rom	1,498	ha	12,500	12,476	11,963	11,544
5.	Road	II	Road networks of Pom Lot - Na Son and Thanh Luong - Hua Pe	56	km	27,000	27,009	26,578	26,160
6.	Market	II	Markets and agricultural inventory group of Na Son and Muong Lay	4,425	m^2	7,000	7,108	6,996	6,872
7.	Road	III	Rehabilitation and Improvement of Ang Cang road in Tuan Giao district	11.5	km	3,963	4,200	4,199	4,059
8.	Road	III	Thanh Luong Hua - Pe road	7.5	km		3,867	3,714	1,547
9.	Irrigation/ Water	III	Finishing water supply network for Muong Ang town and irrigation network for Ang Cang commune in Tuần Giáo district	21,600	people	3,963	3,963	3,728	3,354
				450	ha				
E. Lao Cai Province						**94,241**	**101,297**	**99,479**	**89,667**
1.	Irrigation	I	Irrigations of Na Cang, Son Ha, Ban Qua, Phu Nhuan, and Bao Yen	1,248	ha	19,500	20,011	18,655	16,865
2.	Road	I	Bac Ha - Ximacai road	28	km	12,000	13,490	13,618	11,319
3.	Water	I	Water supply for San Sa Ho, Thanh Phu, Ban Vuoc and Ban Qua	27,487	people	7,800	7,040	7,028	6,045
4.	Irrigation	II	Irrigation for Ta Co, Sin Chai, Lang Cu, and Hop Thanh	1,136	ha	10,900	10,439	10,607	8,689
5.	Road	II	Ban Vuoc - Nam Chac, Pha Long - Tung Trung Pho road	46	km	27,800	36,361	35,378	31,374
6.	Market	II	Road network for Muong Hum, Ban Vuoc, Bac Ngam, and Bao Ha	4,200	m^2	7,000	7,016	7,516	6,812
7.	Road	III	Supplementation roads I and II	15	km	5,456	5,554	5,354	5,567
8.	Irrigation	III	Supplementation irrigation of Na Cang	135	ha	1,387	1,387	1,323	
9.	Irrigation	III	Upgrading and completing Ta Co irrigation network in Van Ban district and Nghia Do irrigation in Bao Yen	385	ha	2,398	3,699	3,397	2,996

No.	Type	Phase	Subprojects	Design Capacity		Initial Cost Estimates: MARD	Feasibility Study	Technological Design	Implemented Cost
F. Yen Bai Province						**103,858**	**93,524**	**88,417**	**87,741**
1.	Irrigation	I	Irrigation of Bac Tran Yen and Nam Van Yen	1,625	ha	30,000	29,997	27,730	26,266
2.	Road	I	An Binh - Lam Giang road (market area of 1,500 m^2)	21	km	12,200	13,291	13,290	13,194
3.	Road	II	Au Lau - Qui Mong - Yen Hop road	19.2	km	21,500	16,051	14,442	14,224
4.	Water	II	Water supply scheme for Son Thinh, Co Phuc, and Yen The	85,500	people	21,300	20,927	20,486	18,656
5.	Road	III	Cau Rao and Xa Y Can roads	15	km	6,508	6,508	6,633	6,115
6.	Irrigation	III	Improvement of Nam Tran Yen irrigation network	580	ha	6,750	6,750	5,836	5,536
7.	Road/ Water	IIIC	Water supply network extension and rural road improvement	0.15 59,850	km people	5,600	5,602	5,513	3,750
G. Thai Nguyen Province						**98,599**	**91,810**	**88,915**	**88,551**
1.	Irrigation	I	Ho Nui Coc irrigation	1,249	ha	33,600	33,528	31,743	28,298
2.	Road	I	Dình Ca - Binh Long road	24	km	12,000	12,000	11,399	10,467
3.	Road	II	Roads of La Hien - Cuc Duong - Vu Chan, Giang Tien - Phu Do - Yen Lac - Nui Phan and Duong Ong Luong - Phu Lac	71	km	31,600	31,543	31,407	29,968
4.	Water	II	Water supply for Dinh Ca, Lau Thuong, Phu Thuong, La Hien, and four other districts	41,000	people	7,800	7,800	7,428	7,380
5.	Road	III	Roads of Giang Tien - Nui Phan, Duong Ong Luong	12	km	6,939	6,939	6,938	6,600
6.	Irrigation/ Water	IIIC	Water supply network expansion of Dinh Hoa, Vo Nhai, and Ho Nui Coc irrigation network improvement			6,660	6,660	6,195	5,838
H. Bac Can Province						**91,630**	**93,047**	**90,209**	**90,280**
1.	Irrigation	I	Irrigations of Bach Thong, Ngan Son, Cho Don, Ba Be, and Na Ri	578	ha	20,000	19,995	18,643	17,861
2.	Road	I	Cho Ra - Boc Bo road	28	km	15,500	16,104	15,606	15,457
3.	Water	I	Water supply for Ngan Son, Phu Thong, Na Ri, Ba Be, and Cho Moi	60,646	people	13,000	13,822	12,963	11,806
4.	Road	II	Roads of Dong Vien - Binh Trung- Yen Nhuan and Bang Van - Coc Dan	37	km	26,500	26,500	26,496	25,043
5.	Road	II	Yen Dinh - Binh Van road	14	km	10,000	9,996	9,872	9,365
6.	Road	III	Yen Dinh - Binh Van branch - road in districts of Cho Moi, Nhu - Co, Quang Chu	12	km	4,630	4,824	4,670	4,618
7.	Road	III	Nhu - Co Quang Chu road			6,630	6,630	6,582	6,130
I. Phu Tho Province						**95,138**	**94,458**	**93,805**	**88,566**
1.	Irrigation	I	Song Bua pumping station	867	ha	6,600	6,615	6,970	5,483
2.	Road	I	Vu Yen - Dao Gia - Am Thuong road	31	km	22,700	22,719	22,365	20,268
3.	Water	I	Water supply for Doan Hung, Yen Lap, and Thanh Ba	48,000	people	8,800	9,740	9,245	8,619

No.	Type	Phase	Subprojects	Design Capacity		Initial Cost Estimates MARD	Feasibility Study	Technological Design	Implemented Cost
4.	Irrigation	II	Tuy Loc pumping station	1,040	ha	12,900	14,546	13,498	13,942
5.	Road	II	Truong Thinh - Yen Lap road	26.8	km	18,000	18,000	18,356	16,319
6.	Irrigation	II	Nam Thanh Thuy Irrigation	1500	ha	16,000	15,837	16,399	15,457
7.	Irrigation/	III	Song Bua Irrigation in Tam Nong district	870 ha		3,998	3998	3,982	2,572
8.	Road	III	Song Bua service road in Tam Nong district	7 km					
9.	Road	III	Thai Ninh - Dong Linh - Thanh Van road	10	km	3,003	3003	2,991	2,854
10.	Road/ Irrigation/ Water	III	Water supply network expansion for Doan Hung Town, Upgrading irrigational canal and service road of irrigation work of Song Bua riverside			3,137			3,052
J. Hoa Binh Province						**89,668**	**89,746**	**84,546**	**86,727**
1.	Road	I	Dong Dam - Bai Nai road	28.5	km	13,600	13,590	13,590	13,220
2.	Water	I	Water supply scheme for Kim Boi, Lac Son, and Tan Lac	141,700	people	29,500	29,500	29,500	28,350
3.	Irrigation	II	Cong Hoa irrigation	1,172	ha	20,900	20,900	21,064	20,274
4.	Road	II	Nga Ba Xa - Bo road	34	km	21,000	21,000	20,392	20,545
5.	Road	III	Yen Binh road in Luong Son district	15	km	4,668	4,756	4,444	4,338
K. Bac Giang Province						**102,177**	**97,990**	**97,444**	**89,158**
1.	Irrigation	I	Pumping stations of Hong Thai and Bao Son	1,397	ha	18,000	18,226	18,397	16,858
2.	Road	I	Doi Ngo - My Ha road	35	km	16,400	16,420	16,680	15,886
3.	Water	I	Water supply for Kep, Luc Nam, Thang, and Bich Dong	29,041	people	10,500	8,667	8,117	6,952
4.	Irrigation	II	Yen Tap, Suoi Cay irrigation	1,500	ha	7,000	7,000	6,721	5,949
5.	Road	II	Ben Tuan - Dong Xuyen road; Voi market (7,000 m^2) Moc market (5,300 m^2)	56	km	33,100	36,200	36,052	29,406
6.	Irrigation	III	Irrigation systems of Bao Son and Suoi Cay	390	ha	6,700	6,700	6,700	4,434
7.	Irrigation	III	Hong Thai - Yen Tap pumping station	370	ha	4,777	4,777	4,777	4,486
8.	Irrigation/ Water	III	Pumping station improvement, expansion of water supply for Kep - Bich Dong, and Luc Nam			5,700	5,700	5,247	5,187
L. Ha Tinh Province						**97,718**	**93,915**	**93,391**	**86,437**
1.	Irrigation	I	N1 Ke Go Irrigational canal	1,500	ha	19,700	19,937	19,937	18,668
2.	Irrigation	I	Nha Duong Reservoir	500	ha	11,500	11,754	11,754	11,392
3.	Road	I	Duc Vinh - Duc Lam, Tan Huong - H. Khe - Huong Lam road	34	km	16,900	16,226	16,226	16,140
4.	Irrigation	II	Irrigations of Con Tranh and Dap Ba	817	ha	11,500	11,500	11,498	10,667
5.	Road	II	Roads of Thach Binh, Cam Duong, Thach Phu - Thach Tan, and Vuong Loc - An Loc	34.9	km	25,400	25,398	24,877	21,757
6.	Irrigation	III	Irrigation system of N1 Ke Go, Thanh Ha district	1,500	ha	5,500	5,500	5,499	4,969
7.	Road	III	Thach Ha road	12	km	3,600	3,600	3,600	
8.	Irrigation	III	Completing irrigation system of Ba Weir and Con Tranh	430	ha	3,618	3,427	3,115	2,844

No.	Type	Phase	Subprojects	Design Capacity		Initial Cost Estimates: MARD	Feasibility Study	Technological Design	Implemented Cost
M. Quang Tri Province						**103,104**	**97,603**	**84,699**	**90,904**
1.	Irrigation	I	Cam Lo irrigation	900	ha	8,500	8,364	8,360	6,385
2.	Irrigation	I	La Nga - Ha Thuong irrigation	2,050	ha	15,200	15,360	16,844	15,842
3.	Road	I	Tan Long - A Tuc - Pa Tang, Vinh Thai - Vinh Kim road	55	km	20,000	20,000	19,917	18,112
4.	Irrigation	II	Truc Kinh irrigation	946	ha	14,000	13,995	13,995	12,027
5.	Road	II	Chợ Cạn - Bo Ban irrigation	23	km	19,000	18,999	18,988	16,839
6.	Water	II	Water supply for Dac Rong	28,000	people	8,300	8,300	6,595	5,540
7.	Road	III	Asphalted road of Tan Long - A Tuc-Pa Tang	18	km	7,000	7,000	6,997	6,452
8.	Road	III	Vinh Thai - Vinh Kim road	11	km	5,585	5,585	5,550	4,958
9	Irrigation	III	Upgrading canals of N1-6: N2-1 La Nga Reservoir and intercommune road Gia Lam - Sa Nam in Vinh Linh	1,500	ha	4,525	4,523	4,510	3,893
10.	Water	III	Water supply for the poor	1,790	people	994	993	862	856
N. Quang Nam Province						**96,450**	**97,438**	**97,460**	**89,890**
1.	Irrigation	I	Phu Ninh irrigation	1,947	ha	18,800	18,998	18,748	17,515
2.	Road	I	Roads of 614, 615 and Tien Phuoc market (4,000 m^2)	47	km	27,200	32,748	30,865	27,639
3.	Irrigation	II	Irrigation schemes of Phuoc Ha and Ho Giang	730	ha	14,000	14,000	13,999	12,460
4.	Road	II	Road 613 and Tra My market (3,600 m^2)	18	km	15,000	15,000	12,706	12,600
5.	Water	II	Water supply for Trao, Trung Phuoc, Que Trung, Cam Thanh, Dai Thang, and Nui Thanh	32,710	people	10,000	9,692	9,692	9,358
6.	Irrigation		Additional investment for Phuoc Ha Ho Giang subproject	125	ha	4,700	4,700	4,700	4,269
7.	Road	III	Additionally asphalted to roads of 614, 615	7	km	6,750	7,000	6,750	6,049
O. Quang Ngai Province						**103,696**	**97,937**	**94,795**	**87,902**
1.	Irrigation	I	Thach Nham irrigation	1,500	ha	27,300	27,427	27,427	24,436
2.	Road	I	Roads of Chau O - Tra Bong and Quan Lat - Da Chat	30	km	15,600	15,610	15,610	13,240
3.	Road	II	Roads of Bo De - Duc Loi-My A and Tinh Phong - Tra	51	km	34,700	34,561	31,419	27,133
4.	Water	II	Water supply for Son Tinh, T. Nghia, and Nghia Hanh	28,187	people	7,400	7,340	7,339	6,198
5.	Irrigation	III	Completing part B6-2 of Thach Nham canal and Liet Son irrigation scheme	1,200	ha	7,000	7,000	7,000	6,340
6.	Irrigation	III	Canal N1,N10-2, N2, N2-8 Thach Nham irrigation	610	ha	6,000	6,000	6,000	5,287
7.	Irrigation	III	Strengthening and completing canals of N12-1, N8 Thach Nham irrigation	1,386	ha	5,696	5,696	5,696	5,268
P. Kon Tum Province						**95,827**	**92,562**	**88,727**	**84,813**
1.	Irrigation	I	Irrigations of Dac Tia Dak Sia 2, Kon Trang Kia, Dak Snghe, Dak Hona, Dak Trui	810	ha	11,400	11,428	11,330	10,340
2.	Road	I	Tan Canh - Mang Xang road	54	km	41,000	40,664	40,654	38,116
3.	Irrigation	II	Daknieng, Dakwen, and Daktin irrigation	550	ha	10,000	10,000	9,531	7,858
4.	Water	II	Water supply of Dakglei, Sa Thay, Dakha, Konplong, and Ngoc Hoi	54,600	people	15,400	15,581	14,984	12,640

No.	Type	Phase	Subprojects	Design Capacity		Initial Cost Estimates MARD	Feasibility Study	Technological Design	Implemented Cost
5.	Market	II	Rural markets for Dakglei, Sa Thay, and Konplong	10,000	m^2	7,200	7,893	7,892	6,142
6.	Road	III	Van Lem - Pakna road	10.5	km	4,337	4,337	4,337	3,757
7.	Road	III	Tan canh Mang Xang road	10	km	2,659	2,659	2,540	2,470
8.	Water	III	Completing and strengthening effects of water supply units	34,310	people	3,831	3,380	3,493	3,490
Q. Binh Dinh Province						**109,274**	**111,234**	**110,397**	**103,779**
1.	Irrigation	I	Thuan Ninh irrigation	1,036	ha	35,900	35,940	35,930	29,707
2.	Road	I	Ong Do - Cat Trinh road	45	km	31,600	31,547	31,133	29,980
3.	Road	II	An Hoa - An Tân - An Lao road	13	km	10,500	10,479	10,479	8,951
4.	Road	II	Flood protection for Ong Do - Cat Trinh road	11	km	10,276	12,276	12,275	11,611
5.	Water	II	Water supply for Van Canh, and Vinh Thanh	47,900	people	7,000	6,994	6,594	5,951
6.	Irrigation	III	Canal and waterpipe for Beo Stream	730	ha	7,000	7,000	6,988	6,256
7.	Road	III	Cat Trinh - Cat tien road	20	km	6,998	6,998	6,998	6,845
8.	Road	III	Upgrading water - drainage construction and branch - road of An Hoa An Tan in Hoa Lao district		km	4,787	4,787	4,580	4,478
R. Phu Yen Province						**94,323**	**93,880**	**94,377**	**83,391**
1.	Irrigation	I	Dong Khon - Tan Giang Thuong irrigation	720	ha	12,900	12,976	12,973	10,957
2.	Road	I	Roads of Phu Thu - Hoa Thinh, Phu Thuan - My Thanh, Phu Lam - Hoa Hiep Nam, and Xuan My - Lac Chi	49	km	28,700	28,717	28,717	26,939
3.	Irrigation	II	Tam Giang irrigation	1,478	ha	22,400	22,396	22,896	18,844
4.	Road	II	Roads of An Phu - An Hai, Phuoc Loc - Xuan Phuoc, Chanh Loc -Diem Truong, and Chanh Bac - Tam Giang	32	km	21,000	20,640	20,640	17,950
5.	Road	III	Rural roads in Tuy Hoa district	11	km	5,000	4,994	4,994	2,610
6.	Irrigation	III	Main canal of Dong Khon irrigation scheme and Tan Giang Thuong irrigation scheme	880	ha	3,307	3,307	3,218	2,530
7.	Irrigation	III	Main canal of Dong Khon and Tan Giang Thuong irrigation schemes	883	ha	4016	4,157	4,157	3,561
S. Ninh Thuan Province						**96,847**	**106,304**	**106,479**	**88,079**
1.	Irrigation	I	Krong Pha irrigation	1,500	ha	14,700	19,984	19,984	14,520
2.	Road	I	Kien Kien - Vinh Hy road	36.2	km	23,500	24,059	23,290	23,046
3.	Road	II	Tan Tai - Xom Lang road	9.8	km	7,000	11,049	11,049	5,101
4.	Irrigation	II	Nha Trinh - Lam Cam irrigation	1,500	ha	24,400	24,400	24,406	21,660
5.	Road	II	Roads of Phu Qui - Phuoc Hau and Phuoc Thai - Lien Sơn	25.7	km	15,400	19,165	19,896	14,241
6.	Irrigation	III	Canals of level II, N.8 and main canal of of Krong Pha system in the west	385	ha	6,188	6,188	6,381	5,973
7.	Irrigation	III	Prolonged canal of Nam II	280	ha	1,459	1,459	1,473	
8.	Irrigation	III	Nha Trinh - Lam Cam irrigation	280	ha	4,200	4,080	4,053	3,538

No.	Type	Phase	Subprojects	Design Capacity		Initial Cost Estimates: MARD	Feasibility Study	Technological Design	Implemented Cost
T. Binh Phuoc Province						**109,749**	**101,117**	**98,778**	**87,588**
1.	Irrigation	I	Ho Rung Cam irrigation	150	ha	20,000	16,236	15,230	11,847
2.	Road	I	Minh Lap - Loc Hiep road	50	km	30,600	30,693	29,484	24,067
3.	Water	II	Water supply for Duc Phong - An Loc and Phuoc Binh	89,500	people	34,400	32,939	32,911	30,217
4.	Road	III	Minh Lap - Tan Khai road	19	km	6,900	6,900	6,873	5,968
5.	Road	III	Roads of Thanh An - An Khuong and Tan Hung - Thanh Binh	21	km	6,849	6,849	6,809	5,823
6.	Irrigation	III	Weirs of Tong Le Cham and Can Le in Loc Ninh district	150	ha	7,500	7,500	7,471	6,940
7.	Road		Loc Hiep - Loc Quang road	8	km	4,145	4,144	3,213	2,726
U. Ben Tre Province						**121,371**	**97,088**	**94,092**	**84,976**
1.	Irrigation	I	An Dien Thanh Phu irrigation	1,275	ha	32,000	11,394	11,394	11,196
2.	Water	I	Water supply for Thanh Phu and Ba Tri	169,270	people	33,000	30,063	29,970	25,109
3.	Road	II	Roads of Phuoc Long, Son Phu, My Thanh An, Nhon Thanh and My Thanh	24	km	20,000	19,908	24,750	20,463
4.	Road	III	Roads of Phuoc Long, An Quy, and An Dien Thanh Phu	15.5	km	6,998	6,998	6,881	5,204
5.	Road	III	Roads of Tan Phu Tay - Thach Ngai Phuoc My and Cau Nha Tho	15	km	6,994	6,854	6,854	5,336
6.	Road	III	Road 14 in Ba Tri district	12	km	6,959	6,959	6,639	5,046
7.	Road	III	Roads of P. Son - V. Thanh - Long Thoi in Cho Lach district	9	km	6,420	6,998	6,536	5,442
8.	Water	III	Expansion of water supply units for rura center in Ba Tri Town	15,000	people	9,000	7,914	7,922	7,180
V. Tra Vinh Province						**104,853**	**74,741**	**73,381**	**89,883**
1.	Water	I	Water supply for 44 residential groups	132,000	people	40,000	10,000	45,054	35,779
2.	Road	II	12 roads of Tra Vinh	87.8	km	45,000	44,888	11,949	36,724
3.	Road	III	Roads of Dong Khoen - Tap Ngai - Hieu Tu and Huong Lo 14	12	km	5,452	5,452	5,754	4,954
4.	Road	III	Inter-villages road 12–14 and Song Giang bridge in Duyen Hai district	4.2	km	4,389	4,389	4,624	3,891
5.	Water	III	Expansion of pipelines of Water supply units (IIIC)	28,000	people	4,012	4,012		4,812
6.	Water	III	Expanding water supply network for 7 districts of Tra Vinh	28,000	people	6,000	6,000	6,000	3,723
W. Soc Trang Province						**118,377**	**111,537**	**108,573**	**85,833**
1.	Irrigation	I	Irrigation of Nam Ba Rinh Ta Liem Phase I	1,400	ha	18,400	16,996	16,957	10,836
2.	Road	I	Road for Huong Lo 11	23	km	15,500	15,500	14,640	9,779
3.	Water	I	Water supply for Thanh Tri, Long Phu, Vinh Chau, My Tu, and My Xn	70,000	people	19,300	19,288	19,287	17,784

No.	Type	Phase	Subprojects	Design Capacity		Initial Cost Estimates			
						MARD	Feasibility Study	Technological Design	Implemented Cost
4.	Irrigation	II	Irrigation of Nam Ba Rinh Ta Liem phase II, III, and IV	4,127	ha	20,000	19,979	18,998	13,366
5.	Road	II	Road of Huong Lo 13	18	km	11,800	11,796	11,789	9,270
6.	Road	III	Bridges of Rach Chua, Tra Lien, and Ba Lui in My Tu district		km	6,981	6,981	6,445	5,477
7.	Road	III	Vinh Chau bridge and branch - road of Lac Hoa in Vinh Chau district	11	km	6,999	6,999	6,979	5,244
8.	Road	III	Road of Huong lo 12 in My Xuyen district	13.5	km	6,999	6,999	6,480	4,826
9.	Road	III	Branch road of Lac Hoa (Alignment 2)	16	km	6,998	6,998	6,998	5,290
10.	Water	III	Expanding water supply network of IIIC subproject	14,505	people	5,400	5,388	5,388	3,961
Total - all Provinces			**Total**			**2,326,503**	**2,215,003**	**2,149,327**	**2,034,418**

ha = hectare, km = kilometer, m^2 = cubic meter, MARD = Ministry of Agriculture and Rural Development.
Source: ADB. 2006. *Completion Report: Rural Infrastructure Sector Project in Viet Nam*. Manila.

SUMMARY OF CASE STUDY FINDINGS

1. The following conclusions were developed from the findings of the Independent Evaluation Department's Special Evaluation Study on Asian Development Bank's Contribution to Inclusive Development through Assistance for Rural Roads.[1] These are presented in four key areas: economic, social, institutional, and environmental.

A. Economic

(i) There is good evidence that the investment in infrastructure has had an impact on livelihoods and well-being for most of the people in the subproject area. Some poor and ethnic minority people were not included in the development because of their remoteness.

(ii) Investments in rehabilitated and new rural roads have provided local people in the subproject area with the ability to add value to products and increased access to markets outside the subproject area.

(iii) The road has also resulted in an increase in the number of input traders. Increased competition among these traders has reduced the price of agricultural and other inputs.

(iv) People have been motivated by the reduced costs to invest in products that require processing in other locations.

(v) Backward linkages have been developed in different market chains, helping to stabilize the market network for the long term. The linkages include information, money, and materials.

(vi) Forward linkages have been developed with some products exported to countries such as the People's Republic of China to become the raw material of another market chain.

(vii) Local people have increased their knowledge of markets and how they operate efficiently and effectively. This enhances the ability of local people and traders to diversify products and develop a more attractive range of products for consumers.

(viii) Local people understand better the price range for the products they are selling or buying, and so their capacity for bargaining has improved as a result. This result is especially important for ethnic minority people, who before the road did not have this information and could be exploited by traders.

(ix) Off-farm enterprises have been developed by wealthier households. Off-farm employment has mainly been limited to people living along the road.

(x) Reliable irrigation services have resulted in the intensification and diversification of crops. However, it is the average and wealthy households who are mostly included in these services. Poor and ethnic minority people are excluded from subproject benefits and opportunities because they live in the high areas and it would not be feasible to provide schemes for irrigation and drainage.

(xi) Reliable irrigation service was the key factor motivating farmers to explore and adapt new varieties of paddy crop. These varieties could increase productivity by 300%.

(xii) The abolition of the water fee has resulted in very little maintenance of irrigation schemes, which will affect the long-term sustainability of the subprojects.

[1] ADB. 2009. *Special Evaluation Study on Asian Development Bank's Contribution to Inclusive Development through Assistance for Rural Roads*. Manila.

(xiii) Good harvests and an increase in the total volume of agriculture products have encouraged households to invest in commercial livestock. Some poor and ethnic minority households have entered the market, especially households with the capacity to borrow.

(xiv) Inclusion of economic opportunities as a result of rural water supply varies widely across provinces. Often the water system runs along the main road of the commune or residential areas, the most developed areas, and business and administrative areas. Businesses and better-off households receive more benefits than those who live far away from the center.

(xv) For better-off households living in the center of commune or business or service entities, access to clean water has a significant role in the development of their business and increases their quality of life. Services such as hairdressing, motorbike washing, and the production of ice cream or ice have been set up and developed.

B. Social

(i) The impact of the road has been significant in improving access to education and health services for many people, but not significant enough to develop the conditions so that the poor and ethnic minorities are included in higher secondary education. However, an important point is that the level of income for these groups is the biggest barrier to their inclusion in gaining access to services away from their immediate area.

(ii) As a consequence of the development of new and rehabilitated roads, more traffic accidents have occurred, as there was no awareness campaign to prepare local people for the change in traffic conditions.

(iii) New businesses have been established and these are having an impact on family life. Children go to internet shops and play games online, and more men visit beer stalls.

C. Institutional

(i) Some provincial people's committees have issued a policy directive instructing local authorities to use the funds from the sale of land and invest in other local infrastructure. However, these policies do not include a mechanism to ensure that the poor and ethnic minority groups are given priority in the allocation of this infrastructure and that they are included in decisions about infrastructure.

(ii) Only a few households lost land as a result of the Rural Infrastructure Sector Project. However, the local government authorities have not resolved these land issues in an equitable way.

(iii) Groups for the operation and maintenance of most infrastructures were not established, and this lack will have an impact on the sustainability of the subprojects. Some groups have been formed, but they are not very effective. Groups in Quang Tri were the exception.

(iv) Local authorities and the community were not included in the design of some infrastructure subprojects. This resulted in the construction of some infrastructure that was not feasible.

(v) Rehabilitated roads were a special problem. Ideally, the design and location of roads would include public consultations and a strategic planning process. With rehabilitated roads this was not possible. The location had been decided many years ago, when local participation and consultations were not used.

(vi) The infrastructure was included in the annual socioeconomic development planning process. This planning process is the main instrument for local development.

D. Environmental

(i) The increased number of people using the infrastructure and number of businesses has resulted in more waste and rubbish in the environment.
(ii) Minimal visual impact on the environment was reported by households who participated in the evaluation. However, diesel runoff from the road into water sources and other concerns should be measured.
(iii) The investment in infrastructure resulted in increased production and an increased use of chemical fertilizers and agricultural sprays. The environmental impact of the use of these chemicals is not known, but awareness-raising campaigns should be conducted and the situation monitored.
(iv) The sustainability of some irrigation schemes was in danger because of soil erosion and wastewater from construction sites in the hills. Poor coordination between the construction sector and the irrigation sector caused problems for farmers.

E. Rural Roads

2. Four road segments in 4 of the 23 project provinces were visited: Phuoc Long–Thach Phu Dong in Ben Tre (15.5 km), Tan Canh–Mang Xang in Kon Tum (10.0 km), Route 68 Cho Can–Bo Ban in Quang Tri (23.0 km), and Bac Ha–Simacai in Lao Cai (28.0 km).

3. **Inclusion in economic opportunities.** The project roads have been instrumental in creating economic opportunities through increased production of primary produce in the road corridors, and have enabled producers to procure production inputs and labor more efficiently. Transportation costs have decreased by 20%–50% depending on the location and nature of economic opportunities, and travel time has been reduced by 40%–50%. The roads have also provided opportunities for a larger number of traders and collectors, and encouraged them to locate or relocate in the road corridor with increased marketing efficiency for both producers and traders/collectors. Improved road connectivity has also led to more transparent market information, and has enabled producers to get fairer prices compared with what they received before the road improvements. Additional businesses have emerged in the road corridors, e.g., input suppliers, retailers, food shops, restaurants, and internet gaming centers.


Rehabilitated Tan Canh-Mang Xang Road in Kon Tum.

4. **Social development opportunities.** The road has facilitated travel to schools, health centers, and other service delivery and community organizations.

5. **Inclusion of poor households and ethnic minorities.** From the perspective of inclusiveness, ethnic minorities, households with female heads, and poor households have also

benefited in terms of economic, social, and institutional development opportunities from improved road connectivity. Subsistence agricultural production system is moving toward commercialization, and ethnic minorities in particular are more actively participating in economic activities, including marketing and home-based small handicraft businesses. However, because of their lower resource endowments and skills base, these disadvantaged groups have not benefited to the same level as their respective counterparts (Kinh/Chinese, households with male heads, and non-poor households). The poor and women in particular have benefited from fruit and vegetable production in three of the four provinces (Ben Tre, Kon Tum, and Quang Tri).

F. Irrigation Schemes

6. Beneficiary communes from the following irrigation schemes were visited: An Dien irrigation project in Ben Tre, Bo Y irrigation project in Kon Tum, Truc Kinh irrigation project in Quang Tri, and Phu Nhuan irrigation scheme in Lao Cai.

7. **Inclusion in economic opportunities.** The economic opportunities and benefits derived from irrigation project vary significantly across the provinces. Of the four subprojects visited, a positive impact on crop intensification was identified in two provinces: Quang Tri and Lao Cai. In Quang Tri, the Truc Kinh irrigation scheme was rehabilitated and updated in 2002 with 17 kilometers (km) of concretized main canal and 7 km of branch. The subproject covered five communes. Before the upgrading of the irrigation scheme, only 100 hectares (ha) of paddy field of the total of 270 ha in the commune was used for two main crops. Now the total area of 350 ha is used for two paddy crops each year. This has increased the household income by at least 100%. Reliable irrigation service was the key factor motivating farmers to explore and adapt new varieties of paddy crop. These varieties could increase productivity by 300%.

Floodgate in Dak Nieng irrigation scheme, Kon Tum province.

8. Good harvests and an increase in the total volume of agriculture products have encouraged households to invest in commercial livestock. Pigs and cattle are the second most important source of income for almost all households. On average, households earn D10 million–D15 million per year from livestock. Many households have diversified and combined paddy crop and fish raising. The return for these households is D30 million–D40 million per year. Benefits from the Truc Kinh irrigation scheme have helped at least three communes to significantly reduce the poverty rate to only 7%.

9. Similarly, the Phu Nhuan irrigation scheme in Lao Cai has had positive economic impact. The scheme has increased the income of many households through the intensification of crops to two or even three crops per year (two paddy crops and one maize crop). This has also contributed to food security. The subproject provided reliable irrigation for 220 ha of lowland paddy field. In addition, a provincial fish nursery station was built to use water from the scheme. Local villagers raise fish, which brings a good and steady income to many households. About 100 households have commercial fishponds with an annual income of D10 million–$30 million.

10. All households reported saving time and labor for irrigation because of the scheme. With crop intensification and diversification in agriculture products, processing and trading business has developed in the last 5 years. Off-farm employment has been created in the fish trade, rice processing, and transportation service. Fourteen businesses have been established as a result of the economic development from the irrigation scheme.

11. **Inclusion of poor and ethnic minority people.** The Phu Nhuan irrigation scheme in Lao Cai serves 60% of all paddy field in the commune. The service area is in a low area. In the commune, 8 of 14 villages are in the uplands and are inhabited mainly by Dao and H'mong people. This group has been excluded from subproject benefits and opportunities.

12. **Operation and service delivery.** The subprojects were handed over to an irrigation management board (often based at district level), which had the responsibility for regulating water in the scheme. Before 2008, users paid irrigation fees to cover the cost of water charge, electricity for water pumping, operation and maintenance, and staff. In 2008, irrigation fees were abolished. However, for operation and maintenance farmers took the initiative and established an O&M team. The charge was 1 or 2 kilograms (kg) of paddy per sao (500 square meters [m^2] in the central region and 360 m^2 in northern region). The team was elected by farmers and was working well. It had the following features:

(i) ownership of the irrigation works;
(ii) transparent decision-making process, and contribution to decision making;
(iii) improved irrigation services;
(iv) better maintenance and repair;
(v) increased sense of community and equality; and
(vi) fewer disputes among water users.

13. Before the construction of the Bo Y irrigation scheme in Kon Tum province, ethnic minority groups carried out slash-and-burn cultivation. After the construction, the wet rice area increased from 16 ha to 150 ha. Ethnic minority households learned the cultivation of wet rice and stopped their slash-and-burn practices. The scheme resulted in stable food security for these households.

14. However, the sustainability of the scheme was in danger because of soil erosion and wastewater from construction sites in the hills. Poor coordination between the construction sector and the irrigation sector caused problems for farmers. In many cases, the irrigation service had become unreliable.

15. In Ben Tre, an unsuccessful irrigation subproject was visited. An Dien irrigation project was designed to build two small dikes to prevent saltwater from the sea from entering cultivation. According to the commune people's committee, the design was not properly considered. In the commune, there were large areas of shrimp ponds and villagers still needed saltwater for cultivation. Wastewater from shrimp raising was discharged directly to the environment and entered cultivation. Shrimp raising was the main livelihood activity for many households, and the paddy field area was reduced. The commune people's committee said that the project management board needed to consult with commune leaders and local people during the design stage of subprojects.


Canal lining in Truc Kinh, Quang Tri province.

16. **Social and institutional inclusion.** Water for crops is always a great concern of farming households, and sufficient water at the right time in the season is a key factor for a good harvest. The efficient operation of the irrigation subproject helps farmers to reduce the worries of production and social order. In Quang Tri and Lao Cai households established water user groups, which were responsible for water distribution. The schedule for regulating water to the fields of each group of households was discussed transparently and decided by the key representatives of the farmers. All households paid a fee for the maintenance of canals and other activities relating to water distribution.

17. **Positive environment impact.** Subprojects focused on upgrading irrigation schemes and the concrete lining of the canal system. The canal lining saves water and increases the efficiency of the schemes, especially in the sandy soil areas such as Quang Tri.

G. Rural Water Supply

18. The following water supply stations were visited: Dac Rong in Quang Tri, Ban Qua in Lao Cai, and Plei Can in Kon Tum.

19. **Inclusion in economic opportunities.** Economic opportunities as a result of rural water supply vary widely across provinces. Often the water system runs along the main road of the commune or residential areas, the most developed areas, and business and administrative areas. Businesses and better-off households receive more benefits than those who live far away from the center. For better-off households living in the center of the commune or business or services entities, access to clean water has a significant role in the development of their business and increases their quality of life. Services such as hairdressing, motorbike washing, and production of ice cream or ice have been set up and developed.

20. Some positive impact on health has been observed and reported by villagers, such as a decrease in diseases such as diarrhea and eye diseases. However, the percentage of households using latrines is still very low in communes. In communes that were visited, only 5%–15% of households had a latrine.

21. In spite of access to clean water, utilization is limited. On average, each household uses only 3–5 cubic meters per month (except businesses). Water from pipes is used only for drinking and cooking. Many households use water from the river or canal for bathing and washing. Access to clean water has had limited effect in changing the sanitation and hygiene practices of local people.

22. **Access to benefits of project.** Typically, water supply subprojects in the four provinces visited are limited in outreach to the poor and ethnic minority people. An exception was the Dac Rong subproject in Quang Tri. There are different reasons for nonpoor targeting. In Ben Tre, misinformation and lack of transparency during project implementation seriously hindered access by villagers to clean water from the scheme.

23. Long Dai commune has 1,320 households living in six villages. Only 142 households are connected to the water system (about 10%). The poverty rate in the commune is 22.5%. Access to water for drinking and households in three villages has become more serious over the last 3 years because of recurring dry seasons.

24. During construction, the commune people's committee and villagers were not properly informed about the project and the benefits from the water supply station. Information about the station was delivered to villagers but did not include clear guidance on financial mechanisms and local contributions to the investment. Only better-off households registered for connection. The poor were worried about the high investment contribution, so only about 120 households registered for connection. These households were mainly those living along the main road of the commune. After construction, information came to villages and users that households did not need to pay any contribution, only a small investment to cover the cost of connection from the main water pipe, a maximum of D200,000 per household. Many households in the commune then tried to register for connection but the opportunity was gone and the water pumping station was already working to full capacity.

25. A similar situation occurred in Lao Cai with the Ban Qua water supply station. The station was located in Ban Qua commune, but very few households in the commune had access to the water supply. The main reason was the financial contribution was too high for the local people, and the operation/management board of the station lacked interest in delivering the service to the rural people. Instead, water was mainly supplied to the district town, which was 7 km away, and other communes near Lao Cai city. So far, about 50% of households in Ban Qua commune have access to clean water, but through government programs such as 134 and 135. Leaders of the district people's committee explained that they were not involved in the planning and implementation of the water supply subprojects, and neither the communes nor the districts had a role in ensuring the inclusion of the poor and ethnic minorities in the subprojects.

26. In Kon Tum province, the Plei Can water supply subproject covers very few poor and ethnic minorities. The subproject supplies water services to the households along the main road and to the town center. There is increasing demand from villages for water supply, but the station is already operating at full capacity.

27. Subprojects in Quang Tri typically invested more effort in the inclusion of poor and ethnic minority groups to have access to the benefits from the subproject. For example, villagers were invited to community meetings and wealth ranking was conducted. Households were categorized into four wealth groups, and poorer groups paid less for their financial contribution to water supply subprojects than better-off households.

H. Markets

28. Two rural markets were visited: the Phu Nhuan market in Lao Cai, and the Sa Thay market in Kon Tum.

29. **Inclusion in economic opportunities. The** upgrading of the markets was completed in 2004. There were 200 households with long-term contracts with the market management committee to conduct business in the markets. Stalls were contracted to business households immediately after the markets were upgraded. There were three types of stalls: first class, second class, and average. Most of the traders in the market were Kink people, and about one-third of traders in the market were not local people but from other towns and communes in other districts.

30. Agricultural products, livestock, vegetables, and household consumption goods are the main products traded in the markets. Markets are open every day, but on Saturday and Sunday, and special days such as the 1st and the 15th of the lunar calendar, the market is especially crowded as ethnic people from more remote villages and other communes come to sell their products, earn cash income and buy necessities. During the special market days, local people from remote areas account for one-third of the total sellers in the market. There is an open space in the market for these people to sell their products. They pay a small fee for a space (D2,000 per day). Most of the products sold are vegetables, chickens, traditional herbs, and tree leaves for medical treatment. Interview respondents stated that they could earn as much as D50,000 per market day, and this was the only source of cash income for their family. Trading in the markets increases the cash income of ethnic minority people, who use the income to buy medicines and food to improve their children's nutrition. Some people travel 20 km or 25 km from their village to the market by motorbike. A small number of sellers are considering hiring a permanent space at the market.

31. An important impact of the markets has been the development of business intermediaries who trade in the market then return to their communes or villages to resell items and products. This ensures that more products such as agricultural inputs are available in remote areas and introduces the principles of commercial activity to local people, especially the poor and ethnic minorities, who do not have the opportunity to travel.

32. Discussions with local people in the markets confirmed that since the upgrading of the markets, the goods sold have become more varied and have improved in quality. Commodities are also cheaper because of the competition among traders. For example, the price of a bicycle was D30,000 higher before the upgrading of the market.

33. Traders from the provincial city also conduct business in the market, helping to diversity the range of commodities available to consumers.

34. Support services have also improved since the upgrading of the markets. For example, in both markets visited, the number of transportation services such as local buses and motorbikes had increased.

35. **Social and institutional inclusion.** Visiting the markets is an important social event for many local people, especially ethnic minority women. Markets help ethnic minority people connect with people from other villages.

36. The management and operation of the markets varies. In Phu Nhuan commune in Lao Cai, the commune people's committee controls the market; in Sa Thay district (Kon Tum) the district people's committee controls the market. Businesses and traders bid for stalls in the market. The chairman of the district people's committee in Kon Tum commented that the funds received from contracts with traders was more than the cost of upgrading the market. However, in the 4 years of operation since the upgrade, no repair or maintenance has been conducted. Services are also very poor. There is no water supply and no latrines in the market, and the cleaning service is low in quality.

A shop in Sa Thay market, Kon Tum province.

37. The following table compares the "before" and "after" impact of the civil works (rural roads, irrigation and water schemes, and markets) under the Rural Infrastructure Sector Project. The information comes from case studies conducted under the Special Evaluation Study on the Asian Development Bank's Contribution to Inclusive Development through Assistance for Rural Roads (footnote 1).

Table A7: Impact before and after the Investment

Item	Before the Investment	After the Investment	Inclusion of Poor and Vulnerable Groups
Road Subprojects			
Ben Tre	Coconut fruit is the only commodity.	Coconut fruit is still the only commodity, but with new variables, more intensive farming (using fertilizers).	Only better-off households could invest in new variables and more land for crops.
	Cheaper selling price (by 20%)	Better prices as the impact of upgraded road	All households are included.
	No subproducts outputs	Using the residual of fruits to produce handicrafts (baskets made from leaf stems) has created home-based employment for about 200.	Poor and women are included.
	No enterprises/processing	One enterprise producing coconut fiber has created permanent jobs for 50–60 workers.	About 20 workers are from poor households.
	No transportation service	Two new services with four vehicles	The poor are not included.
Kon Tum	Cassava is the only commodity.	Cassava is the only commodity; no variables or more intensive cropping. But more unused land is being planted with cassava (20% increase in land cropping).	Only better off could invest in land expansion to plant cassava.
Quang Tri	Rice as key commodity	Intensive rice cropping; two crops applied for all paddy	All households included

Item	Before the Investment	After the Investment	Inclusion of Poor and Vulnerable Groups
		land areas	
		Vegetable as a stable income source, bringing income of D1 million per year for households	About 200 households included, most of them poor
		Paper mill tree (tram). For this, 600 ha of land have been used. Profit is D1.5 million per year per ha.	Only better-off households are included, as they have land, capital for investment and labor.
	No sales agents	Three sales agents for agriculture inputs have emerged, and two agents as satellite collectors of rice.	
Lao Cai	Maize cropping for food. Economy is totally self-subsidizing.	Half of all maize products are used for consumption and the other half sold as commodities. However, the price of maize is low and income from maize cannot help local households escape from poverty.	Only households in villages that are near the road (about half of 400 total households of commune)
	No purchase culture; no marketing or sales agents	Market has been set up; is open every Saturday and Sunday One collector of maize, also providing transportation services	Better-off households
Irrigation Subprojects			
Ben Tre	No impact as expected. Primary design of irrigation at all. Changes in local livelihood did not relate to the irrigation operation.		
Quang Tri	Paddy crop is the only livelihood activity; 240 ha out of 1,890 ha can be used for 2 paddy crops.	More than 1,000 ha used for 2 crops. Increase in productivity due to the application of new technology and good variables. Surplus rice used for livestock, which brings cash income to most of households in the commune.	All households (including the poor) Water provided is limited to field at the tail end of canal Poverty rate of commune reduced from 10% in 2004 to 0.65% in 2008
Kon Tum	100 ha of wet rice field	Increase to 800 ha of wet rice field Good model for ethnic minority people to stop slash-and-burn cultivation and engage in wet rice cropping	Only households at the center of the commune are included.
Lao Cai	One rice crop only	- Two rice crops can be used for 220 ha out of total 313 ha of rice field of commune.	Two-thirds of households in the commune are included. The rest are

Item	Before the Investment	After the Investment	Inclusion of Poor and Vulnerable Groups
		- Development of 100 ha of fishponds, important livelihood source for 200 households - State-owned fish nursery supplies the entire province	Dao and H'mong, who live on higher land and are not included. - Households in lowland areas are mostly Kinh people; ethnic minorities not included
Water Supply Subprojects			
Ben Tre	River water used	- 100 households in commune have access, but make only limited use of the water supply facilities - 2 enterprises (producing dried coconut rice) were able to expand production as a result of access to clean water	The poor and households in remote villages were excluded as the consequence of the nonparticipatory and non-transparent project implementation.
Kong Tum	River water used	- 300 households in the town have access to and use the facilities - New small enterprises, such as restaurants, hairdressing shops, and ice-producing ventures, have been created.	90% of beneficiaries are Kinh people, traders, services in the center of town. Most ethnic minorities have no access.
Quang Tri	River water used	70% of all poor and ethnic minority households in three communes have access to, but make limited use of, the facilities because the price of service is too high for local people.	Good mechanism for including the poor (using wealth ranking and allowing the poorer segments of the population to pay less for access
Lao Cao	River water used	Local people use natural water (from stream or good natural sources). All villages benefiting from water supply schemes of government programs 135 and 134.	Water supply station under the Asian Development Bank project supply water to the people in the town only. Local people in the commune are excluded because of inability to contribute.
Market Subprojects			
Kon Tum	- Market exists but small and not stable - Local traders only - Only local agriculture commodities sold	Stable market; the number of traders increased by 200%, one-third of them not local people but from other places, come to do business	The poor and ethnic groups are included. Ethnic people from other communes sell their traditional and agriculture products.
Lao Cai	Old market is small.	Good business for about 100 local households	Poor and ethnic people come to visit market more frequently.

Source: IED Case Study Report from ADB. 2009. *Special Evaluation Study on Asian Development Bank's Contribution to Inclusive Development through Assistance for Rural Roads.* Manila