

PROJECT COMPLETION REPORT

ON THE

SEMERAK RURAL DEVELOPMENT PROJECT
(Loan 992-MAL)

IN

MALAYSIA

June 2001

CURRENCY EQUIVALENTS

Currency Unit – Ringgit (RM)

		At Appraisal	At Project Completion
RM1.00	=	\$0.371	\$0.26
\$1.00	=	RM2.695	RM3.80

ABBREVIATIONS

ADB	–	Asian Development Bank
BME	–	benefit monitoring and evaluation
DID	–	Drainage and Irrigation Department
DOA	–	Department of Agriculture
DOE	–	Department of Environment
EIRR	–	economic internal rate of return
KRDP	–	Kemasin Rural Development Project
KSIRD	–	Kemasin-Semerak Integrated Rural Development Project
MOA	–	Ministry of Agriculture
O&M	–	operation and maintenance
PMU	–	Project Management Unit
SRDP	–	Semerak Rural Development Project
TA	–	technical assistance

NOTES

- (i) The fiscal year (FY) of the Government ends on 31 December.
- (ii) In this report, “\$” refers to US dollars.

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BASIC DATA

A. Loan Identification

1.	Country	Malaysia
2.	Loan Number	992-MAL
3.	Project Title	Semerak Rural Development Project
4.	Borrower	Government of Malaysia
5.	Executing Agency	Ministry of Agriculture
6.	Amount of Loan	\$33.2 million
7.	PCR Number	PCR:MAL 620

B. Loan Data

1.	Appraisal	
	- Date Started	4 August 1987
	- Date Completed	11 August 1987
2.	Loan Negotiations	
	- Date Started	26 October 1989
	- Date Completed	27 October 1989
3.	Date of Board Approval	23 November 1989
4.	Date of Loan Agreement	28 January 1993
5.	Date of Loan Effectiveness	
	- In Loan Agreement	28 April 1993
	- Actual	18 May 1993
	- Number of Extensions	one
6.	Closing Date	
	- In Loan Agreement	30 June 1997
	- Actual	25 February 2000
	- Number of Extensions	1 ¹
7.	Terms of Loan	
	- Interest Rate	variable
	- Maturity	20 years
	- Grace Period	3 years

8. Disbursements

a. Dates

Initial Disbursement	Final Disbursement	Time Interval
26 December 1995	20 January 2000	4 years and 1 month
Effective Date	Original Closing Date	Time Interval
18 May 1993	30 June 1997	4 years and 1 month

¹ In February 1997, ADB approved an extension of the loan closing date up to 30 June 1999. The loan account, however, was kept open up to February 2000 to maximize and finalize disbursement of project expenditures eligible for financing under the loan.

b. Amount (\$)

Category	Original Allocation	Amount Disbursed	Amount Reallocated (Canceled) (25 Feb 2000)	Revised Allocation
Civil Works				
01A – Part A	16,570,000	24,200,468	7,630,468	24,200,468
01B – Part B	7,520,000		(7,520,000)	
01C – Part C	110,000		(110,000)	
Equipment/Vehicles				
02A – Part A	5,556,000	7,589,513	2,033,513	7,589,513
02B – Part B	2,044,000		(2,044,000)	
02C – Part C	800,000	120,544	(679,456)	120,544
Incremental Operating Costs				
03 – Parts A + B	600,000		(600,000)	
Total	33,200,000	31,910,525	(1,289,475)	31,910,525

Note: In January 1996, ADB approved the Government's request to allow disbursement of funds across the loan categories on a first-come, first-served basis, regardless of the allocated amount, until the proceeds of the loan were exhausted; and (ii) to undertake a reallocation of loan proceeds on a post-facto basis.

9. Local Costs (Financed) None

C. Project Data

1. Project Cost (\$ million)

Project Cost	Appraisal Estimate		Actual	
	Amount	%	Amount	%
Foreign Exchange Cost	49.226	52	33.215	37
Local Currency Cost	45.950	48	55.630	63
Total	95.176	100	88.845	100

2. Financing Plan (\$ million)

Financier	Appraisal Estimate				Actual			
	Foreign	Local	Total	%	Foreign	Local	Total	%
ADB	33.200	0	33.200	35	31.911	0	31.911	36
Government	16.026	45.950	61.976	65	1.304	55.630	56.934	64
Total	49.226	45.950	95.176	100	33.215	55.630	88.845	100
%	52	48	100		37	63	100	

ADB = Asian Development Bank.

3. Cost Breakdown by Project Components (\$ million)

Component	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Part A – Flood Mitigation and Drainage						
1. Gunong Diversion Channel	0.610	1.297	1.907	1.302	1.694	2.996
Civil Works	0.610	0.520	1.130	1.302	1.109	2.411
Land Acquisition	0.000	0.778	0.778	0.000	0.585	0.585
2. Semerak Bunds	4.000	6.185	10.185	4.889	10.221	15.110
Civil Works	4.000	3.407	7.407	4.889	6.561	11.451
Land Acquisition	0.000	2.778	2.778	0.000	3.660	3.660
3. Semerak Tributaries	4.000	5.296	9.296	3.642	8.763	12.405
Civil Works	4.000	3.407	7.407	3.642	4.255	7.897
Land Acquisition	0.000	1.889	1.889	0.000	4.507	4.507
4. Drainage Pumping Stations	5.664	1.743	7.407	13.202	5.007	18.209
Civil Works	1.960	1.689	3.629	4.670	4.498	9.168
Monitoring/Evaluation	3.704	0.000	3.704	8.532	0.495	9.027
Land Acquisition	0.000	0.074	0.074	0.000	0.000	0.000
5. Drainage Bridges	2.000	1.741	3.741	4.121	6.245	10.366
Civil Works	2.000	1.704	3.704	4.121	6.245	10.366
Land Acquisition	0.000	0.037	0.037	0.000	0.000	0.000
6. Semerak Tidal Gate	5.852	3.444	9.296	5.969	6.324	12.293
Civil Works	4.000	3.407	7.407	5.969	5.916	11.885
Monitoring/Evaluation	1.852	0.000	1.852	0.000	0.000	0.000
Land Acquisition	0.000	0.037	0.037	0.000	0.408	0.408
Subtotal (Part A)	22.126	19.707	41.833	33.125	38.254	71.378
Part B – Irrigation						
1. Yong, Gaal, Yong Extension, Tabeing Kiri Schemes	3.589	3.041	6.630	0.000	0.438	0.438
Civil Works	2.700	2.300	5.000	0.000	0.000	0.000
Monitoring/Evaluation	0.889	0.000	0.889	0.000	0.000	0.000
Land Acquisition	0.000	0.741	0.741	0.000	0.438	0.438
2. Lower Semerak Schemes	1.785	1.919	3.704	0.000	0.000	0.000
Civil Works	1.600	1.363	2.963	0.000	0.000	0.000
Monitoring/Evaluation	0.185	0.000	0.185	0.000	0.000	0.000
Land Acquisition	0.000	0.556	0.556	0.000	0.000	0.000
3. South Semerak Scheme	1.685	2.019	3.704	0.000	0.193	0.193
Civil Works	1.500	1.278	2.778	0.000	0.000	0.000
Monitoring/Evaluation	0.185	0.000	1.185	0.000	0.000	0.000
Land Acquisition	0.000	0.741	0.741	0.000	0.193	0.000
4. West, Upper Jerum-Rasau Schemes	1.905	2.576	4.481	0.000	0.099	0.099
Civil Works	1.720	1.465	3.185	0.000	0.000	0.000
Monitoring/Evaluation	0.185	0.000	0.185	0.000	0.000	0.000
Land Acquisition	0.000	1.111	1.111	0.000	0.000	0.000

Component	Appraisal Estimate			Foreign	Actual	
	Foreign	Local	Total		Local	Total
5. Power Lines	0.600	0.511	1.111	0.000	0.000	0.000
Civil Works	0.000	0.511	0.511	0.000	0.000	0.000
Monitoring/Evaluation	0.600	0.000	0.600	0.000	0.000	0.000
Subtotal (Part B)	9.564	10.066	19.630	0.000	0.368	0.368
Part C – Agriculture Support Services						
1. Fruit and Vegetables	0.130	0.171	0.301	0.031	0.000	0.031
Building	0.040	0.034	0.074			
Vehicle	0.030	0.000	0.030	0.031	0.000	0.031
Equipment	0.060	0.000	0.060			
Staff	0.000	0.137	0.137			
2. Rice Development	0.780	0.198	0.978	0.060	1.480	1.540
Building	0.070	0.065	0.135			
Vehicle	0.100	0.000	0.100	0.029	0.000	0.029
Equipment	0.610	0.000	0.610	0.031	0.000	0.031
Staff	0.000	0.102	0.102			
Administration	0.000	0.031	0.031	0.000	1.480	1.480
Subtotal (Part C)	0.910	0.369	1.279	0.091	1.480	1.571
Consulting Services		3.618	3.618	0.000	5.100	5.100
Incremental Operation and Administration	0.600	5.723	6.323	0.000	10.066	10.066
Contingencies and Price Escalation	9.358	6.466	15.824			
Interest During Construction	6.668	0.000	6.668			
Total Project Cost	49.226	45.950	95.176	33.215	55.630	88.845
%	52	48	100	37	63	100

4. Project Schedule

Milestone		Appraisal Estimate	Actual
A.	Date of contract with consultants	May 1990	November 1991
B.	Completion of Engineering Designs Flood Mitigation and Drainage Irrigation	December 1993 December 1993	December 1993 December 1993
C.	Civil Works Contracts		
a.	Dates of Awards		
	Part A: Flood Mitigation and Drainage		
-	Gunong Diversion Channel	December 1993	29 December 1999
-	Semerak Bunds ¹	December 1991	9 December 1995
-	Semerak Tributaries ²	December 1991	21 November 1995
-	Drainage Pumping Stations	December 1993	29 May 1995
-	Drainage Bridges	December 1993	12 September 1996
-	Semerak Tidal Gate ³	May 1990	23 June-October 1995

¹ Bunded Semerak Channel.

² Comprised Package I (P1) and Package 2 (P2).

³ Tidal gate and weir.

Milestone	Appraisal Estimate	Actual
Part B: Irrigation		
- Yong, Gaal, Yong Extension, Tebeing Kiri Schemes	December 1993] Will be implemented] during and after the] 8th Malaysia Plan] (2001-2006)
- Lower Semerak Scheme	December 1992]
- South Semerak Scheme	December 1992]
- West and Upper Semerak, Jeram-Rasau Schemes	December 1991]
- Power Lines	December 1991]
b. Completion of Work		
Part A: Flood Mitigation and Drainage		
- Gunong Diversion Channel	December 1994	June 2002
- Semerak Bunds	December 1994	31 July 1999
- Semerak Tributaries	December 1994	P1-July 1999; P2-November 1999
- Drainage Pumping Stations	December 1996	13 July 1998
- Drainage Bridges	December 1996	31 August 2000
- Semerak Tidal Gate	December 1994	30 June 1998
Part B: Irrigation		
- Yong, Gaal, Yong Extension, Tebeing Kiri Schemes	December 1996] Will be implemented] during and after the] 8th Malaysia Plan] (2001-2006)
- Lower Semerak Scheme	December 1995]
- South Semerak Scheme	December 1995]
- West and Upper Semerak, Jeram-Rasau Schemes	December 1995]
- Power Lines	December 1996]
D. Equipment and Supplies		
- First Procurement		12 October 1995
- Last Procurement		27 December 1997
- Completion of Equipment Installation		April 1999
Start of Operations		
Part A: Flood Mitigation and Drainage		
- Gunong Diversion Channel	January 1995	June 2002
- Semerak Bunds	January 1995	August 1999
- Semerak Tributaries	January 1995	P1-August 1999; P2-December 1999
- Drainage Pumping Stations	January 1997	August 1998
- Drainage Bridges	January 1997	September 2000
- Semerak Tidal Gate	January 1995	July 1998
- Overall Operation of Flood Control	January 1997	June 2002
Part B: Irrigation		
- Yong, Gaal, Yong Extension, Tebeing Kiri Schemes	January 1997] Will be implemented] during and after the] 8th Malaysia Plan] (2001-2006)
- Lower Semerak Scheme	January 1996]
- South Semerak Scheme	June 1996]
- West and Upper Semerak, Jeram-Rasau Schemes	January 1996]
- Power Lines	January 1997]

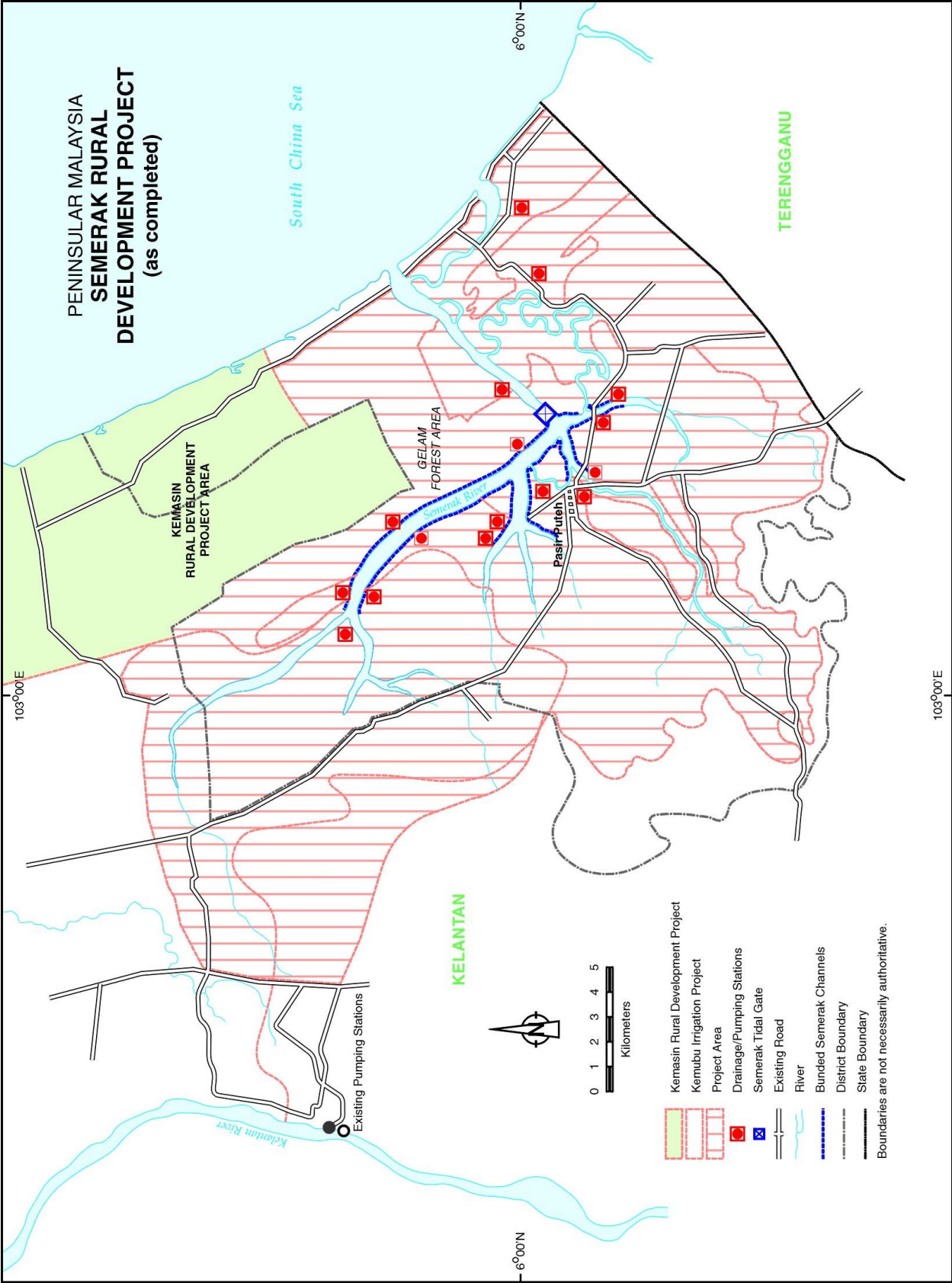
Milestone	Appraisal Estimate	Actual
E. Other Milestones		
Start of Implementation		
- Vegetable Development	July 1990	July 1990
- Rice Development	July 1990	July 1990
Completion of Implementation		
- Vegetable Development	December 1996	continuing
- Rice Development	December 1996	continuing

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Fact-Finding	19 June-7 July 1989	3	60	Senior Project Economist Environment Specialist Project Engineer
Appraisal	5-11 August 1989	4	48	Senior Project Economist Project Engineer Environment Specialist Counsel Senior Country Officer
Project Inception	22 June-1 July 1993	1	10	Senior Project Engineer
Review ^a	24-29 June 1994	3	15	Senior Project Engineer Project Economist Environment Specialist
Review	27 September- 7 October 1994	2	22	Senior Project Engineer Assistant Project Analyst
Review	17-29 April 1995	1	13	Senior Project Engineer
Review	21 November- 1 December 1995	3	33	Senior Project Engineer Environment Specialist Associate Project Analyst
Review	4-15 March 1996	2	24	Senior Project Engineer Project Engineer
Review	18 November- 6 December 1997	1	19	Project Engineer
Review (with another project)	30 June-17 July 1998	2	36	Project Engineer Assistant Project Analyst
Review	12-22 October 1999	1	11	Senior Project Engineer
Project Completion	7-17 November 2000	5	6	Senior Project Engineer
Review ^{ab}	7-17 November 2000		6	Poverty Specialist
	7-17 November 2000		6	Staff Consultant/Civil Engineer
	30 October- 17 November 2000		10	Staff Consultant/ Economist
	30 October- 17 November 2000		10	Associate Project Analyst
Total			329	

^a With Loan 1068-MAL: *Northern Terengganu Rural Development Project*, for \$15.0 million, approved on 13 December 1990.

^b The Project Completion Review Mission comprised W. H. Menninger, Sr. Project Engineer (Mission Leader); S. Settboonsarng, Poverty Reduction Specialist; T. Heiler, Civil Engineer (Staff Consultant); M. Copeland, Economist (Staff Consultant); and L. Medina, Associate Project Analyst.



I. PROJECT DESCRIPTION

1. In the early 1970s, the Malaysian Government recognized that the state of Kelantan was the second most economically depressed state with a very high incidence of poverty with about 22 percent of households living below the national poverty level. The area covered by the Kemasin-Semerak river basins had an even higher incidence of poverty estimated at 47 percent of households. With this in mind, in 1977 the Government prepared a master plan for the Kemasin-Semerak Integrated Rural Development Project (KSIRDP). Due to resource and institutional constraints, the Government decided to implement the KSIRDP in two phases. Accordingly, the Asian Development Bank (ADB) approved the Kemasin Rural Development Project (KRDP), as the first phase in December 1980.¹ Although the KRDP was not expected to be completed until the end of 1990, the constructed flood mitigation facilities had already started yielding significant benefits. Impressed with its success, the Government requested ADB to assist in financing the Semerak Rural Development Project (SRDP), as the second phase. The Project (SRDP) was in accordance with ADB's sectoral objectives of poverty reduction by assisting in smallholder agriculture and environmental protection. The Project was relevant at the time of preparation and remains so as the area is designated as one of the eight granary regions in Malaysia. The Government is committed to developing the agriculture potential of the area through mechanized farming and flood protection works. The main risks for the Project included the possibility of implementation delays and coordination problems and adverse environmental impacts. The Project had built-in measures to try and address these concerns including an advisory technical assistance (TA) on environmental management.

2. The major objectives of the Project were to provide flood mitigation and environmental protection and facilitate uninterrupted agricultural production by providing flood control, drainage, and irrigation facilities. The Project comprised three components:

- (i) flood mitigation and drainage: (a) construction of a tidal gate structure at the conjunction of the lower Semerak channel and upper Semerak River; (b) construction of two parallel bunds, about 10 kilometers (km), along both sides of the main upper Semerak River; (c) excavation of about 30 km of 13 tributaries of the Semerak River system; (d) construction of seven pumping stations; (e) construction of 12 light traffic and three heavy traffic bridges; and (f) construction of a flood diversion channel (Gunong) of approximately 3.4 km length connecting the Melor and the upper Semerak rivers;
- (ii) irrigation: construction of irrigation facilities including head works, pumping stations, and conveyance and distribution channels in six irrigation schemes covering 5,250 hectares (ha); and
- (iii) agriculture support services including (a) strengthening of extension services for rice production in the new 5,250 ha irrigation area and an additional area of 2,000 ha left idle due to flooding; (b) introduction and marketing of high value crops, such as fruits and vegetables, through demonstration farms; and (c) provision of vehicles and equipment.

3. Prior to the start of the Project, the Government began construction on three major civil works essential to the overall area development, including (a) the Semerak sea works, (b) the lower Semerak channel, and (c) the Semerak bridge. The Semerak sea works consists of two

¹ Loan 497-MAL: *Kemasin Rural Development*, for \$40 million, approved on 15 December 1980.

large breakwater structures located at the junction of the new lower Semerak channel and the sea. The lower Semerak Channel is a 7.5 km long excavated and bunded earth channel some 350 m wide designed to convey floodwater to the sea outlet from the ADB-financed Semerak tidal gate and weir structure. Both of these structures were critical to the proposed flood mitigation measures to be implemented under the Project. The Semerak bridge, which crosses the lower Semerak channel upstream of the Semerak sea works, is a 530 meter (m) long reinforced concrete structure that significantly improves the transportation links in the coastal area and project area.

II. EVALUATION OF IMPLEMENTATION

A. Project Components

4. The SRDP has five components: flood mitigation and drainage, irrigation, agricultural support, consulting services, and project management. Three major nonproject components were commenced or implemented by the Government, without ADB assistance, before the project components were implemented. These three components were (i) the Semerak sea works, (ii) the lower Semerak channel, and (iii) the Semerak bridge. Description and detailed evaluation of implementation are presented in Appendix 1.

1. Flood Mitigation and Drainage

5. **Semerak Tidal Gate.** The appraisal design for this structure was a single purpose tidal gate with a 2 m high weir that created a 2,000 ha reservoir upstream. Detailed design studies led to an alternative proposal for a larger tidal gate and weir structure that was capable of safe passage of flood flows and sediment; and provided a smaller 470 ha supplemental storage upstream. The larger tidal gate structure was approved by ADB as it would (i) control saltwater intrusion into the bunded reservoir upstream; (ii) control the upstream water levels to facilitate irrigation withdrawals; (iii) pass the design flood to the lower Semerak channel; (iv) scour accumulated silt and sand downstream in flood events; and (v) provide supplementary storage of some 20 million cubic meters (m³) to augment dry season irrigation supplies. The 800 m long structure has a central section of 100 m containing 10 tidal gates, 8 m wide, and two 350 m long overflow weirs on either side of the central section. It is designed to withstand a 1 in 30-year flood event and has been checked for safe function under a 1 in 100-year flood event.

6. **Bunds of the Upper Semerak River.** The bunded channel was constructed essentially as designed, except for minor modifications to the bunds immediately upstream of the tidal gate structure. A length of 14.6 km of excavated and bunded flood channel was constructed along each side of the Semerak River to (i) safely convey the 1 in 30-year flood event from upstream areas, plus the floodwaters from the Gunong diversion; (ii) act as a drainage collector for 16 new drainage pumping stations; and (iii) contain stored water above the tidal gate in the dry season. Bunds, with a total length of 20.6 km, have been constructed along each side of the excavated channel, with side drains set back from the outside toe of the bund; and two gated structures provided to allow gravity irrigation off-take. The channel has a bed width between 70 and 120 m, and involved excavation of about 8 million m³ of swamp material.

7. **Semerak Tributaries.** These works were constructed as appraised, apart from specific design modifications made as a result of unforeseen foundation conditions. Thirteen upstream tributaries of the Semerak River have been improved by excavation and bunding to convey flood flows across low-lying land to the main bunded channel. Works were required along a total length of 30 km.

8. **Bridges.** The appraisal identified the need for 15 bridges, but traffic access considerations and Public Works Department (PWD) requirements identified the need for one additional light traffic bridge, for a total of 18 (6 heavy traffic bridges, 10 light traffic bridges, and 2 pedestrian bridges). In addition, PWD required all utility-related service pipes to be carried on separate light bridges adjacent to the road bridges in locations where this was necessary. Six heavy traffic bridges have been constructed to PWD standards to significantly improve traffic access in the project area and cross over project drainage works.

9. **Gunong Diversion Channel.** This diversion channel was part of the flood mitigation measures but was not constructed during the implementation period for various reasons. It is currently under construction in accordance with the design at appraisal. The channel is a 3.5 km long excavated and bunded channel that extends from a diversion structure on the Melor River to the upper section of the bunded Semerak tributaries system. The purpose of the diversion channel is (i) to transfer the 1 in 20-year flood flow of 110 m³/second (s) away from the Kemasin area to the Semerak River; and (ii) to convey 11 m³/s in the dry seasons for the planned six irrigation systems of 5,250 ha. Construction of the channel commenced after the loan was closed; it is presently about 30 percent complete and due for commissioning in mid-2002.

10. **Drainage Pumping Stations.** The appraisal identified the need for seven drainage pumping stations. However, detailed designs revealed the need to change nine gravity drainage flap-gate pipe outlets with nine additional pumping stations; or a total of 16 pumping stations. The Project has completed all 16 drainage pumping stations along the bunded channel that are designed to transfer the 1 in 20-year, 7-day water excess from outside of the bunded channel into the floodway. The works comprise a total of 76 electrosubmersible pump sets ranging in capacity from 0.4 to 3.0 m³/s, automatically controlled by inlet sump water levels.

2. Irrigation

11. The Project was expected to construct six new irrigation schemes with a total net area of 5,250 ha. However, delays in construction of the Gunong diversion channel and the need to redesign the irrigation systems to be based on more mechanical operations to meet the new granary area requirements has shifted implementation to the 8th and 9th Malaysia plan periods (Appendix 2). The Government has indicated its commitment to complete these irrigation systems in the future. With the new implementation schedule, completion of the irrigation schemes is not expected until 2008.

3. Agricultural Support Services

12. The Project aimed to (i) provide extension services to the six new irrigation schemes and improve the production of rice paddy on 2,000 ha outside of the proposed irrigated area by strengthening the resources of staff and equipment of the Department of Agriculture (DOA); and (ii) encourage farmers to take up opportunities in vegetable and fruit production (200 ha for each) by setting up demonstration plots and establishing wholesale contract arrangements for the farmers. The Project provided for (i) additional staff and establishment of rainfed paddy demonstration plots involving 1,230 farmers on about 1,485 ha; and (ii) supervision of the establishment of new fruit and vegetable crops resulting in an additional 1,443 ha of vegetable crops, and 566 ha of fruit trees. The Project successfully assisted farmers with marketing of produce to wholesalers. The economic evaluation as shown in the appraisal estimated an increase in tobacco from 1,100 ha to 3,000 ha. With implementation of most of the flood mitigation measures, tobacco production has increased to about 2,590 ha with restriction on the

upper limit imposed by the federal Government. The appraisal targets and actual procurement of machinery and equipment are detailed in Appendix 3.

4. Consulting Services

13. The consulting services for the Project were provided by a domestic engineering firm that was responsible for design concepts, feasibility studies, final contract drawings and documentation, and supervision of works. The Government also gave them the responsibility as the engineer. For the Gunong diversion channel, the domestic firm was responsible for the design and contract documentation, and the Drainage and Irrigation Department (DID) was responsible for construction supervision, acting as the engineer, using its local staff.

14. The appraisal report estimated that about 954 person-months of services would be required for construction supervision of the Project and that these would be entirely funded by the Government. At the time of loan closure, the domestic firm had provided 347 person-months of professional time to supervise the Government-funded components; and 768 and 987 person-months of professional and subprofessional time, respectively, for the ADB-funded components.

5. Project Management

15. The Project was managed by the same Project Management Unit (PMU) that was established and responsible for the KRDP (para. 18), and was structured as designed at appraisal. Project management was assisted by a project steering committee (PSC) and implementation committees.

6. Construction Quality, Operation and Maintenance, and Drainage Fees

16. The quality of construction of the major civil works that were completed is considered excellent; they are operated and maintained in good condition using federal and state resources. Because the six irrigation schemes are not yet constructed, no irrigation/drainage service fees are being charged to farmers. However, once construction is completed, irrigation/drainage service fees will be collected by the established farmers' associations.

B. Implementation Arrangements

17. The Ministry of Agriculture (MOA) was the Executing Agency, responsible for overall project supervision and execution. The various components were carried out under the direct responsibility of two separate departments under MOA: (i) DID, responsible for flood mitigation, drainage, and irrigation; and (ii) DOA, responsible for agriculture support. Other agencies involved in implementation included (iii) Farmers' Organization Authority (FOA), responsible for the provision of technical support to enable farmers to undertake agricultural and agrobased activities; (iv) Department of Fisheries, responsible for implementing aquaculture development programs such as rehabilitation of inactive or idle ponds, cage culture, and stocking of various fish and crustacean species in public waterways; and (v) Department of Veterinary Services, responsible for implementation of livestock development programs in the area (Appendix 4).

18. The PMU provided day-to-day management and implementation of the Project. The project director, who headed the PMU for the KRDP, also served as the project director for the Project. He reported to the PSC, and was responsible for coordinating all activities and operations of the departments and agencies involved in implementation.

19. The PSC, established for the KRDP, was responsible for coordinating, monitoring, reviewing, and evaluating the progress of project implementation and initial operation of facilities already completed. Its members were drawn from the Kelantan State Government, DID, DOA, FOA, Kemubu Agricultural Development Authority, the State Forestry Department, and the director general of the Department of Environment (DOE). Under the agriculture support services component, the Federal Agricultural Marketing Authority, under MOA, prepared an operational plan for marketing vegetables and fruits grown in the project area, while DOA provided extension services and technical support available under ongoing government programs at a level adequate for meeting the implementation requirements of the Project.

C. Project Costs

20. At appraisal, the total project cost was estimated at \$95.18 million equivalent, consisting of \$49.23 million in foreign exchange cost and \$45.95 million equivalent in local currency. The actual cost amounted to \$88.85 million, comprising \$33.22 million in foreign exchange and \$55.63 million equivalent in local currency (Appendix 5). The actual costs excluded the estimated cost of the six irrigation schemes (5,250 ha), whose implementation is now deferred to the 8th and 9th Malaysia plans from 2001 through 2008. The Government made sound technical decisions not to proceed with the irrigation systems until the flood control system was completed and decisions were made on introducing more modern and advanced technical farming methods. ADB's financing amounted to \$31.91 million, representing 96 percent of the foreign exchange cost, or 36 percent of the total project cost. The loan covered only the Project's base cost. This was based on the agreement between the Government and ADB to exclude under the loan the physical and price contingencies and interest during construction. The reasons for exclusions were that in certain past projects, the allocations for physical and price contingencies were neither utilized nor canceled during implementation, requiring the Government to pay higher commitment charges. Cost overruns in total cost and local currency cost of the Project were significant and were attributed mainly to price escalation, caused by significant delay in implementation and changes in civil works design. The Government has borne the cost overrun out of its own resources. For the irrigation component, the Government has given assurances that it will provide all the funds required to meet the implementation requirements of the six irrigation schemes (to be implemented during the 8th and 9th Malaysia plans) and the Gunong diversion channel (currently being implemented).

D. Project Schedule

21. The Project was originally to be completed over seven years beginning in mid-1990 and ending in December 1996, with the original loan closing date scheduled for 30 June 1997. Actual implementation was carried out over 10 years (Appendix 2), with the works under the irrigation component being deferred to the 8th and 9th Malaysia plans up to 2008. The delay in loan effectivity was a result of the Government's decision to make it effective only after completion of detailed designs and land acquisition, which were not covered under the loan, and complete, as much as possible, two major civil works (Semerak sea works completed in August 1991 and lower Semerak channel completed in August 1995) that were totally financed by the Government. Delays were also caused by other factors, such as the need to revise the designs of the irrigation systems as a result of a change in traditional farming practices to more mechanized farming, and revision of budget allocations for the Project. The Government is committed to completing all of the works.

E. Engagement of Consultants, and Procurement of Goods and Services

22. No international consultants were recruited for the Project. The domestic consultants engaged for design and construction supervision of the KRDP were retained for the Project. The consultants were engaged in accordance with government procedures acceptable to ADB, but were financed entirely by the Government out of its own resources. The arrangement adopted for the engagement of consultants was in the interests of continuity, consistency in design, and efficiency in implementation.

23. Award of contracts for the Project were generally in line with the requirements of the Loan Agreement, except in one instance where the contract award did not qualify for financing under the loan. Seven major civil works and one major supply contract were financed under the loan. As per the Loan Agreement, contracts, valued at more than \$1.0 million each, were to be awarded using international competitive bidding procedures (Appendix 6). However, with ADB approval, three of the contracts were awarded using local competitive bidding (LCB) procedures. The change in the mode of procurement was adopted by the Project as the works were considered simple and local contractors were qualified to do the work. Two LCB civil works contracts were awarded without ADB's concurrence; however, ADB's review of the procurement process and the evaluation undertaken by MOA resulted in approval of the contracts after the fact.

F. Performance of Consultants, Contractors, and Suppliers

24. The performance of the consultants, contractors, and suppliers was satisfactory as no major problems were encountered during implementation. Delays in loan effectiveness and low disbursements early in project implementation were not due to their shortcomings. The work was generally carried out on time and met all of the technical requirements expected. Unforeseen technical problems resulted in extensions of several engineering and construction contracts. The quality of construction is considered good to excellent and meets internationally accepted standards.

G. Conditions and Covenants

25. The Government generally complied with the major conditions and covenants under the loan, except for those indicated in Appendix 7. The major covenants that were not complied with included (i) collection of irrigation and drainage fees as these are not envisioned by the Government to be collected directly, but will be collected through land tax provisions and farmers association fees, (ii) upper watershed improvements were not carried out because the Government canceled the Second Compensatory Forestry Sector loan,² and (iii) uncontrolled disposal of excavated material that destroyed wetlands and habitats in many locations. The Government delayed the submission of audited financial statements although the Project prepared annual unaudited ones that were available. Delays in submission were reported to be caused by the heavy workload of the Auditor General's Office.

H. Disbursements

26. The Project was approved in 1989 and the loan effective in 1993. However, the first disbursement under the loan was not made until December 1995, more than six years after loan approval. During implementation, measures were introduced to expedite disbursement and

² Loan 921-MAL: *Secondary Compensatory Forestry Sector*, for \$29.5 million, approved on 17 November 1998.

maximize the utilization of loan funds, including (i) the use of ADB's statement of expenditure procedure, with ceilings up to \$300,000; and (ii) the disbursement of funds on a first-come, first-served basis across loan categories, and the reallocation of loan funds among categories after the fact.³ The loan account was kept open until 25 February 2000, or more than the normal three-month grace period allowed by ADB to accommodate outstanding payment of expenditures incurred for eligible civil works.

27. As of loan closing, \$31.91 million had been disbursed from the loan. The undisbursed loan balance of \$1.289 million was canceled on 25 February 2000. The total amount disbursed represents 96 percent of the loan. The annual utilization of loan funds by component and annual expenditures incurred for the Project are shown in Appendix 8.

I. Environmental and Social Impacts

1. Environmental

28. The main environmental impacts anticipated at the time of appraisal related to (i) disposal of excess excavated material on wetland communities of Gelam forest and *nipa* palm; (ii) the sustainability of the Project because of a perceived need to protect the upper watershed to reduce erosion and downstream sedimentation; (iii) alteration of natural flood and drainage situations and effects on soil fertility, salinity, and groundwater levels; (iv) possible problems related to diversion of flood flows from the Kelantan River into the Semerak River through the Gunong diversion channel; (v) increased sedimentation because of containment of floods within bunded channels; (vi) water quality degradation resulting from increased agricultural production; and (vii) coastal erosion. The attached TA⁴ was to address these risks and support establishment of an environmental monitoring system and advise on mitigation and remedial measures during implementation.

29. Because the main flood mitigation works have only recently been commissioned, Gunong diversion channel is still under construction, and the six irrigation schemes delayed for several years, some of these concerns are either not yet relevant, or cannot be determined at this time. However, the Project has not caused any measurable impact on water quality, or influenced soil fertility and salinity. The effect of altered drainage patterns on ecosystems and groundwater level is not yet an issue, but may become so in the future. Unfortunately substantial areas of the Gelam forest and limited communities of *nipa* and mangrove forests (wetlands) have been destroyed by land clearing for construction and uncontrolled spoil disposal. The area cleared for construction works, including work completed by the Government, is estimated to be about 1,000 ha. Of this, about 300 ha contained animal habitats and about 330 ha, which is the total spoil disposal area, covered wetlands and Gelam forestlands. This loss has been largely a result of the construction of the lower Semerak channel under government funding that commenced before the Project. An additional area of about 15 ha of Gelam forest was destroyed with spoil deposition from the Project just north of the tidal gate structure.

³ Statement of expenditures procedure was not included in the Loan Agreement but agreed to during implementation.

⁴ TA 1231-MAL: *Environmental Impact Monitoring and Evaluation*, for \$350,000, approved on 23 November 1998.

30. The appraisal report emphasized that about 6,000 ha of the Machang Hills upper watershed would be reforested under a separate ADB-assisted project.⁵ Unfortunately this did not occur because of early cancellation of the loan by the Government on 6 January 1996. The Government has not taken any substantial steps to address the erosion problems that were considered by ADB to be a necessary requirement for the Project to proceed. Details on the environmental aspects are shown in Appendix 9.

31. MOA was expected to carry out benefit monitoring and evaluation (BME) reporting, with particular emphasis on the farmers, on a regular basis. These reports were supposed to be submitted to ADB during implementation. Unfortunately, routine reports were not prepared although a baseline study was undertaken in 1982 and a recent one completed in 1998. The environment management plan would have been part of a BME program but the Project did not implement the recommendations. The socioeconomic study in the project area completed in 1998 includes valuable socioeconomic data and information that could have been compared with later surveys if they had been taken at regular intervals; say every five years. However, because of a 16-year gap from the first socioeconomic survey conducted by ADB in 1982, the socioeconomic impacts of the Project are difficult to assess. At the present time, the Government has no plans to establish a formal BME program. For the longer term, responsibility for BME will be managed by state agencies; relevant agencies are yet involved in the planning of a BME program.

2. Social

32. The flood protection program has increased property security and lowered investment risk for economic activities in the project area. Alternative income opportunities and land value have increased considerably since the start of the Project. In addition to increased investment by the private sector, the project area has benefited from several development programs for rural infrastructure funded by the Government during the past 10 years.

33. Based on information from two socioeconomic surveys on rural households in the project areas in 1982 and 1998, the socioeconomic changes in the project area during project implementation have been highly positive. The respondents note a significant increase in education attainment; ownership of household durables; and access to basic household amenities, including water supply, electricity, and modern latrines. However, the cause of the changes was due largely to overall economic growth in the project area (Appendix 10).

J. Performance of the Borrower and Executing Agency

34. The Borrower and MOA performed in a satisfactory manner during implementation. The PMU provided excellent office facilities, transportation, and support services at the project office. The PMU staff carried out their tasks in a professional manner; the PMU is well staffed with sufficient engineers, technicians, and administrative personnel to complete the Project in the future. Although the Borrower had problems providing adequate budget to support all of the project activities as envisioned at appraisal, the Borrower made sound financial decisions by providing funds for works that could be realistically accomplished for the flood mitigation measures. At the start of the Asian financial crisis in 1997, the Borrower made a sound financial decision to reduce foreign debt payments by asking ADB to expedite disbursements under the loan by financing across categories and on a first-come, first-served basis to reduce commitment charges.

⁵ Loan 921-MAL: *Secondary Compensatory Forestry Sector*, for \$29.5 million, approved on 17 November 1998.

K. Performance of the Asian Development Bank

35. ADB performed in a relatively satisfactory manner during implementation, although project design and administration had some deficiencies. ADB carried out 10 review missions during implementation, identified major problems, and brought them to the attention of the Government and ADB in a timely manner. ADB continued to change project administration staff during implementation, resulting in lack of continuity. However, ADB should have recognized that the Project was dependent on the completion of the two major civil works financed by the Government. Because these two works were key to meeting the overall project objectives, the Project should not have been prepared until these two works were nearly completed. The delay in these two works resulted in the Government's delay in signing the Loan Agreement; the loan became effective about four years after Board approval.

III. EVALUATION OF INITIAL PERFORMANCE AND BENEFITS

A. Financial Performance

36. Because the six irrigation schemes have yet to be completed, the impact of the Project on farm incomes has been limited to the following:

- (i) Farm incomes have increased by RM2,370 per annum for farmers on two thirds of the total Kemubu Agricultural Development Authority area of 5,000 ha, which overlaps with the project area and which will benefit from reduced flooding and therefore higher main season paddy yields. The whole of this overlapping area, involving around 10,000 farm households, will receive this benefit from 2002 onward with the completion of the Gunong diversion channel.
- (ii) Farm incomes increased by RM1,185 per annum for 30 percent or about 1,035 of the farmers in the areas proposed for future irrigation in the project area (5,250 ha). This arises from increased main season paddy yield as the threat of flooding has been reduced and from the impact of the agricultural support services component of the Project.
- (iii) Incomes increased for those farmers with tobacco (RM4,290/ha per annum), vegetables (RM6,825/ha per annum), fruit (RM5,990/ha per annum), and nonirrigated paddy (RM2,640/ha per annum).

37. These impacts assume an average farm size of 1.5 ha and are additional to the incremental returns to labor generated by the Project (Appendix 11).

38. The flood protection financial benefits of the Project are difficult to identify on a per household basis. The total expected average annual financial benefits based on year 2000 exposure of RM20.35 million are spread over approximately 13,000 households in the project area. This gives an average annual financial benefit per household of RM1,570. However, these benefits include those for businesses and public infrastructure, as well as urban and residential property. Also the benefits from the flood protection works component will be quite disparate in terms of its impacts on properties in different localities.

39. The Project's on-farm employment impacts have also thus far been limited by the noncompletion of the irrigation component. However, even the limited areas of additional tobacco (568 ha), vegetables (1,443 ha), and fruit trees (556 ha) developed under the Project

are estimated to have created 1,800 new jobs, growing to 2,290 new jobs by 2005 inclusive of around 190 additional jobs from 2,000 ha of nonirrigated paddy resulting from the Project (Appendix 9).

40. The development of the new fishing port at Tok Bali as a result of the new lower Semerak channel, and Semerak bridge and sea works, has broadened the economic base of the Kelantan state economy. Approximately 3,000 new offshore and onshore jobs have been created for Kelantan residents. This is expected to grow to 3,850 jobs by 2005 (Appendix 9).

B. Economic Performance

1. Economic Internal Rate of Return

41. An economic internal rate of return (EIRR) of 11.5 percent is estimated for the base case of the Project. For the future implementation of the irrigation component an EIRR of 8.0 percent is estimated. The combined project (i.e., the completed Project plus the yet to be implemented irrigation component) has an estimated EIRR of 11.2 percent, which compares with an EIRR of 15.7 percent estimated for the total Project at appraisal. The lower EIRR now estimated reflects an increase in actual and projected costs, an extended implementation period, less than anticipated additional areas of tobacco developed, and lower international prices for paddy. To some extent these factors are offset by higher flood protection benefits immediately upon project completion as a consequence of economic growth and the delayed project implementation, greater than anticipated areas of vegetables and fruit developed, and higher yields now assumed for paddy (Appendix 10). In estimating these EIRRs, the negative environmental benefits of the Project were not taken into account as the exact damages had not been measured, assessed or valued at the time of the PCR mission. Inclusion of environmental damages in the quantitative analysis would lower the Project's EIRR. On the other hand, no positive economic benefits have been included for the improved transportation links or value of additional industrial and residential lands as a result of reclaimed swamplands.

2. Sensitivity Analysis

42. Including the unanticipated fishing benefits, which resulted from the improvements to lower Semerak channel and the related sea works, lifts the EIRR to 14.2 percent while lowering the assumed flood damage cost benefits by 10 percent reduces the EIRR to 11 percent. For the incremental project, increasing capital costs by 10 percent and reducing expected benefits by 10 percent, lowers the EIRR for the proposed irrigation works to only 5.3 percent.⁶ For the flood mitigation component, this sensitivity testing indicates that the results are reasonably robust to changes in key assumptions.

C. Attainment of Benefits

1. Initial Performance

43. The flood mitigation works have been completed except for the Gunong diversion channel. Two timing milestones are significant in assessing benefits under the initial project operation.

⁶ No sensitivity testing in relation to inadequate maintenance of the Project has been undertaken. The Government is thought to be committed to maintaining the integrity of the systems.

44. Before the monsoon in 1995, the lower reaches of the Semerak River tributaries were redirected into the lower Semerak channel, thereby providing flood protection to the lower reaches directly, and further upstream as the constriction effect of the lower river meanders was removed. With the new sea works, fishing access improved significantly from 1995 to the present.

45. The main river was fully contained within the project works prior to the monsoon season in 1999, and full flood protection benefits apply from that time.

2. Expected Benefits

a. Quantified Benefits

i. Flood Mitigation

46. The flood mitigation component of the Project is estimated to provide an expected average annual savings of RM20.35 million based on the crop and noncrop assets at risk in 2000. The effects of economic growth in the flood plain area means that by 2010 these benefits will increase to RM27.23 million per annum.

ii. Agricultural Production and Fishing Benefits

47. In 2000, the estimated value of increased agricultural production benefits (paddy, tobacco, vegetables, and fruit) is RM7.72 million. This is estimated to rise to RM25.28 million by 2010. Fishing economic benefits in 2000 are estimated at RM10.36 million, rising to RM16.88 by 2010.

b. Nonquantifiable Benefits

48. The tourism industry receives benefits from the Project because of more reliable boat services from Tok Bali to offshore islands. The Project also provides benefits from improved transportation links due to the new lower Semerak bridge and construction of roads within the project area.

3. Impact on Beneficiaries

49. According to the data from Kelantan State Economic Planning Unit, the headcount index of hard core poverty households (households with income less than half of poverty line) was 415 households or only 2 percent of total households in the project area in 1999. Poverty incidence is relatively small and has remained unchanged since 1995. Poverty reduction in the project area is due largely to the overall economic growth of the region. According to information from two socioeconomic surveys conducted by ADB in 1982 and by the Project in 1998, socioeconomic conditions, i.e., level of education, basic amenities, type of houses, household living conditions, and level of incomes of respondents, have all substantially improved (Appendix 9). Participation in voluntary organizations has also increased. Gender issues, particularly relating to women in development, were not directly addressed as part of the Project.

50. The direct financial impacts brought about by the completed project components (i.e., the flood protection works and the agricultural support services) have been diverse and varied in intensity in regard to their effect on rural households in different locations. A complicating factor is that federal and state agencies have also made interventions that have impacted on household incomes since the Project commenced.

51. To date, the impacts of the Project on beneficiaries have been in the form of flood protection benefits for those with properties previously susceptible to flooding; additional income from increased paddy, tobacco, vegetable, and fruit production; development of a fishing industry in Kelantan state; and increased employment opportunities in agriculture and fishing.

52. With the future completion of the irrigation component by 2008, additional benefits will accrue to farmers in several different areas totaling 5,250 ha from additional cropped area and yields in both the main and off seasons.

IV. THE TECHNICAL ASSISTANCE

53. The advisory TA for Environmental Impact Monitoring and Evaluation was expected to develop a monitoring program for environmental parameters during and after project implementation; and to propose short- and long-term mitigation and remedial measures to address identified environmental problems encountered during construction. The TA consultants, an international firm in a joint venture with a domestic firm, commenced work in May 1994 and presented their final report in December 1996. DOE was the Implementing Agency for the TA and most of the work was carried out in Kuala Lumpur and not at the project site. A detailed discussion on the TA is given in Appendix 11.

54. Suggestions by the consultants to enlarge the scope of the TA to include a socioeconomic survey and oceanographic studies were not approved by ADB in July 1994 due to shortage of funds. In addition, because of delays in the major construction activities envisioned under the Project, ADB, PMU, and DOE agreed to modify the focus of the TA to reduce the emphasis on the design of short-term remedial and mitigation measures, and concentrate on the development of a longer-term environmental management plan for the Project. This decision in 1995 effectively removed the responsibility of the consultants for real-time involvement in construction and spoil disposal issues.

55. The final TA report provides suitable recommendations as to the Project's environmental monitoring needs (although the recommendations would have been expensive for the Government to implement), a plan for monitoring, and suggested responsibilities and organizational arrangements. The main recommendations were for the Project to establish a dedicated environmental management unit to implement the recommendations, and to develop relationships with other agencies for the provision of detailed analytical services. Unfortunately, significant actions have not been taken by the Project to implement the recommendations and no structured monitoring work has been carried out. Shortage of resources (funds, transport, and suitably qualified staff in the PMU) were given as the main reason for lack of any significant actions.

V. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

56. The criteria for rating project success are based on the *Guidelines for Preparation of Project Performance Audit Reports*, and cover relevance, efficacy, efficiency, sustainability, institutional development, and other impacts.

57. **Relevance.** The Project was high on the Government's and ADB's development strategy at the time of appraisal but, due to the significant improvements in the poverty situation in the area, is now less so for ADB. The project area remains high on the Government's priority areas as it is one of the major granary areas of Malaysia. The Government is committed to completing the irrigation works in the next decade after the Government decides how to manage and operate them.

58. **Efficacy.** The Project achieved most of its development objectives except for the irrigation schemes. The Government did not pay enough attention to the environmental concerns identified during the appraisal and the advisory TA had very little impact on monitoring or measuring the environmental parameters as very few of the recommendations were implemented and the project offices did not establish either an environmental unit or a BME unit. The irrigation schemes and flood control measures are expected to be operational within the next 10 years as the Government is committed to developing it as a major granary area. However, with the flood mitigation measures in place, agriculture production increased due to reduced flooding and improved extension services.

59. **Efficiency.** The Project was prepared too early and implementation was delayed. Due to a delay in the construction of two major civil works financed by the Government, loan effectiveness was delayed by four years. All six of the irrigation schemes were not completed as the Government wanted to complete the flood control measures first. The scope was not reformulated at midterm and therefore expectations were high that the Project would be completed as designed during the implementation period. The Project nearly met the expected economic rates of return and was cost effective in the sense that the Government was practical in not starting works that could not be completed; such as the irrigation systems prior to completion of the flood control measures. The Project achieved an EIRR of 11.5 percent as compared to the 15.7 percent estimated at appraisal for the base case. The Government was pragmatic during the 1997 Asian financial crisis by requesting ADB to finance across categories on a first-come, first-served basis, which helped to reduce their foreign debt burden. The Government did have occasional difficulty in providing counterpart funding. Because the forestry loan was canceled, certain actions should have been taken to assure ADB and the Government that an upper watershed program would be undertaken.

60. **Sustainability.** The Project has a likely probability of sustainability as the demand for grains is growing, flood protection is needed for the area, and the federal and state governments have accepted this responsibility. The main concern is the commitment by the Government to provide the funds needed for the capital works. Even though the Government is committed to developing the area during the next decade, rising costs and needs in other regions of Malaysia may constrain the availability of funds for this Project. The state has agreed to provide adequate funds to maintain the flood control works and river outlet, and a small portion of property taxes is dedicated to irrigation improvements. In the future, the private sector is expected to take over complete O&M of the systems. The Government did provide a very competent team to manage the Project and continues to staff it with well-qualified professionals.

61. **Institutional Development and Other Impacts.** The skill levels of the project staff are high and the growing economy has lifted the area out of poverty as a direct result of the Project. The Government should implement environmental monitoring and address the upper watershed areas. The project management, as well as the local population, are committed to developing the area and the Government should try to restore the wetland areas that were damaged during construction.

62. **Overall Assessment.** Based on the above criteria, the Project is rated as partly successful (Table 1).

Table 1: Project Performance Rating Assessment

Criterion	Weight	Rating Description	Rating Value
Relevance	20%	Partly Relevant	1.00
Efficacy	25%	Less Efficacious	1.00
Efficiency	20%	Efficient	2.00
Sustainability	20%	Likely	2.00
Institutional Development and Other Impacts	15%	Moderate	2.00
Overall Assessment		Partly Successful	1.55

^a Highly successful: overall weighted average (OWA) > 2.5; successful: $2.5 \geq \text{OWA} > 1.6$; partly successful: $1.6 \geq \text{OWA} > 0.6$; unsuccessful: $\text{OWA} \leq 0.6$.

B. Lessons Learned

63. The following were lessons learned:

- (i) Combining flood mitigation and irrigation development into one project introduces risks because flood control works are often delayed due to land acquisition problems.
- (ii) The timing of the TA input/output determines the effectiveness of resulting recommendations.
- (iii) If a project is dependent on major interventions that are outside of the project works, such as reforestation of upper watersheds or construction of major civil works, these must be closely monitored by ADB to ensure they are implemented.
- (iv) BME units should be established at the start of a project under direction of the project office and be fully supported with adequate resources during implementation. Funding for this should be initially from ADB, with nongovernment organization or university involvement, as this would assure a higher likelihood of success in establishing baseline information and developing a system of collection and analysis of data.

C. Recommendations

1. Project-Related

64. Project-related recommendations include the following:

- (i) The Government should review the upper watershed problems and implement a program of erosion control as required. In addition, damage to the wetlands should be reviewed and reclamation or replanting of nearby areas should be considered to restore the integrity of these habitats. Remaining *nipa*, mangroves, and Gelam forests should be protected as much as possible.
- (ii) The Government should complete the Gunong diversion channel as soon as possible as it is a major component of the flood mitigation system. The Government should also reassess the economic viability of the six irrigation systems in light of revised cost estimates and planned change of operation and management scenarios.
- (iii) ADB should schedule the Project Performance Audit Report mission after completion of the six irrigation schemes.

2. General

65. General recommendations include the following:

- (i) Projects that rely on the completion of major civil works that are outside of the project works should be delayed until those specific works are nearly completed; otherwise significant delays may occur.
- (ii) Flood control projects have the potential to have significant environmental impact and should be closely monitored by ADB's Environment Division. Loan conditions on the environment should be written so that they are effective and enforceable by government.
- (iii) TA, regardless of the type, should be timed on the actual need for the completed study and not necessarily as outlined at appraisal.
- (iv) Projects should maintain project administration staff during implementation for consistency of administration and better understanding of problems and concerns; as well as for improving relationships with executing agencies.

APPENDIXES

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PROJECT COMPONENTS: FLOOD MITIGATION, DRAINAGE, AND IRRIGATION

A. The Project Background

1. The Project components involving flood mitigation, drainage, and irrigation of the Semerak Rural Development Project (SRDP) need to be reviewed within the context and background of the Kemasin-Semerak Integrated Rural Development Project (KSIRDP), of which it forms a part. The KSIRDP was formulated by the Government of Malaysia in 1977 as a master plan for the development of 68,300 hectares (ha) in the state of Kelantan, with the primary aim of improving the well-being of rural communities of the area. The plan included an integrated program of investments in flood control and drainage, improvements to irrigation systems, and enhanced agricultural support services designed to improve farm incomes, reduce poverty, and minimize the disruption and damage caused by annual flooding from the Kemasin and Semerak river systems. The Government decided to implement the KSIRDP in two phases, because of budgetary and institutional constraints. The first phase, the Kemasin Rural Development Project (KRDP) was developed with Asian Development Bank (ADB) assistance¹ and was completed in March 1991. ADB submitted the project completion report in June 1992 and a postevaluation study in 1994. The balance of the KSIRP proposal was reviewed and updated under an ADB-financed project preparatory technical assistance (TA) in 1989, with the object of identifying a suitable second-phase project for ADB assistance. This TA study incorporated ADB's current priorities for poverty reduction and environmental protection. It became the basis for the SRDP, which was appraised by ADB in August 1989, and the loan approved by the Board on 23 November 1989. The KRDP and SRDP are part of an integrated development plan for the area covered by the KSIRP. Each of the two projects have components that affect the flood status of adjacent land within the earlier IBRD-financed Kemubu Irrigation Project (KIP), and derive benefits from KIP irrigation pumping facilities. In reviewing the SRDP, the influence of overall needs and the strategy for development of the whole KSIRDP area must be noted.

B. Project Components

2. The SRDP as appraised has four major components: flood mitigation and drainage, irrigation systems, agricultural support, and consulting services.

3. Three major nonproject components were commenced or implemented by the Government, without ADB assistance, before the project components were implemented. These three components are integral to the function of the SRDP and are also reviewed here. They comprise (i) the Semerak sea works, (ii) the lower Semerak channel, and (iii) the Semerak bridge.

C. Flood Mitigation and Drainage

1. Semerak Sea Works

4. This nonloan component comprises two rock breakwaters constructed at the mouth of the lower Semerak channel on the northern and southern sides of the channel to stabilize the position of the mouth, reduce the effect of the northward littoral drift on mouth closure, and provide a stable hydraulic exit to the sea for floodwaters conveyed via upstream flood mitigation works. The works were designed to cater for a flood flow of 1,500 cubic meters (m³)/second (s),

¹ Loan 497-MAL: *Kemasin Rural Development*, for \$40 million, approved on 15 December 1990.

equivalent to a 1 in 30-year river flood flow and exhaust of seawater during tides, and a design wave height of 4 meters (m). The works consist of the northern breakwater (200 m long) and the southern breakwater (550 m long) involving some 320,000 tons of rock, the largest of which weighs 8 tons.

5. The works were started in January 1989 and completed in August 1991.

2. Lower Semerak Channel

6. This nonloan component comprises a dredged and bunded channel 350 m wide and 7.5 kilometers (km) long, with a design capacity of 1,200 m³/s, that was constructed to link the stabilized mouth to the new loan-financed tidal gate and weir structure upstream. It replaces the meandering 35 km natural course of the Semerak River in its lower reaches. The channel involved site clearance of 440 ha, 6.8 million m³ of excavation, and has three gated structures to control salinity and drainage in the cut-off lower Semerak River reaches.

7. The construction was carried out between mid-1990 and August 1995.

3. Semerak Bridge

8. This nonloan component was required to carry the coastal road across the lower Semerak channel, and comprises a reinforced concrete bridge some 530 m long, 10.9 m wide, sited on 300 prestressed concrete piles.

9. The construction was carried out between October 1990 and August 1993.

4. Tidal Gate and Weir Structure

10. This structure was implemented under the Project to (i) prevent saltwater intrusion from the lower Semerak channel into the upstream bunded Semerak channel, (ii) regulate the level upstream for irrigation purposes, (iii) pass the design flood safely, (iv) discharge accumulated silt and sand during floods into the lower Semerak channel, and (v) provide a supplementary storage of water for irrigation in the dry season.

11. The site works for the structure cover an area of some 60 ha. The structure has a design capacity of 1,100 m³/s, equivalent to a 1 in 20-year flood peak, and was checked for operational stability for a 1 in 100-year discharge of 1,800 m³/s.² It comprises a 100 m wide central section of 10 vertical steel gates each 8 m wide with a sill level of minus 4 m Low Sea Level (LSL). On either side of the tidal gate structure two sharp-crested reinforced concrete weirs have been constructed, each 350 m long to carry excess flows, with overflow levels set at plus 2 m LSL. Associated works include a control room, retaining walls, approach roads, and earthen embankments.

12. Work on the structure was started in December 1994 and completed in June 1998.

² Hydraulic Design Report for Semerak Tidal Gate cum Weir Structure, Semerak Joint Venture, Sdn Bhd, August 1993.

5. Bunded Semerak Channel

13. These works were implemented under the Project to (i) improve and contain flood carrying capacity of the natural course of the Semerak River by excavation and bund works; (ii) accommodate the diverted flood flows from the Melor River, which provides flood protection to areas of the KIP; (iii) to act as a drainage collector for 16 drainage pumping stations constructed under the Project.

14. The works as constructed comprised (i) the excavation of new channels and improvement to existing river channels over a distance of 14.6 km; (ii) construction of bunds on both sides over a total length of 29.8 km; (iii) side drains along the outside toe of the bunds totalling 20.6 km; and (iv) two gated structures to provide water to irrigation pumps from the stored water and drainage structures; and (v) two gated structures to provide water to irrigation pumps from the stored water and drainage structures.³

15. The main excavated channel was designed with a bed width of 70 m, but the need to secure suitable material for bund construction required the bed width to be widened to 120 m over some reaches, and in some reaches bunds were not constructed if the capacity was secured through additional excavation. The changes in earthwork configuration resulted in an increase of 940,000 m³ in excavation over the design quantity of some 7 million m³.

16. The works were started in March 1995 and completed in July 1999.

6. Semerak Tributaries

17. These works were implemented under the Project to convey floodwater from 13 upstream Semerak tributaries into the bunded Semerak channel. These tributaries all cross low-lying land and channel excavation and bunding along both sides were required over a total length of 30 km.

18. The earthworks were commenced in January 1992 and completed in December 1994.

7. Semerak Tributary Bridges

19. Because the Semerak tributary works cut road access, a total of 16 new bridges were constructed under the Project from January 1994 to December 1996.⁴

8. Gunong Diversion Channel

20. These project works have been designed to convey the floodwaters from the Melor River, which flows through the area of the KIP to the headwaters of the Semerak tributary system. The design diversion discharge was 110 m³/s (1 in 30-year event). The works comprise the blockage of the Melor River with an earthen plug, and the construction of a gabion inlet structure at the confluence of the Melor River and upstream of the Gunong diversion channel. This structure was checked for safe function for a discharge of 150 m³/s (1 in 100-year event). The channel comprises a 3.5 km long excavated channel with a bed width of 20 m and a top

³ The appraisal report allowed for three gated structures, but realignment of the left side bunds upstream of the tidal gate structure obviated the need for one of these.

⁴ The appraisal design included 15 bridges, but Public Works Department requirements resulted in an additional light traffic bridge.

width of 65 m. Excavation of 425,000 m³ is involved of which 117,000 m³ is required for bunds along both sides of the channel.

21. Because of technical and budgetary constraints under the 7th Malaysia Plan, this work was not commenced until February 2000 and is scheduled for completion in June 2002. As the loan period closed in June 2000, this component has not received any ADB support.

9. Drainage Pumping Stations

22. The 16 drainage pumping stations constructed under the Project are located along the outside of the bunds of the bunded Semerak channel and Semerak tributaries. They are designed to transfer accumulated drainage water resulting from excess rainfall and irrigation drainage flows into the main flood disposal network. The pumps have been designed for a drainage rate of 11.2 liters (l)/s/ha, equivalent to the removal of a 1 in 5-year, 7-day rainfall amount. Pumps have been standardized into three discharges: 3.0, 1.0, and 0.4 m³/s. All are of the submersible type, and are automatically controlled to operate in a predesigned sequence in response to water levels in the inlet sumps. Pumping station discharges range from 1.2 m³/s to 27.0 m³/s.

23. All pumping stations except numbers 2, 10, 12, and 16 have sliding gates allowing stored water in the bunded flood channels to flow back into drainage channels for irrigation use in the dry season.

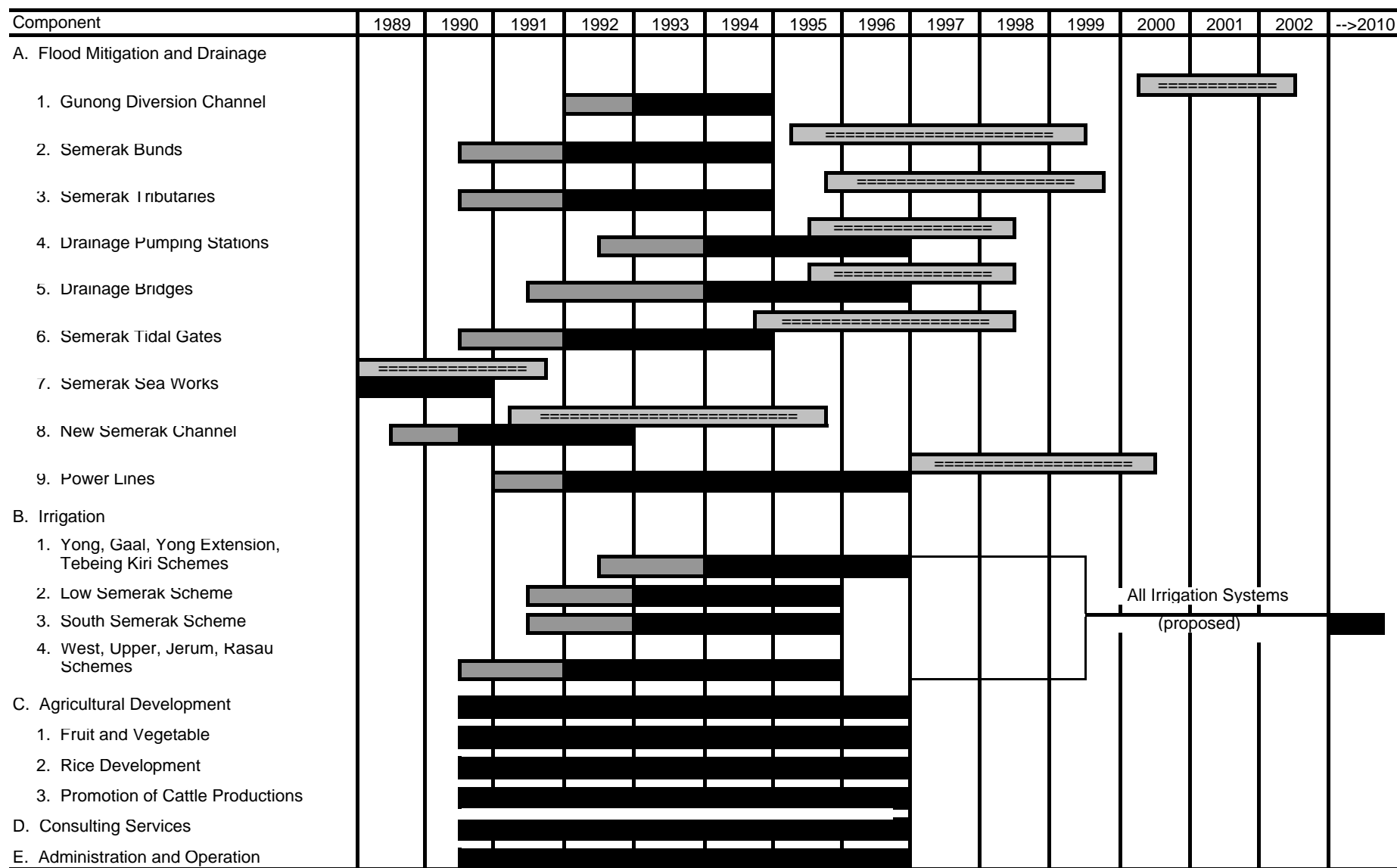
24. The work on the drainage pumping stations commenced in May 1995 and the works except for electrical supply systems was completed in July 1998 (April 1999). Full commissioning was delayed until electrical supplies were completed in 2000.

10. Irrigation Systems

25. The Project as appraised included the establishment of some 5,250 ha of irrigated land for double cropping of padi. The proposed irrigation area was divided into six schemes that each have separate local pumping sources from either the bunded channel reservoir via outlet gates, or the old Semerak River course supplied via gates from the reservoir. The systems were designed for a supply rate of 2 l/s/ha, and the dry season supply was assumed to come from the main pumping station of the KIP. A total of 11 m³/s is allocated for this purpose; it will be conveyed to the Melor River and then to the bunded reservoir via the Gunong diversion channel. Delays in implementation of the Gunong diversion channel resulted in the irrigation development being delayed considerably into the 8th Malaysia Plan and beyond.

26. As a consequence of the delays and the adoption of new Drainage and Irrigation Department policy determining how irrigation water is to be supplied in granary areas, the final designs of the irrigation systems are undergoing radical change. Final designs and costings are not expected to be available until early 2003, and implementation complete sometime in 2008.

IMPLEMENTATION SCHEDULE



Design, Land Acquisition, and Tendering

Construction and Implementation

MP = Malaysia Plan.



-----> Emphasis on Rice Productivity

(7th MP)

All Irrigation Systems
(proposed)

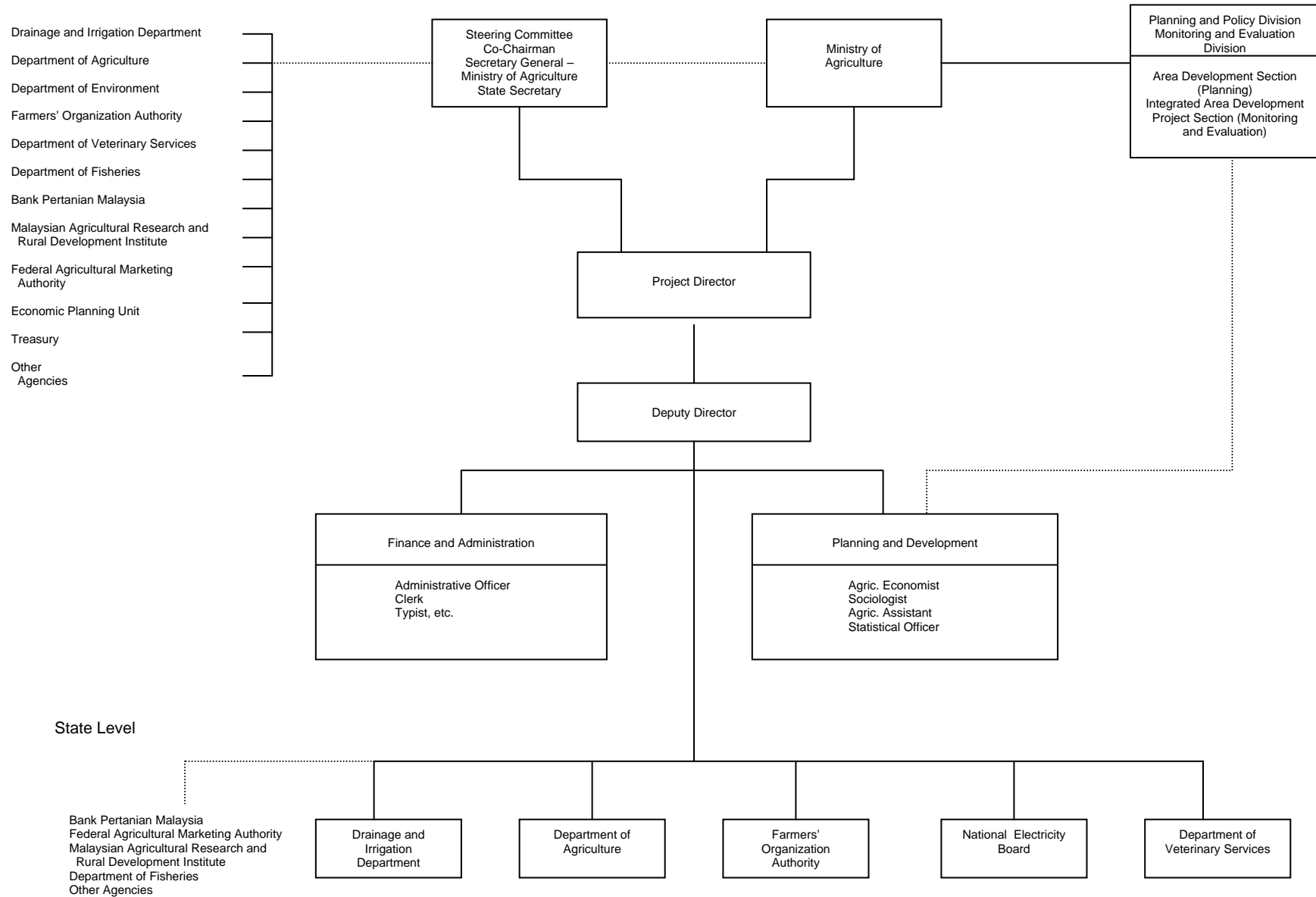
IMPLEMENTATION SCHEDULE

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**MACHINERY/EQUIPMENT PROCURED UNDER THE AGRICULTURE
SUPPORT COMPONENT**

Item	At Appraisal	Actual Need	1995	1996	1997	1998	Progress Up To Dec 1999
A. Fruits and Vegetables							
1. Vehicles							
Tractor Four-Wheel	1	2	0	0	1	0	1 unit
Power Tiller	0	2	0	0	0	0	0
Pick-up	1	2	1	0	0	0	1 unit Toyota Hilux
5-Tone Lorry	1	1	0	0	0	0	0
Four-Wheel Drive	0	1	1	0	0	0	1 unit Pajero
Rotovator	0	2	0	0	1	0	1 unit
2. Equipment							
Ridger	0	2	0	0	0	0	0
Knapsack Power Sprayer	0	6	0	0	2	0	2 units
High Power Sprayer	0	2	0	0	0	0	0
Water Pump	0	10	0	0	0	0	0
Tube Well	1	10	0	0	0	0	0
Chain Saw	0	2	0	0	0	0	0
3. Agriculture Support Services							
Building	1	0	0	0	0	0	0
B. Paddy Rice							
1. Vehicles							
Four-Wheel Tractor	22	3	1	0	1	1	3 units
Rotovator	15	3	1	0	1	1	3 units
Ridger	5	0	0	0	0	0	0
5-Tone Lorry	1	1	0	0	0	0	0
Four-Wheel Drive	1	1	1	0	0	0	1 unit Pajero
2. Equipment							
High Power Sprayer	20	5	0	0	2	0	2 units
Seed Drill	0	2	0	0	0	0	0
Motor Blower	0	5	0	0	0	0	0
Water Pump	0	5	0	0	0	2	2 units
Laser Beam	0	1	0	1	0	0	1 Set Laser Beam
Grader	0	1	0	1	0	0	1 Set Grader
Lime Spreader	0	0	0	0	1	0	1 unit
Knapsack Power Sprayer	0	0	0	0	2	0	2 units
Back Bucket	0	0	0	0	2	0	2 units
Fogging Machine	0	0	0	0	0	0	0
Baler	0	0	0	0	0	1	1 unit
3. Agriculture Support Services							
Seed Processing Unit	0	1	0	0	0	0	0
Tyto Alba Nest	0	0	0	6	12	0	18 units

PROJECT ORGANIZATION CHART



PROJECT COST AND FINANCING PLAN
(\$ million)

Component	Per Appraisal			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
A. Project Cost						
1. Flood Mitigation and Drainage						
a. Gunong Diversion Channel						
Civil Works	0.610	0.520	1.130	1.302	1.109	2.411
Land Acquisition	0.000	0.778	0.778	0.000	0.585	0.585
Subtotal (a)	0.610	1.298	1.908	1.302	1.694	2.996
b. Semerak Bunds						
Civil Works	4.000	3.407	7.407	4.889	6.561	11.451
Land Acquisition	0.000	2.778	2.778	0.000	3.660	3.660
Subtotal (b)	4.000	6.185	10.185	4.889	10.221	15.110
c. Semerak Tributaries						
Civil Works	4.000	3.407	7.407	3.642	4.255	7.897
Land Acquisition	0.000	1.890	1.890	0.000	4.507	4.507
Subtotal (c)	4.000	5.297	9.297	3.642	8.763	12.405
d. Drainage Pumping Stations						
Civil Works	1.960	1.669	3.629	4.670	4.498	9.168
Equipment	0.000	0.000	0.000	8.532	0.495	9.027
M&E	3.704	0.000	3.704	0.000	0.000	0.000
Land Acquisition	0.000	0.074	0.074	0.000	0.014	0.013
Subtotal (d)	5.664	1.743	7.407	13.202	5.007	18.209
e. Drainage Bridges						
Civil Works	2.000	1.704	3.704	4.121	6.245	10.366
Land Acquisition	0.000	0.037	0.037	0.000	0.000	0.000
Subtotal (e)	2.000	1.741	3.741	4.121	6.245	10.366
f. Semerak Tidal Gate						
Civil Works	4.000	3.407	7.407	5.969	5.916	11.885
M&E	1.852	0.000	1.852	0.000	0.000	0.000
Land Acquisition	0.000	0.800	0.800	0.000	0.408	0.408
Subtotal (f)	5.852	4.207	10.059	5.969	6.324	12.293
Subtotal (1)	22.126	20.471	42.597	33.125	38.254	71.378

M&E = Monitoring and Evaluation.

Source: Staff estimates.

Component	Per Appraisal			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
2. Irrigation						
a. Yong, Gaal, Yong Extension, Tebeing Kiri Schemes						
Civil Works	2.700	2.300	5.000	0.000	0.000	0.000
M&E	0.889	0.000	0.889	0.000	0.000	0.000
Land Acquisition	0.000	1.200	1.200	0.000	0.438	0.438
Subtotal (a)	3.589	3.500	7.089	0.000	0.438	0.438
b. Low Semerak Scheme						
Civil Works	1.600	1.363	2.963	0.000	0.000	0.000
M&E	0.185	0.000	0.185	0.000	0.000	0.000
Land Acquisition	0.000	0.800	0.800	0.000	0.000	0.000
Subtotal (b)	1.785	2.163	3.948	0.000	0.000	0.000
c. South Semerak Scheme						
Civil Works	1.500	1.278	2.778	0.000	0.000	0.000
M&E	0.185	0.000	0.185	0.000	0.000	0.000
Land Acquisition	0.000	1.100	1.100	0.000	0.193	0.193
Subtotal (c)	1.685	2.378	4.063	0.000	0.193	0.193
d. West, Upper Jerum, Rasau Schemes						
Civil Works	1.720	1.465	3.185	0.000	0.000	0.000
M&E	0.185	0.000	0.185	0.000	0.000	0.000
Land Acquisition	0.000	1.500	1.500	0.000	0.099	0.099
Subtotal (d)	1.905	2.965	4.870	0.000	0.099	0.099
e. Power Lines						
Civil Works	0.000	0.511	0.511	0.000	0.000	0.000
M&E	0.600	0.000	0.600	0.000	0.000	0.000
Subtotal (e)	0.600	0.511	1.111	0.000	0.000	0.000
Subtotal (2)	9.564	11.517	21.081	0.000	0.730	0.730
3. Agriculture Support Services						
a. Fruits and Vegetables						
Building	0.040	0.034	0.074			
Vehicle	0.030	0.000	0.030	0.031	0.000	0.031
Equipment	0.060	0.000	0.060			
Staff	0.000	0.137	0.137			
Subtotal (a)	0.130	0.171	0.301	0.031	0.000	0.031

Component	Per Appraisal			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
b. Rice Development						
Building	0.070	0.065	0.135			
Vehicle	0.100	0.000	0.100	0.029	0.000	0.029
Equipment	0.610	0.000	0.600	0.031	0.000	0.031
Staff	0.000	0.120	0.120			
Administration	0.000	0.031	0.031	0.000	1.480	1.480
Subtotal (b)	0.780	0.216	0.996	0.060	1.480	1.540
Subtotal (3)	0.910	0.387	1.297	0.091	1.480	1.571
4. Consulting Services	0.000	3.618	3.618	0.000	5.100	5.100
5. Incremental Operation and Administration						
Administration	0.000	4.454	4.454			
Maintenance (Civil Works)	0.600	0.528	1.128	0.000	10.066	10.066
Miscellaneous	0.000	0.741	0.741			
Subtotal (5)	0.600	5.723	6.323	0.000	10.066	10.066
Subtotal (Base Cost)	33.200	41.716	41.916	33.215	55.630	88.845
6. Contingencies						
Physical Contingencies (5%)	1.663	1.537	3.200			
Price Escalation	7.695	4.929	12.624			
Subtotal (6)	9.358	6.466	15.824			
7. Interest During Construction	6.668	0.000	6.668			
Total	49.226	45.950	95.176	33.215	55.630	88.843
%	52	48	100	37	63	100

B. Financing Plan

	Per Appraisal				Actual			
	Foreign Exchange	Local Currency	Total Cost	% of Financing	Foreign Exchange	Local Currency	Total Cost	% of Financing
ADB	33.200	0.000	33.200	35	31.911	0.000	31.911	36
Government	16.026	45.950	61.975	65	1.305	55.630	56.933	64
Total	49.225	45.950	95.176	100	33.215	55.630	88.843	100
%	52	48	100		37	63	100	

ADB = Asian Development Bank.

LIST OF CONTRACTS FINANCED UNDER THE LOAN

PCSS No.	Category			Mode of Procurement	% of ADB Financing	Amount		Contractor	Approval Date	Contract Date	Status
						RM	\$				
001	01A	CW-Part A	Construction of Semerak Tidal Gate and Weir and Associated Work	ICB	54	19,774,800	6,991,955	Sinar Lim SDN BHD	20 Sep 94	23 Jun 95	completed
002	01A	CW-Part A	Construction and Completion of Bunded Middle Semerak Channel	ICB	54	15,632,460	5,320,630	Daiho Construction Co. Bhd	17 Jan 95	01 Jul 95	completed
003	01A	CW-Part A	Construction of Drainage Pumping Stations and Associated Works	ICB	54	13,598,206	4,825,060	Syrikat Pembangunan	26 Apr 95	11 Oct 95	completed
006	01A	CW-Part A	Construction of Bund for Semerak Tributaries under Package II	LCB	54	6,378,562	2,015,510	Cimetra Sdn Bhd	-	25 Apr 95	completed
008	01A	CW-Part A	Construction of Sungai Teratak Batang/Upper Semerak, Sungai-Tasik	LCB	54	5,438,699	1,680,073	Salmiah Holdings Sdn Bhd	19 Jun 97	14 Jun 97	completed
009	01A	CW-Part A	Construction of Bridges on Semerak Tributaries	LCB	54	12,968,581	3,367,241	Kheng Bee Co. Sdn Bhd	-	26 Dec 96	completed
Subtotal (Category 01A)						73,791,308	24,200,469				
007	02A	E&V-Part A	Supply and Installation of Drainage Pumping Equipment	ICB	100	28,266,000	7,589,513	Hazama Corp/Syarikat Lee	23 May 96	27 Dec 97	completed
Subtotal (Category 02A)						28,266,000	7,589,513				
004	02C	E&V-Part C	Office and Transport Equipment	DP/ST	100	149,438	59,046	Various		12 Oct 95	
005	02C	E&V-Part C	Office and Transport Equipment	DP/ST	100	150,728	61,497	Various		25 Feb 96	
Subtotal (Category 02C)						300,166	120,543				
Total						102,357,474	31,910,525				

CW = civil works, DP/ST = direct payment/single tender, E&V = equipment and vehicles, ICB = International competitive bidding, LCB = local competitive bidding.

STATUS OF COMPLIANCE WITH LOAN COVENANTS

Loan Covenant	Reference to Loan Agreement	Status of Compliance/ Remarks
Project Execution		
Ministry of Agriculture (MOA) will be responsible for the overall supervision and execution of the Project. To ensure effective project implementation, MOA will assign specific responsibility for the carrying out of the various parts of the Project to the Implementing Agencies, as follows:	LA, Schedule 6, para. 1(a)	Complied with.
(i) Drainage and Irrigation Department (DID) will be responsible for Parts A and B; and		
(ii) Department of Agriculture (DOA) will be responsible for Part C.		
MOA will make the proceeds of the loan available to DID and DOA, in such amounts as will be required by each to carry out its respective part or parts of the Project.	LA, Schedule 5, para. 1(b)	Partially complied with, but due to delays, project implementation was slow. Six irrigation schemes (5,250 ha) and Gunong diversion were not implemented as planned at appraisal.
Project Management		
The existing Project Management Unit (PMU), which is in charge of the Kemasin Rural Development Project (KRDP), financed by the Asian Development Bank (ADB) under Loan 497-MAL, will also function as PMU for the Project and will as such be responsible for the day-to-day management and implementation of the Project. The project director heading the PMU for the KRDP will also function as project director of the Project.	LA, Schedule 5, para. 2	Complied with.
Project Steering Committee		
The existing Project Steering Committee (PSC) established for the KRDP, with the addition of representatives of the Department of Environment (DOE), the Kelantan State Forestry Department, and other related	LA, Schedule 5, para. 3	Partially complied with. The last PSC meeting was held on 15 March 1997. DOE was not an active member throughout

Loan Covenant	Reference to Loan Agreement	Status of Compliance/ Remarks
agencies, will also function as PSC for the Project. The PSC shall be responsible for coordinating, monitoring, reviewing and evaluating the progress of project implementation and the initial operation of facilities completed under the Project.		the implementation period. The irrigation and environmental efforts may have been more successful if the PSC were more proactive in controlling costs and monitoring environmental aspects.
Provision of Funds, Facilities, etc.		
The Borrower shall make available promptly as needed, the funds, facilities, services, land and other resources which are required, in addition to the proceeds of the Loan, for the carrying out of the Project and for the operation and maintenance of the Project facilities, including such funds as are necessary to cover all physical and price contingencies.	LA, Article IV, Section 4.02	Partially complied with. Award of a number of major contracts was delayed by the revision of budget allocation by the Federal Treasury. Also, declaration of loan effectivity was significantly delayed by, among others, budgetary constraints.
Submission of Plans and Specifications		
The Borrower will cause competent and qualified contractors, acceptable to the Borrower and ADB, to be employed to an extent and upon terms and conditions satisfactory to the Borrower and ADB.	LA, Article IV, Section 4.03(a)	Complied with.
The Borrower will cause the Project to be carried out in accordance with plans, design standards, specifications, work schedules, and construction methods acceptable to the Borrower and ADB.	LA, Article IV, Section 4.03(b)	Generally complied with. Frequent revisions in the designs resulted in significant delays in implementation. ADB was not involved in the review process and consultants were not financed under the loan.
Financial Accounts and Audited Statements		
The Borrower will (i) cause DID and DOA each to maintain separate accounts for their respective parts of the Project; (ii) ensure that	LA, Article IV, Section 4.06(b)	Delayed compliance. Consistent delays from Auditor General's Office.

Loan Covenant	Reference to Loan Agreement	Status of Compliance/ Remarks
<p>DID and DOA have such accounts and related financial statements audited annually, in accordance with sound auditing standards, by auditors acceptable to ADB; (iii) furnish to ADB as soon as available, but in any event not later than six months after the end of each related fiscal year, unaudited copies of such accounts and financial statements, and not later than nine months after the end of each related fiscal year, certified copies of such audited accounts and financial statements and the report of the auditors relating thereto, all in English language.</p>		
Progress Reports		
<p>The Borrower will ensure that (i) DID and DOA each prepare and submit to PMU four-monthly progress reports on the carrying out of their respective parts of the Project and the operation and management of the project facilities under the respective parts; (ii) cause PMU to consolidate these reports and submit them to MOA and ADB. Such consolidated reports will be submitted within six weeks after the end of each trimester, in such form and in such details as ADB shall reasonably request.</p>	Article IV, Section 4.07(b)	Delayed compliance.
Project Completion Report		
<p>Promptly after physical completion of the Project, but in any event not later than six (6) months thereafter, the Borrower will prepare and furnish to ADB the report, in form as required by ADB.</p>	LA, Article IV, Section 4.07(c)	Delayed compliance. The PCR was submitted to ADB in late October 2000, 8 months late.
Complementary Program		
<p>DOA, Federal Agricultural Marketing Authority (FAMA), the Farmer's Organization Authority, and the Bank Pertanian Malaysia should extend to the Project area the extension services, technical support, and credit facilities for effective Project implementation.</p>	Schedule 5, para. 4	Complied with.

Loan Covenant	Reference to Loan Agreement	Status of Compliance/ Remarks
Marketing of Fruits and Vegetables		
FAMA should prepare an operational plan for the marketing of fruits and vegetables grown in the Project area.	Schedule 5, para. 5	Partially complied with.
Operation and Maintenance (O&M)		
DID should operate and maintain the facilities provided under Parts A and B and DOA will operate and maintain the facility provided under the agriculture support component, i.e., Part C.	Schedule 5, para. 6(i)	Complied with limitation funding on major facilities under Part A.
The Borrower will provide adequate funds, including foreign exchange resources available in a timely manner as will be required for the effective O&M of Project facilities during and after Project implementation.	Schedule 5, para. 6(i)	Complied with. Inadequate funds are provided for routine O&M as these are the responsibility of the State and the farmers.
The Borrower will ensure that irrigation and drainage fees will be collected from the farmers in the Project area.	Schedule 5, para. 5(ii)	Not complied with. The irrigation facilities have not yet been constructed. Irrigation fees of RM9/ha/yr will be added as part of the land tax collected and made part of the state general revenues.
MOA will carry out benefit monitoring and evaluation (BME) of the Project, with particular emphasis on the benefits to the farmers concerned and their families, and BME reports assessing the benefits from those portions of the Project which have been completed, shall be submitted to ADB during the project implementation period. A BME review study examining the benefits derived from each component shall be prepared by the Monitoring and Evaluation Division of the MOA within a period of two years following the loan closing date in accordance with the terms of reference to be agreed upon between ADB and MOA.	Schedule 5, para. 7	Partially complied with. No reports were received by ADB during implementation. No baseline survey was conducted at the start; however, a BME review study to be conducted two years following the loan closing date is not indicated in the future plan of actual project completion. DOA consultants carried out a socioeconomic study for phases I and 2 areas,

Loan Covenant	Reference to Loan Agreement	Status of Compliance/ Remarks
		and submitted it during the PCR Mission.
Land Acquisition and Water Rights		
The Kelantan State Land and Mines Department will acquire all land or rights on land, water rights, and other rights or privileges required for the Project, in accordance with the agreed implementation schedule.	Schedule 5, para. 8	Partially complied.
Environmental Protection		
Reforestation. The Machang Hill slopes of the catchment area of the Semerak River, which have already been included for compensatory forestry plantation under the ADB-assisted Second Compensatory Forestry Sector Project (Loan 921-MAL), will be given the highest priority for reforestation.	LA, Schedule 5, para. 9	Not complied with. ADB loan was canceled by the Government.
Use of Pesticides. The Borrower will ensure that the use of pesticides and fertilizers in the Project area will be in accordance with the provisions in ADB's <i>Handbook on the use of Pesticides in the Asia and Pacific Region</i> .	LA, Schedule 5, para. 10	Complied with. Integrated pest management programs are ongoing to train farmers in pest monitoring and in non-chemical pest control using colored sticky charts on a trial basis. Results are promising.
Spoil Disposal. The Borrower will ensure that spoils resulting from the excavation works under the Project will be disposed in accordance with advice provided by the consultants engaged under the Technical Assistance for Environmental Impact Monitoring and Evaluation, which is provided in conjunction with the loan.	LA, Schedule 5, para. 11	Not complied with. The responsibility of the TA in this regard was removed with ADB agreement, because of delays in implementation.
Semerak River Mouth. The Borrower will ensure that the natural mouth of the Semerak River at the existing confluence with the sea will not be artificially closed.	LA, Schedule 5, para. 12.	Complied with. Natural mouth closed by sea sediments. A new road crossing, with culverts, under construction.

UTILIZATION OF LOAN PROCEEDS

Table A8.1: Utilization of Loan Proceeds
(\$)

Category		Original Allocation	Amount Reallocated/ (Canceled) (25 Feb 00)	Revised Allocation (25 Feb 00)	Amount Disbursed
Civil Works					
01A	Part A	16,570,000	7,630,468	24,200,468	24,200,468
01B	Part B	7,520,000	(7,520,000)	0	
01C	Part C	110,000	(110,000)	0	
	Subtotal	24,200,000	468	24,200,468	24,200,468
Equipment/Vehicles					
02A	Part A	5,556,000	2,033,513	7,589,513	7,589,513
02B	Part B	2,044,000	(2,044,000)	0	0
02C	Part C	800,000	(679,456)	120,544	120,544
	Subtotal	8,400,000	(689,943)	7,170,057	7,170,057
Incremental Operating Costs					
03	Parts A + B	600,000	(600,000)	0	0
	Subtotal	600,000	(600,000)	0	0
Total		33,200,000	(1,289,475)	31,910,525	31,910,525

Table A8.2: Yearly Contract Awards and Disbursements

(\$)

Year	Loan Amount 1	Contract Awards			Disbursements		
		Cumulative 2	For the Year 3	Percent 4=2/1	Cumulative 5	For the Year 6	Percent 7=5/1
1994	33,200,000	0			0		
1995	33,200,000	14,035,703	14,035,703		3,294,167	3,294,167	10
1996	33,200,000	25,378,076	11,342,373	42	9,623,671	6,329,504	29
1997	33,200,000	31,970,640	6,592,564	76	16,176,314	6,552,643	49
1998	33,200,000	31,901,347	(69,293)	96	27,687,715	11,511,401	83
1999	33,200,000	31,917,695	16,348	0	31,335,521	3,647,806	94
2000	33,200,000 ^a	31,910,525	(7,170)	96	31,910,525	575,004	96

^a Undisbursed funds were cancelled effective 25 February 2000, which lowered the loan amount to \$31.910 million.

Table A8.3: Yearly Project Expenditures

Year 1	ADB		Government ^a		Total	
	RM 2	\$ 3	RM 4	\$ ^b 5	RM 6=2+4	\$ 7=3+5
1992	0	0	48,330,095	14,588,015	48,330,095	14,588,015
1993	0	0	32,021,693	9,665,467	32,021,693	9,665,467
1994	0	0	28,180,513	8,506,041	28,180,513	8,506,041
1995	8,998,030	3,294,167	29,857,458	9,012,212	38,855,488	12,306,379
1996	15,971,028	6,329,504	45,527,326	13,742,024	61,498,354	20,071,528
1997	44,143,023	6,552,643	33,779,403	10,196,017	77,922,426	16,748,660
1998	27,184,960	11,511,401	30,717,092	9,271,685	57,902,052	20,783,086
1999	9,429,900	4,222,810 ^c	26,623,630	8,036,109	36,053,530	12,258,919
2000			7,988,000	2,411,108	7,988,000	2,411,108
Total	105,726,941	31,910,525	283,025,211	85,428,678	388,752,151	117,339,203
Percent		27		73		100

ADB = Asian Development Bank.

^a Includes land acquisition and other costs: administration (Project Management Unit, Drainage and Irrigation Department), agriculture development, fisheries development, and farmers' development.

^b Exchange rate used: \$1.00 = RM3.313 (weighted average rate of disbursements under the ADB loan).

^c Includes an amount of RM1,988,160 (\$575,004) disbursed in January 2000.

ENVIRONMENTAL IMPACT AND ADVISORY TECHNICAL ASSISTANCE

A. Relevant History

1. The Kemasin-Semerak Integrated Rural Development Project (KSIRD), which includes the Asian Development Bank (ADB)-financed Kemasin Rural Development (KRDP) and the Semerak Rural Development Projects (SRDP), was developed from a master plan prepared under a New Zealand-financed technical assistance (TA) completed in 1977.
2. The environmental impact assessment (EIA) component of the KSIRD was approved in 1980, prior to the effectiveness of the Quality Environment Order promulgated by the Government in 1987. Because of this, the SRDP was not required to prepare an EIA in connection with the decision to implement the Project.
3. To ensure that the environmental issues of the SRDP were properly addressed under the Project, ADB suggested and the Government agreed to an advisory TA, at the time of loan negotiations, to allay concerns of the Department of Environment (DOE) about environmental issues associated with the Project. This study was carried out by a joint venture of an international consulting firm under implementation control of DOE, from May 1994 to December 1996. The performance of the TA is reviewed separately in Section D of this appendix.
4. This appendix is concerned with the treatment of environmental issues during implementation of the SRDP, and draws on the environmental assessments made at the time of appraisal, the TA findings, DOE assessments, and findings of the Project Completion Review Mission.

B. Environmental Assessments and Concerns

5. The SRDP appraisal report identified several environmental issues and suggested responses (Table A9).

Table A9: Environmental Issues and Responses

Issue	Response
Spoil disposal from lower channel excavations	Disposed under direction of technical assistance (TA) consultants
Changes in water quality	Monitoring by TA consultants
Closure of mouth of Semerak River	Allow natural closure
Gunong diversion	Monitor spills from Sg Kelantan to Semerak
Spoil disposal from bunded channel	Disposed under direction of TA consultants
Operation of quarries and/or upper watershed	Reforestation under the Second Compensatory Forestry Sector Project

Issue	Response
Enhanced paddy cultivation and potable water supply	Manage pesticide use and monitor water quality
Reduction in soil fertility and reduced flooding	Monitor soil fertility
Enhanced flood routing and increased sedimentation	Monitor sedimentation
Enhanced surface drainage, salinity, and groundwater	Monitor soil salinity and shallow groundwater
Modification of drainage patterns	Monitor habitats and local flooding
Increased density of canals and diseases	Monitor waterborne diseases
Construction impacts	Monitor impacts
Coastal impact	Monitor coastal erosion and mitigate

6. The Asian Wetland Bureau (AWB) expressed concerns in the early stages of the Project about using wetland sites for the disposal of soil and offered to assist with devising mitigation measures. Nothing came of this.

7. ADB also had some concerns about the proposed reservoir to be created upstream of the tidal gate and weir structure with an area of over 2,000 hectares (ha), which had the potential to flood low-lying natural areas and create an artificial water level.

C. Environmental Impacts, Monitoring and Mitigation Measures

8. **Lower Semerak Channel.** The lower Semerak channel and sea works were completed under Government funding, outside of the project provisions. Spoil from the excavations was spread over seven disposal sites in three major areas covering 330 ha. Two of the sites (covering about 70 percent of the area) used were low-lying swampland away from the main river in which the natural vegetation was covered with up to 2 meters of spoil. No data was collected as to the nature of the covered lands in terms of vegetation or habitat issues prior to spoil disposal; however, no restoration of natural habitat is feasible on the actual spoil areas.

9. The third area was located in the riparian lands on both sides of the lower reaches of the Semerak River adjacent to the right side of the channel, and along the cutoff section of the river above the natural river mouth. No data are available on the vegetation or habitat of the covered land, although areas of mangrove and *nipa* swamp were likely to have been destroyed.

10. The footprint of the excavated channel and bunds required the removal of all vegetation, which was mostly Gelam forest. The remaining areas of Gelam forest on both sides of the lower Semerak channel are now privately owned, and some areas have been cleared for agricultural development. The flood protection afforded by the Project appears to have encouraged the development of these lands, and future removal of forests is expected.

11. A limited area of land within the bunds has been planted with acacia to improve the aesthetic environment, with some success. The area involved is small in relation to the area of exposed spoil. Spoil areas outside of the reserve are now owned by the state government, and are proposed for development for industrial and institutional facilities.

12. **Changes in Water Quality.** Based on water quality measurements taken by DOE in April 2000, no measurable change in water quality has resulted from the Project. DOE noted an increase in chemical oxygen demand, but attributes this to nonproject developments in urban areas. Water quality was not monitored regularly by DOE or the Project Management Unit (PMU) during implementation.

13. **Closure of Semerak River Mouth.** The mouth has closed naturally. A sand spit some 400 meters (m) wide has developed since the river was closed, accelerated by the accumulation of littoral drift sands on the southern side of the sea works breakwater. The lagoon created by the Project is connected to the sea via the lower Semerak channel, and large areas of mangrove and *nipa* are unaffected in this new environment. No data has been collected to allow an environmental assessment of the new situation in the lagoon.

14. **Gunong Diversion.** These works are under construction with completion scheduled for mid-2002. The initial concerns about redirection of the Kelantan River spills into the Semerak have not been addressed in the design of this diversion system.

15. **Spoil Disposal from Semerak Bunded Channel.** Most of the excavated material from the bunded channel has been used for bund construction, filling areas between the inside of the bund and the excavated channel, and filling areas between the outside of the bund and the edge of the reserve. These areas were cleared of all vegetation during construction works. About 15 ha has been used for spoil disposal on the left side of the bunded channel just upstream of the tidal gate structure. This area was initially acquired as it was to be within the bunded reservoir, but changes in the location of the left side containment bund made the area available for spoil disposal. The area has been covered in spoil to a depth of some 3 meters in parts close to the bund, with lower depths on the northern limit of the reserve area. No detailed data are available on preconstruction vegetation and habitat, but areas of swamp and Gelam forest have been covered. Turfing of the exposed slopes of bonds has not been fully successful, despite strong efforts on the part of the contractors, and conditions make establishment difficult. Rain-induced erosion has occurred.

16. **Upper Watershed Issues.** The appraisal report was clear that upper watershed reforestation was required to ensure project sustainability, and noted that some 6,000 ha of the Machang Hills was to be reforested under the Second Compensatory Forestry Sector Project as a high priority. The forestry project was canceled by the Government on 6 January 1996, as a result of implementation problems, policy changes, and tree health issues. The reforestation of the upper watershed was not implemented and no other watershed work has been involved in the Project.

17. **Padi Cultivation and Potable Water Supply.** No irrigation development has taken place under the Project. The area devoted to wet season padi production has increased. DOE measurements of water quality show no impact on water quality related to water supply abstractions.

18. **Reduced Flooding and Contract Farming of Chillies.** With the reduced risk of floods, contract farming of chili for agroprocessing business has become a new activity in the project

area. This form of production is associated with high use of fungicides and pesticides. Monitoring of chemical use and health impacts to chillie farmers should be established.

19. **Reduced Flooding and Soil Fertility.** No measurements of soil fertility have been taken, but this has had little impact on the project flood protection works.

20. **Increased Sedimentation.** Irregular surveys by the PMU have shown no evidence of project effects on sediment deposition along the channels or at the mouth. No substantive data collection has been initiated to monitor this feature.

21. **Enhanced Surface Drainage and Effect on Salinity and Groundwater.** Project works have not affected the surface drainage situation, as the drainage pumps have not been used to evacuate drainage water. No data collection of salinity or groundwater levels has commenced.

22. **Modification of Drainage Patterns and Effect of Habitat.** The Project has had no impact on drainage patterns except where construction has cut off natural drainage flows. No data collection on benchmark habitats was initiated before the Project, or undertaken since.

23. **Increased Density of Canals and Water-borne Diseases.** No new canals are likely to influence the incidence of waterborne diseases. Benchmark data on disease incidence are available from health authorities, but no specific enhancement of data collection is planned.

24. **Construction Impacts.** No record exists of any environmental impact from actual construction operations, in addition to those anticipated.

25. **Coastal Impacts.** Some erosion was noted to the beach area north of the sea works, over a distance of less than 300 m. This in contrast to the coastal erosion resulting from the construction of breakwaters at the mouth of the Pengkalan River (part of the KRDP), which has created beach erosion over 3-4 kilometers to the north.

D. Technical Assistance on Environmental Impact Monitoring and Evaluation

1. Study Focus

26. The study was carried out from May 1994 to December 1996, overlapping with the first 18 months or so of the main project works, some of which continued until late 1999. The TA resulted in the following: (i) an assessment of potential environmental impacts and recommendations for mitigation and remediation; (ii) development of an environmental management plan (EMP); (iii) establishment of a framework of environmental monitoring stations for key indicator parameters; and (iv) training of DOE and PERKASA personnel in environmental monitoring and environmental management planning.

27. Changes to planned construction schedules and (unspecified) institutional developments at DOE allowed for the initial work program of the TA to be modified. In particular, (i) mitigation and remediation programs to address the environmental problems during construction were considered to be premature; and (ii) development of a water quality monitoring capability within DOE was not considered necessary.

28. The TA therefore focused on environmental management planning and institutional strengthening. With the approval of DOE, PMU, Project Steering Committee, and ADB, the consultants redirected their efforts in early 1995 to this new institutional focus.

29. The impact of this decision on the role expected of the TA at appraisal was significant. A significant number of the environmental concerns at appraisal were to be addressed by recourse to advice and direction from the consultants (Section B). The 1995 decision relieved the consultants of this responsibility, and left it with the project consultants, the PMU, and where spoil disposal was concerned, the Kelantan state government.

2. The Technical Outputs and Recommendations

30. The TA carried out an assessment of potentially significant effects of the SRDP, along with general recommendations as to remediation and mitigation measures. This assessment was quite general; and covered the following issues: (i) loss of biodiversity, (ii) hydrology and flooding, (iii) erosion and sedimentation, (iv) sociocultural, and (v) public health. For each issue, suggestions were made as to the likely scale of impact, mitigation and remediation, and monitoring required.

31. A major limitation of the study was the neglect of upper watershed issues as a factor in the erosion and sedimentation dynamics. No reference is made in the study to the appraisal's perception for the need to reforest the Machang Hills.

32. The main technical output was recommendations from monitoring for issues of (i) biological; (ii) public health; (iii) hydrology, erosion, and sedimentation; (iv) surface water quality; (v) groundwater quality; and (vi) soil quality.

3. Institutional Outputs and Recommendations

33. The TA developed recommendations for the development of an environmental management strategy (EMS) and an EMP, specifying goals, functions, staffing, and institutional responsibilities. Implementation of recommendations implied substantial additional government support to PERKASA and formally agreed support from other government agencies.

34. The main institutional recommendations were:

- (i) PERKASA to establish an environmental monitoring unit to implement the EMP;
- (ii) PERKASA to establish interdepartmental agreements with the Department of Chemistry and Kelantan Department of Health for specialist services;
- (iii) post-PERKASA, responsibility for the EMP to be devolved to other agencies (unspecified); and
- (iv) DOE should pay a coordinating role post-PERKASA and monitor environmental performance.

4. Outcomes of the TA

35. The implementation of the TA technical and institutional recommendations required additional resources from Government to support PERKASA, and some incentives to mobilize interest of noninvolved line agencies. Neither was forthcoming. As a consequence, the first step of establishing the EMU was not taken. All subsequent recommendations thereby become unactionable.

36. ADB should have recognized that the benefits from the TA could only be realized if the Government acted on its recommendations. No actions were taken by ADB in this regard, and consequently the face value and impact of the investment in the TA have not been realized.

E. Future Issues

37. The main requirement for the SRDP for the monitoring of environmental impact, and the identification of environmental management needs, is to implement the recommendations of the TA. These recommendations cover all of the aspects required to understand and mitigate future environmental issues for the following: aquatic plant growth, plant cover on bunds, spoil areas, and wetland fringes, fish communities, wildlife communities, hydrometric data, erosion and sedimentation, salinity and groundwater, coastal processes, water quality, and disease incidence.

ECONOMIC PERFORMANCE

1. The economic internal rates of return (EIRRs) were recalculated separately for
 - (i) the Project completed during the period of the Asian Development Bank (ADB) loan and including the share of the Gunong Diversion Channel costs relating to the relief of flooding in the Semerak Agricultural Development Project area (i.e., for all project components as appraised, excluding the irrigation component for 5,250 hectares (ha) in the project area);
 - (ii) the irrigation component for the 5,250 ha (the incremental project); and
 - (iii) the Project plus the incremental project.
2. The economic analysis is undertaken in constant 2000 prices in ringgit. Costs and benefits in years prior to 2000 are converted using the price indices and exchange rates set out in Table A10.1. Farm-gate prices for paddy and fertilizers were calculated from international prices (Tables A10.2, A10.3, and A10.4), while a standard conversion factor (SCF) of 0.9 was applied to local costs. The financial and economic farm-gate prices for agricultural inputs and outputs are summarized in Table A10.5.

Table A10.1: Exchange and Inflation Rates

Year	Exchange Rate ^a RM=\$1	Malaysia CPI ^a	G5MUV Index ^b
1987	2.52	74.70	88.85
1988	2.62	76.70	95.32
1989	2.71	78.80	94.65
1990	2.70	80.90	100.00
1991	2.75	84.40	102.23
1992	2.55	88.40	106.64
1993	2.57	91.60	104.22
1994	2.62	95.00	107.35
1995	2.50	100.00	108.99
1996	2.52	103.50	110.94
1997	2.81	106.20	108.38
1998	3.92	111.80	104.19
1999	3.80	114.90	103.56
2000 ^c	3.80	117.40	106.15

CPI = consumers price index, G5MUV = G5 Group of Countries' Manufactures Unit Value Index.

^a *International Financial Statistics*. International Monetary Fund, 1999 and July 2000.

^b World Bank. Various years. Commodity Price Projections. *Global Commodity Markets*. Washington, D.C.

^c Based upon incomplete actual data and projections.

3. The other data and assumptions used in calculating the EIRRs are on the following pages.

Table A10.2: Import Parity Price for Rice Paddy
(constant 2000 prices)

Item	1990	1995	2000	2005	2010
Rice Paddy ^a (\$/t)	288	286	250	279	271
Less Quality Differential (10%)	29	29	25	28	27
Plus Freight and Insurance	34	34	34	34	34
CIF Price Port Kelang (\$/t)	293	291	259	285	278
CIF Price Port Kelang (RM/t)	1,114	1,107	984	1,083	1,056
Landing Charges, Transport, and Margin	90	90	90	90	90
Wholesale Price	1,204	1,197	1,074	1,173	1,146
Less Transport, Mill to Wholesaler	15	15	15	15	15
Ex-Mill Price	1,189	1,182	1,059	1,158	1,131
Paddy Equivalent (65%)	773	769	688	753	735
Less Milling Costs Net of By-Products	70	70	70	70	70
Value of Paddy into Mill	703	699	618	683	665
Less Transport and Handling, Farm to Mill	30	30	30	30	30
Import Parity Price at Farm Gate (RM/t)	673	669	588	653	635
Financial Farm Gate Price			790		

CIF = cost, insurance, and freight included in the price; t = ton.

^a Thai (White) milled, 5% broken, government standard, freight on board, Bangkok.

Source: World Bank. Various years. Commodity Price Projections. *Global Commodity Markets*. Washington, D.C.

Table A10.3: Import Parity Price for Urea
(constant 2000 prices)

Item	1990	1995	2000	2005	2010
DAP Price ^a (\$/t)	139	189	90	107	110
Plus Freight and Insurance	40	40	40	40	40
CIF Price Port Kelang (\$/t)	179	229	130	147	150
CIF Price Port Kelang (RM/t)	680	870	494	559	570
Plus Port Charges	25	25	25	25	25
Plus Transport and Handling	40	40	40	40	40
Plus Storage and Distribution	25	25	25	25	25
Import Parity Price at Farm Gate (RM/t)	770	980	584	649	660
Financial Farm Gate Price			300		

CIF = cost, insurance, and freight included in the price; DAP = Diammonium Phosphate; t = ton.

^a DAP (Bulk), Free on Board United States of American Gulf Ports.

Source: World Bank. Various years. Commodity Price Projections. *Global Commodity Markets*. Washington, D.C.

Table A10.4: Import Parity Price for Diammonium Phosphate
(constant 2000 prices)

Item	1990	1995	2000	2005	2010
DAP Price ^a (\$/t)	182	193	165	173	161
Plus Freight and Insurance	40	40	40	40	40
CIF Price Port Kelang (\$/t)	222	233	205	213	201
CIF Price Port Kelang (RM/t)	884	885	779	809	764
Plus Port Charges	25	25	25	25	25
Plus Transport and Handling	40	40	40	40	40
Plus Storage and Distributing	25	25	25	25	25
Import Parity Price at Farm Gate (RM/t)	934	975	869	899	854
Financial Farm Gate Price			600		

CIF = cost, insurance, and freight included in the price; DAP = Diammonium Phosphate; t = ton.

^a DAP (Bulk), Free on Board United States of American Gulf Ports.

Source: World Bank. Various years. Commodity Price Projections. *Global Commodity Markets*. Washington, D.C.

Table A10.5: Farm Gate Prices of Agricultural Outputs and Inputs
(constant 2000 prices)

Item	Unit	Financial	Economic
A. Outputs			
Paddy	RM/t	790	588 ^a
Watermelon	RM/t	300	270
Chillies	RM/t	1750	1575
Rambutan	RM/t	1000	900
Durian/Lansium	RM/t	2500	2250
Tobacco	RM/t	800	720
B. Inputs			
Seeds			
Paddy	RM/kg	1.2	0.64
Watermelon	RM/kg	850	765
Chillies	RM/kg	50	45
Fertilizer			
Urea	RM/t	300	630 ^b
DAP	RM/t	600	869 ^c
Lime	RM/t	100	90
Chemicals			
Paddy	RM/ha	280	252
Watermelon	RM/ha	250	225
Chillies	RM/ha	500	450
Rambutan	RM/ha	350	315
Durian	RM/ha	350	315
Lansium	RM/ha	350	315
Plastic Covers	RM/roll	45	40.5
Combine Harvester	RM/ha	270	243
Fruit Picking	RM/kg	0.15	0.14
Labor	RM/day	15	13.5

^a Table A10.2 provides for economic price variations by year.

^b Table A10.3 provides for economic price variations by year.

^c Table A10.4 provides for economic price variations by year.

A. Project Implementation Period and Period of Analysis

4. The major works for the Project were implemented over 10 years from 1989 to 1999. Construction of the Gunong diversion channel commenced in 2000 and is expected to be completed by June 2002. The irrigation works for the 5,250 ha (i.e., the incremental project) are expected to be completed in 2008. The analysis period extends to 2028; i.e., 30 years after conclusion of the major project works in 1999.

B. Economic Costs

5. In the economic analysis of the Project, the investment costs for the sea works and the lower Semerak channel (including the new Semerak bridge) funded by the Government from its own resources, outside the Project, are included since they contribute to the economic benefits of the Project.

6. The economic costs are net of transfer payments such as taxes and land costs. Land acquired for the Project is assumed to have zero economic cost, even though it was wetlands or Gelam forest areas.

7. For the Project, only 10 percent of the Gunong diversion channel's costs have been included, since the principal purpose of the channel is to provide flood relief to land outside the Project area. The 10 percent of the costs included is to account for the flood relief benefits on 5,000 ha of project area land, which overlaps with the Kemubu Agricultural Development Authority (KADA) project and will gain additional flood protection benefits from the Gunong diversion channel.

8. For the incremental project, no Gunong diversion channel costs have been included. Although the channel will be used to convey 11 cubic meter (m^3)/second (s) of irrigation water during the dry season to augment water supplies for the areas to be irrigated, the channel capacity ($110 \text{ m}^3/\text{s}$) is dictated by the flows it is required to carry during the monsoon season to provide flood protection. The incremental costs for irrigation in the Semerak Project area are confined to a share of operations and maintenance costs for the Kemubu pumping station. An allowance of RM0.5 million per annum has been included in the incremental project's operation and maintenance (O&M) costs.

9. O&M costs for the Project were estimated on the basis of 1 percent of capital costs for civil works and 9 percent for the drainage pumps. Periodic dredging costs of RM200,000 were estimated. These were assumed to be incurred every five years starting in 2004. For the incremental project involving the new irrigation works, O&M costs of RM800/ha were assumed plus the RM0.5 million per annum for a share of the Kemubu pumping station costs.

10. The total economic capital costs of the Project are RM339.51 million. This compares with an equivalent (i.e., in 2000 prices and ringgit) economic cost estimate at appraisal of RM247.22 million, excluding the irrigation component as costed at appraisal. The economic capital cost of the incremental project is estimated to be RM118.89 million (in financial prices, RM128 million for irrigation works, and RM3.1 million for agricultural support services), compared with an equivalent appraisal estimate of RM70.25 million.

C. Flood Control Benefits

1. Direct and Indirect Damage Cost Savings

11. With the completion of the lower Semerak channel works in 1995, the Project is estimated to have achieved 20 percent of the direct and indirect damage cost savings estimated at appraisal. By 1998, the flood control works constructed under the Project were sufficient to achieve 100 percent of these benefits.

12. In the absence of any more recent flood damage cost estimates for various return period floods, the appraisal report estimates have been used for the annual expected direct and indirect damage cost savings, appropriately adjusted for inflation and applying the Kelantan State gross domestic product (GDP) growth rate since 1989. (Taken to be 7.3 percent for 1989/90, 6.2 percent per annum for 1990/95, and 6.6 percent per annum for 1996/2000, except for 1998-99 zero growth was assumed given the negative growth experienced by Malaysia at

this time.¹ For future years, these benefits are assumed to grow at 6 percent per annum, consistent with ADB's *Asian Development Outlook* projections for Malaysia in 2000 and 2001, but only up until 2010, when they are assumed to remain constant.

2. Paddy Crop Yield Enhancement (KADA Project Area)

13. A total of 5,000 ha of paddy area of the KADA project had a reduced yield of 2.2 tons (t)/ha in the main season due to flooding. With the completion of the Project, two thirds of this area is protected from flooding, allowing an additional 2 t/ha to be grown in the main season (i.e., 6,667 t per annum). With the completion of the Gunong diversion channel in 2002, the full 5,000 ha will be protected from flooding yielding an additional 10,000 t of paddy.

14. The economic benefits of this flood protection impact is found by multiplying these additional quantities of paddy by the farm-gate economic prices for paddy as presented in Table A10.2.

3. Increased Area of Tobacco

15. Before the Project, 1,900 ha of tobacco were grown in the project area. The flood protection of the Project, together with activities under the Agricultural Support Services component, have enabled the area to grow to 2,586 ha in 2000. However, no further growth in the area planted in tobacco is expected due to government quota limits. The growth in area that has occurred is assumed to be linear since 1994.

16. The economic benefits of additional tobacco is estimated to be RM3,860 per ha, based upon an average yield of 13 t/ha,² in a farm-gate economic price of RM720/t and production costs of RM5,500/ha, based on 1998 Tobacco Board Statistics and the economic farm-gate prices for fertilizers (Tables A10.3 and A10.4).

D. Agricultural Production Benefits

1. Paddy

17. The irrigation component of the Project has yet to be implemented. However, about 30 percent of the 5,250 ha to be irrigated under the incremental project has increased its yield by an extra 1 t/ha due to the flood protection benefits of the Project and the agricultural extension component. This is assumed to have commenced in 1999 and grow linearly up to 2005.

18. In addition, outside the 5,250 ha designated for future irrigation, the Project will lead to an increase in single-crop paddy production, totaling 2,000 ha by 2004. The yield in 2001 is assumed to be 3 t/ha, building to 4 t/ha in 2004. The economic production costs for this paddy are estimated to be RM1,246/ha.

19. For the incremental project, 1,000 ha will be provided with irrigation in 2004, an additional 1,115 ha in 2005, 2,434 ha in 2007, and the final 601 ha of the 5,250 ha in 2009. An eventual cropping intensity of 190 percent is assumed implying 5,250 ha in the main season and 4,750 ha in the off-season. In the main season, the increase in yield is expected to reach 2 t/ha, given that yields are around 3.2 t/ha at present and even without the incremental project

¹ Kelantan State Economic Planning Unit. 1988. Kelantan Socioeconomic Profile.

² Department of Agriculture. 2000. Kemasin Semerak Integrated Agricultural Development Project Impact Study.

will rise to around 4 mt/ha on 30 percent of the area as a result of the project components already completed. Paddy production economic costs are estimated at RM1,246/ha.

2. Vegetables

20. At appraisal the Flood Mitigation and Agricultural Support Services components of the Project were expected to result in an additional 200 ha of vegetables being cropped. In fact by 1999 an additional 1,443 ha of vegetable crops were harvested outside the irrigable area. The most popular of these are chillies, watermelon, long beans, brassica, and cucumber. The data on the increase of vegetable cropped area was provided by the Project Management Unit (PMU). This area is expected to expand at a rate of 5 percent per annum up to 2005 as a consequence of the Project. A cap on vegetable production growth in part reflects limited suitable land available, but also the downward pressure on prices, resulting from the increasing supply of surpluses for cash sales.

21. The net economic benefits per ha for vegetables are based on the average net returns for chillies and watermelons (RM5,920/ha).

3. Fruit

22. At appraisal an additional 200 ha of fruit tree plantings were expected to result from the Project. By 1999 actual additional plantings totaled 556 ha. The most popular of these are rambutan, durian, and lansium. Production from these additional fruit trees is conservatively assumed to have commenced in 1998 (50 percent) and 1999 (100 percent), with further growth in production of 5 percent per annum up to 2005.

23. Net economic benefits of fruit trees are estimated to be RM5,390/ha based upon net returns estimated for rambutan orchards, the most popular variety developed under the Project.

E. Other Benefits

1. Fishing

24. Since the completion of the sea works and the lower Semerak channel, fishing boats have been able to berth at Tok Bali, a thriving fishing center with two ice factories; three major jetties; and several smaller jetties, slipways, and ship-repair facilities. The total value of the catch has been RM1.1 million in 1995, RM13.2 million in 1996, RM2.0 million in 1997, RM3.4 million in 1998, RM80.0 million in 1999, and RM38.4 million in January to June 2000.

25. In part this reflected the transfer of business away from other Malaysian ports. However, it also resulted from vessels which previously landed their catch in Thailand diverting to Tok Bali. Assuming 50 percent of the landed catch is additional trade for Malaysia, 70 percent of the catch value represent production costs and applying the SCF of 0.9 yields the following economic benefits from the Project: RM0.15 million in 1995, RM1.78 million in 1996, RM0.27 million in 1997, RM0.46 million in 1998, RM10.80 million in 1999, and RM10.36 million in 2000. These economic benefits are expected to grow at 10 percent per annum until 2005.

26. Similar but much smaller benefits have arisen from the development of caged fish production as a result of the Project. These are estimated to be worth RM0.2 million in 2000, growing at 10 percent per annum up until 2005.

27. Because neither of these fishing benefits were anticipated at the time of project appraisal, they have been excluded from the base case analysis. However, they are included in the sensitivity analysis as they are a direct result of the project works.

2. Tourism and Other Benefits

28. The completion of the lower Semerak channel works has enabled the development of regular boat services to Pulau Perhentian from Tok Bali. Tourist chalets have been constructed at Tok Bali itself. The flood protection works and filling in of swampland with spoil has provided additional land for industrial and residential purposes. Road construction and improvement have also occurred under the Project. No account of these benefits has been taken in the economic analysis, nor has any account been taken of any environmental damages imposed by the project in the EIRR calculations (These are discussed in Appendix 11).

F. Results

1. Base Case

29. The various economic cost and benefit items and the net economic benefit streams for the Project, the incremental project and the combined project plus incremental project are shown in Tables A10.6, A10.7, and A10.8. The base case EIRRs are 11.5 percent for the Project, 8.0 percent for the incremental project, and 11.2 percent for the Project plus incremental project.

30. These results compare with an EIRR for the total Project at appraisal of 15.7 percent.

31. For the Project implemented during the period of the ADB loan, the EIRR of 11.5 percent is still reasonable despite the cost of the Project being significantly higher than anticipated at appraisal, lower international prices for paddy, and the extended project implementation period. These three factors have been offset to some extent by:

- (i) delays to project implementation resulting in higher value economic activity being protected by the flood protection component of the Project;
- (ii) the larger than expected areas of fruit trees and vegetables more than offsetting a less than anticipated increase in the area planted in tobacco; and
- (iii) higher yields expected for paddy.

32. The modest 8.0 percent EIRR for the irrigation component, i.e., the yet to be undertaken incremental project, reflects the high costs required to convert the 5,250 ha of new paddy irrigation to enable double cropping and the reasonable yields expected in the main season (4 t/ha) even without irrigation facilities. The costs for the incremental project used in the analysis are only provisional estimates at this stage. The inclusion of the incremental project in the 8th Malaysia Plan is indicative of its strategic importance in terms of targeting 65 percent rice self-sufficiency from designated granary areas (which include the project area) and reducing income disparities between regions. These considerations are additional to that of economic efficiency reflected by a comparison of alternative project EIRRs.

Table A10.6: Project Costs and Benefits
(RM million)

Year	Capital Costs	O&M Costs	Total Costs	Direct Plus Indirect Flood Damage Cost Savings Crop Non-Crop	Additional Paddy Yield in KADA Area	Additional Tobacco	Additional Paddy Project Area	Additional Vegetables	Additional Fruit	Fishing	Total Benefits	Net Benefits	
1989	5.08		5.08								0.00	(5.08)	
1990	2.50		2.50								0.00	(2.50)	
1991	7.25		7.25								0.00	(7.25)	
1992	13.79		13.79								0.00	(13.79)	
1993	35.82		35.82								0.00	(35.82)	
1994	32.89		32.89			0.38		1.78			2.16	(30.73)	
1995	37.64		37.64	1.82	1.33	0.76		2.91		0.00	6.82	(30.82)	
1996	48.72		48.72	1.94	1.42	1.14		3.76		0.00	8.26	(40.46)	
1997	70.41		70.41	2.07	1.51	1.51		5.49		0.00	10.58	(59.83)	
1998	49.55		49.55	11.02	8.07	1.89		7.06	1.56	0.00	29.60	(19.95)	
1999	35.14		35.14	11.02	8.07	4.03	2.27	1.11	8.54	3.11	0.00	38.15	3.01
2000	0.29	5.00	5.29	11.75	8.60	3.92	2.65	1.42	8.97	3.36	0.00	40.67	35.38
2001	0.29	5.00	5.29	12.46	9.12	4.01	2.65	1.79	9.42	3.53	0.00	42.98	37.69
2002	0.14	5.00	5.14	13.20	9.67	6.14	2.65	2.26	9.89	3.70	0.00	47.51	42.37
2003		5.00	5.00	13.99	10.25	6.27	2.65	2.76	10.38	3.89	0.00	50.19	45.19
2004		5.18	5.18	14.83	10.86	6.40	2.65	3.26	10.90	4.08	0.00	52.98	47.80
2005		5.00	5.00	15.72	11.51	6.53	2.65	3.76	11.44	4.29	0.00	55.90	50.90
2006		5.00	5.00	15.72	11.51	6.49	2.65	3.73	11.44	4.29	0.00	55.83	50.83
2007		5.00	5.00	15.72	11.51	6.46	2.65	3.69	11.44	4.29	0.00	55.76	50.76
2008		5.00	5.00	15.72	11.51	6.42	2.65	3.66	11.44	4.29	0.00	55.69	50.69
2009		5.18	5.18	15.72	11.51	6.39	2.65	3.63	11.44	4.29	0.00	55.63	50.45
2010		5.00	5.00	15.72	11.51	6.35	2.65	3.59	11.44	4.29	0.00	55.55	50.55
to													
2028		5.00	5.00	15.72	11.51	6.35	2.65	3.59	11.44	4.29	0.00	55.55	50.55

Economic Internal Rate of Return = 11.47%

KADA = Kemubu Agricultural Development Authority, O&M = operation and maintenance.

Table A10.7: Incremental Project Costs and Benefits
(RM million)

Year	Capital Costs	O&M Costs	Total Costs	Total Benefits	Net Benefits
2000			0.00		0.00
2001	2.70		2.70		(2.70)
2002	4.77		4.77		(4.77)
2003	13.95		13.95		(13.95)
2004	18.45	0.80	19.25	0.90	(18.35)
2005	3.42	1.77	5.19	3.02	(2.17)
2006	27.90	1.77	29.67	4.14	(25.53)
2007	23.40	3.72	27.12	11.00	(16.12)
2008	24.30	3.72	28.02	12.84	(15.18)
2009		4.70	4.70	15.92	11.22
2010		4.70	4.70	17.28	12.58
to					
2028		4.70	4.70	17.28	12.58

Economic Internal Rate of Return = 7.96%

O&M = operation and maintenance.

Table A10.8: Combined Project Costs and Benefits
(RM million)

Year	Project Net Benefits	Incremental Project Net Benefits	Combined Project Net Benefits
1989	(5.08)		(5.08)
1990	(2.50)		(2.50)
1991	(7.25)		(7.25)
1992	(13.79)		(13.79)
1993	(35.82)		(35.82)
1994	(30.73)		(30.73)
1995	(30.82)		(30.82)
1996	(40.46)		(40.46)
1997	(59.83)		(59.83)
1998	(19.95)		(19.95)
1999	3.01		3.01
2000	35.38		35.38
2001	37.69	(2.70)	34.99
2002	42.37	(4.77)	37.60
2003	45.19	(13.95)	31.24
2004	47.80	(18.35)	29.45
2005	50.90	(2.17)	48.73
2006	50.83	(25.53)	25.30
2007	50.76	(16.12)	34.64
2008	50.69	(15.18)	35.51
2009	50.45	11.72	62.17
2010	50.55	12.58	63.13
to			
2028	50.55	12.58	63.13

Economic Internal Rate of Return = 11.20%

33. The EIRR of 11.2 percent for the Project plus incremental project, compared with the appraisal estimate of 15.7 percent, reflects the Project's higher costs and longer than anticipated implementation period and consequential delays in achieving full project benefits.

2. Sensitivity Testing

34. Including the fishing impacts in project benefits lifts the EIRR for the Project to 14.2 percent. A 10 percent reduction in the assumed direct and indirect flood damage cost savings reduces the EIRR to 11 percent.

35. For the incremental project, sensitivity testing was undertaken firstly, assuming a 10 percent increase in capital costs, and secondly, assuming a 10 percent reduction in benefits (from reduced paddy yield, higher farm production costs and/or lower paddy economic prices). Under both of these changed assumptions the EIRR drops to 5.3 percent.

36. A summary of the sensitivity testing is presented in Table A10.9.

Table A10.9: Sensitivity Testing Results

Component		EIRR (%)
A. The Project		
(i)	Base Case	11.5
(ii)	Inclusion of Fishing	14.2
(iii)	10% Reduction in Flood	
(iv)	Control Benefits	11.0
(v)	Item (ii) plus (iii)	13.8
B. The Incremental Project		
(i)	Base Case	8.0
(ii)	10% Increase in Capital Costs	6.9
(iii)	10% Reduction in Benefits	6.3
(iv)	Item (ii) plus (iii)	5.3

EIRR = economic internal rate of return.

37. For the Project (i.e., the flood mitigation component), the sensitivity testing indicates that the results are reasonably robust under a range of conditions. However, for the incremental project, the sensitivity testing indicates that the irrigation component is marginal.

IMPACT ON BENEFICIARIES

A. Financial Impacts

1. Because the irrigation component of the Project has yet to be undertaken, the financial impact of the Project on farm incomes thus far has been limited. Also the financial impacts of the completed project components (i.e., the flood mitigation works and the agricultural support services) have been diverse and varied in intensity on farmers and nonfarmers in different locations. A complicating factor is that federal and state agency interventions have impacted on household incomes since the Project commenced. Several particular financial impacts on specific groups within the project area are discussed here.

1. Farm Incomes

2. For farmers in the Kemubu Agricultural Development Authority area, the Project has led to increases in yield of 2 metric tons (t)/hectare (ha) of paddy in the main season from 1999 onward for two thirds of the area. Farmers in the whole of this area will benefit from 2002 onward with the completion of the Gunong diversion channel. Assuming an average paddy holding of 1.5 ha, this implies an increase in income per household of RM2,370 per annum for the farmers in this area.

3. For paddy farmers in 30 percent of the 5,250 ha area proposed for future irrigation, an increase in main season yield of 1 t/ha from 1998 has been assumed to result from the Project works already completed. Assuming an average paddy holding of 1.5 ha, this implies an increase in farm income per household of RM1,185 per annum.

4. For farmers with a 1.5 ha holding in the area of unirrigated paddy assumed to result from the Project, incomes will increase by RM2,640 per annum. Additional jobs created will total around 200 by 2004.

5. The additional areas of tobacco, vegetables, and fruit are relatively small, but for individual farmers fortunate enough to have been covered by these aspects of the Project, the financial benefits are significant. For example, for farmers with a 1.0 ha holding of these crops developed under the Project, the financial returns (excluding returns to labor) are RM4,290, RM6,825 and RM5,990 respectively. The promotion of tobacco, vegetables, and fruit by the Project has resulted to about 1,800 new on-farm jobs in 2000. This will rise to 2,100 new jobs by 2005.

6. Crop budgets for the various crops are presented in Table A11.1.

2. Nonfarm Incomes

7. The flood protection financial benefits of the Project are difficult to identify on a per household basis. The total expected average annual financial benefits in 2000 of RM20.35 million are spread over approximately 13,000 households in the project area. This gives an average annual financial benefit per household of RM1,570. However, these benefits include those for businesses and public infrastructure as well as urban and residential property. Also the benefits from the flood protection works component will be quite disparate in terms of its impacts on properties in different localities.

Table A11.1: Crop Budgets

Crop	Item	Amount	Price (RM)	RM/ha
Paddy				
Revenue	Yield	4.1 mt/ha	790/t	3,239.0
Cost	Land prep 1 st	1	150	150.0
	Land prep 2 nd	1	100/t	100.0
	Seed	100/kg	1/kg	100.0
	Urea	100/kg	0.3/kg	30.0
	NPK	250/kg	0.6/kg	150.0
	Lime	2.5 mt	100/t	250.0
	Chemicals	1	280	280.0
	Land Tax	1	5/crop	5.0
	Combine Harvester	1	270	270.0
	Labor	25 days	15/day	375.0
				1,710.0
Net Revenue				1,529.0
Water Melons				
Revenue	Yield	23mt/ha	300/t	6,900.0
Cost	Land Prep	1	250	250.0
	Seed	250g	0.85/g	212.5
	Chicken Manure	3mt	100/t	300.0
	NPK	700kg	0.6/kg	420.0
	Lime	3mt	100/t	300.0
	Chemicals	1	250	250.0
	Plastic Covers	20 rolls	45/roll	900.0
	Water Pump Petrol	1	90/ha	90.0
	Plastic Bags for seed	1	17	17.0
	Land Tax	1	5/crop	5.0
	Labor	100 days	15/day	1,500.0
				4,244.5
Net Revenue				2,655.5
Chillies				
Revenue	Yield	12mt/ha	1,750/t	21,000.0
Cost	Land Prep	1	400	400.0
	Seed	0.5kg	50/kg	25.0
	Chicken Manure	5	100/t	500.0
	NPK	3,000kg	0.6/kg	1,800.0
	Lime	3mt	100/t	300.0
	Chemicals	1	500	500.0
	Plastic Covers	35 rolls	45/roll	1,575.0
	Other Costs	1	550/ha	550.0
	Land Tax	1	5/crop	5.0
	Labor	290 days	15/day	4,350.0
				10,005.0
Net Revenue				10,995.0

Crop	Item	Amount	Price (RM)	RM/ha
Tobacco				
Revenue	Yield	13 mt/ha	800/t	10,400.0
Cost	Labor	260 days	15/kg	3,900.0
	Other Costs	1	2,210/ha	2,210.0
				6,110.0
Net Revenue				4,290.0
Rambutan				
Revenue	Yield	4.5 mt/ha	1,500/t	6,750.0
Cost	Labor	1,500 kg	15/kg	225.0
	Other Costs	1	535/ha	535.0
				760.0
Net Revenue				5,990.0
Durian/Lansium				
Revenue	Yield	12 mt/ha	2,500/t	30,000.0
Cost	Labor	12,000 kg	15/kg	1,800.0
	Other Costs	1	675/ha	675.0
				2,475.0
Net Revenue				27,525.0

ha = hectare, kg = kilogram, NPK = Nitrogen Phosphorus Potassium, t = ton.

8. The Project has resulted in substantially increased employment opportunities associated with fishing at Tok Bali and elsewhere in Kelantan. In 2000, the value of fish landed is estimated to be RM76.8 million (Fisheries Department, Kelantan). Data gathered during the Mission indicated that on-board labor costs were around 25 percent of the landed catch value and that crew on average earned about RM10,000 per annum (RM40 per day, 25 days per month, 10 months per year). This implies that by 2000, the Project had generated 1,920 new jobs at sea. Fishing industry sources interviewed during the Mission indicated that around half of these jobs are taken by foreigners (Thais) on either foreign- or Malaysian-owned boats. On the other hand, for each job generated at sea another is likely generated on land for the maintenance of the fishing boats and equipment; provisioning of the boats; and the unloading, storage, distribution, marketing, and processing of the fish (albeit at an average wage rate of only about half that for on-board crew). Therefore development of the fishing industry at Tok Bali by the Project has created up to around 3,000 jobs in the project area. By 2005 this is expected to grow to around 3,850 new jobs.

B. Social Impacts

9. Based on information from two socioeconomic surveys of rural households in the Project area in 1982 and 1998, the socioeconomic change in the project area over the 16 years has been highly positive.

10. According to the results of the two surveys, the average size of families has decreased from 6 in 1982 to 5.4 members in 1998, while land size has remained unchanged at 1.5 ha/household. Education attainment of respondents in 1998 improved substantially from 1989 with the percentage of respondents who had never attended school lowered from 42 percent to

29 percent and the percentage of those who attended secondary school increased sharply from 5 percent to 16 percent (Table A11.2). However, since there is a gap of 16 years in the data collected, it could be said that the cause of the changes were due largely to overall economic growth in the area.

11. The results of the surveys suggest that the rural population in the project area is aging as the average age of respondents increased from 47 in 1982 to 56 in 1998. With the improvement in transportation infrastructure, the incidence of out-migration of household members between the age of 18-40 to find temporary employment in agriculture and other sectors outside of the Project area also increased from 6.7 percent to 18 percent. Along with the increased opportunities of employment outside of agriculture, employment opportunities in agriculture have also increased in the area. In 1982, only 60 percent of the respondents stated that they were full-time farmers; in 1998, up to 81 percent of respondents were full-time farmers (Table A11.2).

Table A11.2: Socioeconomic Information for Households in Project Area in 1982 and 1998

Socioeconomic Information	1982 (131 households)	1998 (937 households)
Average age of respondents (years)	47.0	56.00
Average family size (people)	6.0	5.40
Education attainment of respondents		
- never attended schools (%)	42.0	29.00
- attended secondary school (%)	5.0	16.00
Full-time farmer respondents (%)	60.0	80.00
Out-migration of household members between the age of 18-40 (%)	6.7	18.00
Type of house		
- wooden house built with locally obtained wood	11.0	0.96
- semiconcrete and brick (%)	2.0	22.00
Basic amenities		
- water supply (%)	14.3	94.13
- modern toilet (%)	44.0	98.90
- electricity (%)	66.0	99.40
Ownership of household durables		
- gas stove (%)	9.0	96.00
- television (%)	37.0	89.00
- refrigerator (%)	7.0	55.70
- washing machine (%)	0.0	30.00
- microwave oven (%)	0.0	5.00
- computer (%)	0.0	1.10
- telephone (%)	1.0	24.40
- electric cooker (%)	4.0	40.40

Sources: Baseline Study: Kemasin-Semerak Integrated Agriculture Development Project 1982 and Impact Study: Kemasin Semerak Integrated Agriculture Development Project, 1998.

12. In rural areas, the type of construction material of houses is generally a good proxy indicator of household wealth. The surveys show that the percentage of the most basic type of wooden house built with locally obtained wood has declined from 11 percent to only 0.96 percent. On the other hand, the proportion of houses made of semiconcrete and brick has increased from 2 percent to 22 percent. Basic amenities, including water supply, electricity, and availability of modern latrines have also improved substantially. Regarding ownership of household durables, the survey shows generally improved living conditions of respondents with ownership of gas stoves increasing from 9 percent to 96 percent, televisions from 37 percent to 89 percent, washing machines from 0 percent to 30 percent, microwave ovens from 0 percent to 5 percent, and computers from 0 percent to 1.1 percent (Table A11.2).

C. Impacts on Poverty

1. Poverty in Malaysia

13. The incidence of poverty among Malaysians is moderate and manageable. Remarkable progress has been achieved in reducing poverty as a consequence of high economic growth following industrialization and widespread government interventions. Incidence of poverty in Malaysia is estimated on the basis of poverty line income, which takes into account the minimum requirements for food, clothing and shelter, and other basic expenditures. The national poverty line was defined as RM4,560 per family per year in 1990 and RM5,520 per family per year in 1999. For Malaysia as a whole, poverty incidence, which was 17.1 percent in 1990, reduced to 10 percent in 1999. Rural poverty declined from 21.8 percent to 11.0 percent in the same period.

14. Among rural poor households, 72 percent have access to electricity, 65 percent have access to safe drinking water, 88 percent live within 9 kilometers of either a government or private clinic, and 94 percent of rural poor households have access to primary education.

2. Poverty Reduction in Malaysia

15. Since the 1970s, the Government has successfully implemented various programs and projects to eradicate poverty.

16. The poverty reduction program has two major categories:

- (i) Rural poor with land suitable for agriculture. For this group of rural households, the approach has been to provide better technology and various other incentives. Rice farmers have been provided with high-yielding varieties, improved irrigation facilities, and a direct subsidy of 140 kilogram of fertilizer/acre. Other crops and livestock productivity improvement programs have also been implemented.
- (ii) Rural poor without land or with land not suitable for agriculture. For this group of rural households, the approach has been to move them out of poverty sectors into nonpoverty sectors. This has normally been done by resettling the farmers to new land development schemes organized by different government agencies, particularly Federal Land Development Authority.

17. The Government further classifies the poor into (i) the hard-core poverty group, those with income less than half that of the poverty line, and (ii) the poor whose income is below the poverty line but not less than half of the poverty line. For the hard-core poverty group, the Government implemented a special program, the Development Program For the Poorest. The program encompassed income-generating projects and the inculcation of positive values, such

as self-reliance and hard work, as well as provision of direct welfare assistance. A summary of the poverty reduction programs is presented in Tables A11.3 and A11.4.

18. While poverty incidence continued to decrease, this is expected to slow down as the remaining pockets of poverty will be the hardest and the most difficult to eradicate.

Table A11.3: Summary of Rural Development Strategies and Poverty Reduction Programs in Malaysia

Strategy	Brief Description of Programs
1. Area Development	
Agricultural Development	Implemented as integrated area development projects based on the concept of site development to improve productivity and incomes of farmers. Package of physical and economic infrastructures, social amenities, technology, inputs, and agricultural support services provided.
Regional and Land Development	Large-scale regional and land development projects involve resettlement of landless or marginal farmers into land schemes. Package of physical, economic, and social infrastructures, and amenities is provided.
Land Consolidation and Rehabilitation	Uneconomic holdings in existing agricultural and rural areas are consolidated and rehabilitated to improve productivity and incomes of farmers.
2. Agricultural Support Services and Subsidies	Institutional and agricultural support services such as extension, training, input and price subsidies, research, marketing, etc. are provided to reduce real costs of production and increase production efficiency.
3. Assisting Smallholder and Traditional Farmers	Assistance and funds are provided for replanting rubber, pineapple, and coconut, and also crop diversification and multicropping strategy for smallholders and traditional farmers.
4. Rural Industrialization	Agricultural resource-based industries and rural handicrafts are expanded to create employment and supplement rural incomes.
5. Social Development	
Social Amenities	Basic social amenities like education, health, water and electricity supplies, and community and religious facilities are provided.
Community Development	Community development programs and amenities instill positive values and self-help among rural households and youths.
6. Applied Food and Nutrition Program	The program supports better food and nutrition among rural households for better health, and encourages local food production and self-help among rural communities.
7. Rehabilitation of Traditional Villages	The socioeconomic well-being of households in traditional villages is improved by providing basic socioeconomic infrastructure and amenities.
8. Rural Urbanization	Basic amenities infrastructure is improved and urban facilities are brought to rural areas.

Source: Compiled from various five-year plan documents in Chamhuri Siwar (1992).

**Table A11.4: Federal Government Development Allocation Directed
Toward Eradication of Poverty, 1971-2000**
(RM million)

Item	2MP (1971-75)	3MP (1976-80)	4MP (1981-85)	5MP (1986-90)	6MP (1991-95)	7MP (1996-2000)
Poverty Reduction (A)	2,350	6,376	9,319	13,661	—	72.4
Agricultural and Rural Development (B)	2,127	4,443	8,000	7,611	9,019	18,200
Commerce and Industry	1	76	—	71	—	—
Social Infrastructure	13	781	—	2,597	—	—
Total Development	110	974	—	3,382	—	—
Allocations (C)	7,250	21,202	39,329	49,262	55,000	67,500
A as of % of C	32.4	30.1	23.7	27.7	—	—
B as of % of C	29.3	21.0	21.9	15.4	16.4	27.0

— = not available.

Source: Malaysia (1976,1981,1991,1996).

19. Based on the statistics from the Kelantan State Economic Planning Unit, a head count of households living below the hard-core poverty line with income less than half of the poverty line in the project area remained at 415 households in 1995 and 1999. However, based on the results of the survey conducted by the Project, the general standard of living of farmers in the project area has improved substantially during the same period as discussed in paras. 9-12.

20. During the project period, the Drainage and Irrigation Department (DID) executed a poverty eradication program under the Ministry of Rural Development by providing agricultural equipment to 17 poor households in the project area. Income has increased substantially for all 17 households with 60 percent of the households being lifted above the poverty line (Table A11.5).

**Table A11.5: Poverty Eradication Programs under Ministry of Rural
Development Through the Semerak Rural Development Project**

Name	Type of Subsidy	Year Given	Average Income Per Month (RM)				
			Before Project	1997	1998	1999	2000
Mohd. Nor. b. Daud Kolam Tembesu	Agriculture Equipment	1995	350	525	655	566	716
Daud bin Omar Kg. Kolam Tembesu	Agriculture Equipment	1995	350	525	712	500	683
Deris b. Yunus Kg. Tok Din	Agriculture Equipment	1996	0	290	537	376	483
Abdullah b. Salamat Kg. Binjai	Agriculture Equipment	1996	200	316	450	384	467
Yusuf bin Kundur Kg. Tebing Tinggi	Agriculture Equipment	1996	0	550	250	293	550

Name	Type of Subsidy	Year Given	Average Income Per Month (RM)				
			Before Project	1997	1998	1999	2000
Ibrahim Ismail Kg. Gong Ketereh, P. Puteh	Agriculture Equipment	1997	300	–	–	310	–
Nor b. Mat Sin Kg. Binjai, P. Puteh	Agriculture Equipment	(1997)	300		655	310	–
Mat Salleh b. Daud Kg. Kedai Menanti Pasir Puteh	Agriculture Equipment		250		–	600	625
Muhammad b. Ali Semerak P. Puteh	Agriculture Equipment		300		–	170	–
Muhammad bin Ali Semerak P. Puteh	Agriculture Equipment		300		–	170	–
Mat Jusoh b. Bebakar Kg. Telipot, P. Puteh	Agriculture Equipment		200		–	303	290
Tuan Soh b. Tuan Kec Kg. Telipot, Pasir Puteh	Fisheries Equipment		200			303	290
Ab. Rahman b. Said Kg. Binjai, Pasir Puteh	Cement Mixer		300			600	600
A. Razak b. Harom Kg. Panchor, Semerak	3-cycle for small business		150			600	–
Ismail b. Omar Kg. Kolam Tembesu, Bukit Jawa, P. Puteh	Carpenters Equipment		250			616	583
Mat Daud @ Daud bin Awang Kg. Tasik Jawa, P. Puteh	Carpenters equipment		250			600	600
Mohammad bin Said Kg. Tok Kandis Wakaf Lundang	Cattle		75			400	300

– = not available.

21. The Project Completion Review Mission visited a formerly poor family of a brick maker who received a cement mixer from DID in 1997. The cement mixer resulted in increased quantity as well as increased quality of bricks produced, and hence a substantial increase in household income. The increased income was used to expand their family home for the nine family members. The increased income was also used for the education of the children. The eldest children are attending university in Perlis State.

D. Farmers' Organizations

22. Participation in farmers' organizations increased in the project area. All three farmers' organizations have expanded their activities both in terms of number and size (Tables A11.6 and A11.7). Total membership increased from 6,280 (98.3%) in 1989 to 8,305 (129.9%) in 1999. The share capital of the membership also increased from RM105,267 to RM683,137 during the same period. The expansion of their activities is due partly to the increased land availability for production brought about by the flood mitigation system of the Project. Apart from provision of credit, inputs, marketing, and other farming activities, the farmers' organizations also provide other social services such as education funds and training of youth in the Project area.

Table A11.6: Membership and Share Capital of Farmers' Organizations

Farmers' Organization	No. of Families	Membership Year		% Membership Year		Share Capital (RM) Year		Share Capital/Member (RM) Year	
		1989	1999	1989	1999	1989	1999	1989	1999
PPK Tiga Daerah	2,701	2,908	3,907	107.7	144.7	53,259	427,140	18.3	109.3
PPK Bukit Awang	1,605	2,003	2,375	124.8	148.0	38,782	175,296	19.4	73.8
PPK Semerak	2,085	1,369	2,023	65.7	97.0	13,226	80,701	9.7	39.9
Total/Average	6,319	6,280	8,305	98.3	129.9	105,267	683,137	16.8	82.3

Table A11.7: Credit Service to Farmers in 1999

Farmers' Organization	No. of Farmers	Amount (RM)
PPK Tiga Daerah	1,540	990,684
PPK Bukit Awang	780	2,735,884
PPK Semerak	471	74,598
Total	2,791	3,801,166