

**Table 1.7 Projected Paddy Demand in the Year 2015**

	Year	1994	2015	Remarks
<b>Population (Million)</b>		<b>71.46</b>	<b>107.17</b>	*1
	Study Area	11.02	18.32	
	Mekong Delta	15.85	65.14	
	Rest Area	44.59	23.71	
<b>Paddy Requirement (Mil. ton)</b>		<b>22.44</b>	<b>33.54</b>	*2
	Study Area	3.00	5.22	
	Mekong Delta	4.31	18.56	
	Rest Area	12.13	6.76	
	Export	3.00	3.00	

**Remarks**

\*1 : Refer to Chapter 3 of Progress Report (3)

\*2 : Projected paddy consumption per capita, as shown below

	1994	2015
Rice consumption per capita (kg/year)	145	160
Paddy consumption per capita (kg/year)	223	246
Paddy - farm loss and seed (kg/year)	38	27
Reserve (assuming 5% of consumption)	11	12
<b>Total (kg/year)</b>	<b>272</b>	<b>285</b>

**Table 1.8 Projected Paddy Production in the Year 2015**

	Year	1994	2015	Remarks
<b>Cropping Area in Whole Country</b>		<b>6.60</b>	<b>7.40</b>	(Mil. ha)
	Mekong Delta	3.00	3.40	*1
	Study Area	0.64	0.79	*2
	Red River Delta	1.03	1.12	*3
	Rest Area	1.93	2.09	*3
<b>Paddy Production</b>		<b>23.50</b>	<b>31.46</b>	(Mil. ton)
	Mekong Delta	12.10	15.20	*1
	Study Area	1.84	2.86	*2
	Red River Delta	4.10	5.04	*4
	Rest Area	5.46	8.36	*4

**Remarks**

\*1 : Source : Master Plan for the Mekong Delta in Viet Nam, October 1993

\*2 : Incremental cropping area and production in the Study Area from the year 1994 to 2015 (Except Long An Delta), as shown below (Ref. Table 2.67)

	Cropping Area (ha)	Production (Mil. ton)
Master Plan Projects	104,500	0.68
Rural Agricultural Development Project (RADP)	49,300	0.34
<b>Total</b>	<b>153,800</b>	<b>1.02</b>

\*3 : Annual increase in cropping area at a rate of 0.4%, referred to "Agriculture of Viet Nam 1945-1995, Dr. Nguyen Sinh Cuc, 1995)

\*4 : Projected paddy yields in the year 2015

	Red River Delta	Rest Area
	4.5ton/ha	4.0ton/ha

Table 1.9 Projected Regional Balance of Paddy in the Year 2015 in the Study Area and Mekong Delta

Region	Population ('000)		Paddy Demand ('000 ton) (*2)		Paddy Production ('000 ton)		Balance ('000 ton)	
	1994	2015	1994	2015	1994	2015 (*3)	1994	2015
Study Area (*1)	12,199.1	18,669.2	3,452	5,563	1,541	2,561	-1,911	-3,002
South Central Coast	1,341.5	2,048.9	380	611	315	759	-65	+148
Central Highland	1,979.6	3,001.9	560	895	298	339	-262	-556
N - E Southland	8,878.0	13,618.4	2,512	4,058	928	1,463	-1,584	-2,595
Mekong Delta	15,850.6	23,712.1	4,486	7,066	12,121	15,200	+7,635	+8,134
Total	28,049.7	42,381.3	7,938	12,630	13,662	17,761	+5,724	+5,131

Remarks

(\*1) : excluding Long An Delta

(\*2) : Refer to Table 2.3.7 on projected paddy demand

(\*3) : Projected incremental production in the Study Area from the year 1994 to 2015 (except Long An Delta), as shown below.

Region	Master Plan Projects	IRD P	Total
South Central Coast	362	82	444
Central Highland	0	41	41
N - E Southland	320	215	535
Total	682	338	1,020

Unit: '000 ton

Table 1.10 Crop Budget, Winter-spring Paddy

Name of crop: winter - spring paddy, in case of 4.5 ton/ha yield.

	Material			Labour			Total
	Qty(kg) (/ha)	Price (d/kg)	Value (1000d)	day/ha	Unit rate (d/day)	Value (1000d)	Value(1000d) (/ha)
<b>I. Production Cost</b>							
1) Land preparation							
-Plowing							366.6
-Puddling				8.0	5500.0	44.0	44.0
2) Field drainage making				2.0	5500.0	11.0	11.0
3) Sowing							
-Seed treatment				3.0	7333.3	22.0	22.0
-Sowing	230.0	1906.5	438.5	1.0	5500.0	5.5	444.0
4) Fertilizing							
-Urea	250.0	2840.0	710.0	3.0	5500.0	16.5	726.5
-Super phosphate	150.0	800.0	120.0	1.0	5500.0	5.5	125.5
-Kcl	100.0	1840.0	184.0	1.0	5500.0	5.5	189.5
5) Weeding				18.0	5500.0	99.0	99.0
6) Spraying of agrochemical							
-Insecticide	6.0	26397.4	158.4	3.0	7333.3	22.0	180.4
-Herbicide	1.0	43995.6	44.0	1.0	7333.3	7.3	51.3
7) Irrigation			422.4	6.0	5500.0	33.0	455.4
8) Harvesting							
-Reaping				15.0	5500.0	82.5	82.5
-Threshing				6.0	5500.0	33.0	33.0
-Drying				5.0	9166.7	45.8	45.8
-Hauling				2.0	9166.7	18.3	18.3
9) Miscellaneous				8.0	5500.0	44.0	44.0
<b>2. Other Costs</b>							
1) Interests			237.6				237.6
2) Administration costs						146.7	146.7
<b>Total</b>				83.0			3323.1
<b>3. Gross Income</b>		Unit yield (ton/ha)		Unit Price(1000 d/ton)			
			4.5		1282.0		5769.0
<b>4. Net Income=</b>	42 % of the gross income.						2445.9

Source: based on data of Sub-NIAPP, Ho Chi Minh City, updated

**Table 1.11 Crop Budget, Summer-autumn Paddy**

Name of crop: summer - autumn paddy, in case of unit yield of 3.5ton/ha.

	Material			Labour			Total Value(1000d) (/ha)
	Qty(kg) (/ha)	Price (d/kg)	Value (1000d)	(day/ha)	Unit rate (d/day)	Value (1000d)	
<b>1. Production Cost</b>							
1) Land preparation							
-Plowing							322.1
-Puddling				6.0	5500	33.0	33.0
2) Field drainage making				2.0	5500	11.0	11.0
3) Sowing							
-Seed treatment				3.0	7333	22.0	22.0
-Sowing	220.0	1906.5	419.4	1.0	5500	5.5	424.9
4) Fertilizing						0.0	
-Urea	200.0	2840.0	568.0	2.0	5500	11.0	579.0
-Super phosphate	100.0	800.0	80.0	1.0	5500	5.5	85.5
-Kcl	100.0	1840.0	184.0	1.0	5500	5.5	189.5
5) Weeding				14.0	5500	77.0	77.0
6) Spraying of agrochemical							
-Insecticide	5.0	26397.4	132.0	2.0	7333	14.7	146.7
-Herbicide	2.0	43995.6	88.0	1.0	7333	7.3	95.3
7) Irrigation			228.4				228.4
8) Harvesting							
-Reaping				14.0	5500	77.0	77.0
-Threshing				5.0	5500	27.5	27.5
-Drying				6.0	9167	55.0	90.0
-Hauling				2.0	9167	18.3	18.3
9) Miscellaneous				8.0	5500	44.0	44.0
<b>2. Others</b>							
1) Interests			158.1				158.1
2) Administration costs						146.7	146.7
<b>Total</b>				68.0			2776.0
<b>3. Gross Income</b>	Unit yield (ton/ha)		Unit Price( 1000d/ton)		Gross Income		
	3.5		1282		4487		
<b>4. Net Income =</b>	38 % of the gross income					1711.0	

Source: Based on data of Sub-NIAPP, Ho Chi Minh city, updated

**Table 1.12 Crop Budget, Wet Season Paddy**

Name of crop: wet season paddy, in case of 2.8ton/ha yield.

	Material			Labour			Total
	Qty(kg) (/ha)	Price (d/kg)	Value (1000d)	Unit rate (day/ha)	Value (d/day)	Value(1000d)	Value(1000d) (/ha)
<b>1. Production Cost</b>							
1) Land preparation							
-Plowing							264.0
-Puddling				4.0	5,500.0	22.0	22.0
2) Field drainage making				2.0	5,500.0	11.0	11.0
3) Sowing						0.0	
-Seed treatment				2.0	7,333.3	14.7	14.7
-Sowing	90.0	1,906.5	171.6	14.0	5,500.0	77.0	248.6
4) Fertilizing							
-Urea	150.0	2,840.0	426.0	2.0	5,500.0	11.0	437.0
-Super phosphate	100.0	800.0	80.0	1.0	5,500.0	5.5	85.5
-Kcl	50.0	1,840.0	92.0	1.0	5,500.0	5.5	97.5
5) Weeding				8.0	5,500.0	44.0	44.0
6) Spraying of agrochemical	2.0	26,397.4	52.8	1.5	7,333.3	11.0	63.8
7) Irrigating			70.4			26.4	96.8
8) Harvesting							
-Reaping				10.0	5,500.0	55.0	55.0
-Threshing				4.0	5,500.0	22.0	22.0
-Drying				4.0	9,166.7	36.7	36.7
-Hauling				2.0	9,166.7	18.3	18.3
9) Miscellaneous				5.0	5,500.0	27.5	27.5
<b>2. Others</b>							
1) Interests			88.0				88.0
2) Administration costs						146.7	146.7
<b>Total</b>				<b>60.5</b>			<b>1,779.0</b>
<b>3. Gross Income</b>		<b>Unit yield (ton/ha)</b>		<b>Unit Price(1000d/ton)</b>			<b>Gross Income</b>
		2.8		1282			3,589.6
<b>4. Net Income=</b>		<b>50 % of the gross income.</b>					<b>1,810.6</b>

Source: based of data of Sub-NIAPP, Ho Chi Minh city, updated

**Table 1.13 Crop Budget, Plant Cane**

Name of crop: plant cane, in case of 57 ton/ha yield.

	Materials			Labor			Total
	Qty kg, piece/ha	Price x 1000 dong/ kg	Value x1000 dong	Qty day/ha	Price x 1000 dong/ kg	Value x1000 dong	Value x1000 dong/ha
<b>1. PRODUCTION COST</b>							
1) Land preparation							
-hoeing				60	8.25	495	495
-harrowing				40	8.25	330	330
-ridging				16	8.25	132	132
2) Planting	20000	0.0733	1466.5	24	5.5	132	1598.5
3) Replanting				3	5.5	16.5	16.5
4) Unsheathing				15	5.5	82.5	82.5
5) Fertilizing				30	5.5	165	165
-Urea	300	2.84	852				852
-Super phosphate	280	0.8	224				224
-Kcl	100	1.84	184				184
-Lime	500	0.22	110				110
6) Earthing				8	5.5	44	44
7) Weeding				50	5.5	275	275
8) Spraying of agrochemical							
-ash for seed cane	2	126.12	252.24				252.24
-insecticide	20	21.998	439.96				439.96
9) Irrigation			101.19				101.19
10) Harvesting						1509.1	1509.1
11) Clearing fields				5	5.5	27.5	27.5
<b>2. OTHER COSTS</b>							
1) Interests							593.94
2) Administration costs				8	5.5	44	44
<b>Total</b>				259			7476.4
<b>3. GROSS INCOME</b>	Unit yield (ton/ha)		Unit Price( x 1000 dong)				
	57		238				13566
<b>4. NET INCOME=</b>	45 % of the gross income.						6089.6

Source: based of data of Sub-NIAPP, Ho Chi Minh city, updated.

Table 1.14 Crop Budget, 1st Ratoon Cane

Name of crop: 1st ratoon cane, in case of 50 ton/ha yield.

	Materials			Labor			Total
	Qty kg, piece/ha	Price x 1000 dong/ kg	Value x1000 dong/ha	Qty day/ha	Price x 1000 dong/ kg	Value x1000 dong	Value x1000 dong/ha
<b>1. PRODUCTION COST</b>							
1) Pruing roots				16	5.5	88	88
2) Sub-soiling				40	8.25	330	330
3) Replanting				5	5.5	27.5	27.5
4) Fertilizing				12	5.5	66	66
-Urea	400	2.84	1136				1136
-Super phosphate	200	0.8	160				160
-Kcl	100	1.84	184				184
-Lime	200	0.22	43.996				43.996
5) Weeding				60	5.5	330	330
6) Spraying of agrochemical							
-ash for seed cane							
-insecticide	20	21.998	439.96				439.96
7) Irrigation			101.19				101.19
8) Harvesting							1755.4
9) Clearing fields				7	5.5	38.5	38.5
<b>2. OTHER COSTS</b>							
1) Interests							573.41
2) Administration costs				8	5.5	44	44
Total				148			5318
<b>3. GROSS INCOME</b>							
	Unit yield (ton/ha)			Unit Price( x 1000 dong)			
	50			238			11900
<b>4. NET INCOME=</b>							
	55 % of the gross income.						6582

Source: based of data of Sub-NIAPP, Ho Chi Minh city, updated.

Table 1.15 Crop Budget, 2nd Ratoon Cane

Name of crop: 2nd ratoon cane, in case of 49 ton/ha yield.

	Materials			Labor			Total
	Qty kg/ha	Price x 1000 dong/ kg	Value x1000 dong	Qty day/ha	Price x 1000 dong/ kg	Value x1000 dong	Value x1000 dong/ha
<b>1. PRODUCTION COST</b>							
1)Pruning roots				16	5.5	88	88
2)Sub-soiling				40	8.25	330	330
3)Replanting				8	5.5	44	44
4)Fertilizing				11	5.5	60.5	60.5
-Urea	380	2.84	1079.2				1079.2
-Super phosphate	200	0.8	160				160
-Kcl	100	1.84	184				184
-Lime	200	0.22	44				44
5)Weeding				70	5.5	385	385
6)Spraying of agrochemical							
-insecticide	20	21.998	439.96				439.96
7)Irrigation			101.19				101.19
8)Harvesting							1050
9 )Clearing fields				10	5.5	55	55
<b>2. OTHER COSTS</b>							
1)Interests							558.74
2)Administration costs				8	5.5	44	44
<b>Total</b>				<b>163</b>			<b>4623.6</b>
<b>3. GROSS INCOME</b>	Unit yield (ton/ha)		Unit Price( x 1000 dong)				
	49		238				11662
<b>4. NET INCOME=</b>	60 % of the gross income.						7038.4

Source:Sub-NIAPP, Ho Chi Minh city, 1994



**Table 1.16 Crop Budget, Cotton**

Name of crop: cotton, in case of 1.4 ton/ha yield.

	Material			Labour			Total
	Qty(kg) (/ha)	Price (d/kg)	Value (1000d)	(day/ha)	Unit rate (d/day)	Value (1000d)	Value(1000d) /ha
<b>1. Production Cost</b>							
1) Land preparation							359.3
2) Field drainage making				3.0	5500.0	16.5	16.5
3) Sowing							0.0
-Seed treatment				2.0	7333.3	14.7	14.7
-Sowing	25.0	5866.1	146.7	4.0	5500.0	22.0	168.7
4) Fertilizing							0.0
-Urea	150.0	2840.0	426.0	2.0	5500.0	11.0	437.0
-Super phosphate	100.0	800.0	80.0	1.0	5500.0	5.5	85.5
5) Earthing				5.0	5500.0	27.5	27.5
6) Weeding				12.0	5500.0	66.0	66.0
7) Spraying of agrochemical							0.0
-Powder	30.0	13198.7	396.0	3.0	7333.3	22.0	418.0
-Liquid	2.0	26397.4	52.8	2.0	7333.3	14.7	67.5
8) Irrigation			52.8	1.0	5500.0	5.5	58.3
9) Harvesting							0.0
-Harvesting				16.0	5500.0	88.0	88.0
-Drying				5.0	9166.7	45.8	45.8
-Hauling				3.0	9166.7	27.5	27.5
10) Miscellaneous				8.0	5500.0	44.0	44.0
<b>2. Others</b>							
1) Interests			118.8				118.8
2) Administration costs						146.7	146.7
<b>Total</b>				<b>67.0</b>			<b>2189.6</b>
<b>3. Gross Income</b>	Unit yield (ton/ha)		Unit Price(1000d)		Gross Income		
	1.4		12053		16874.2		
<b>4. Net Income=</b>	87 % of the gross income.						<b>14684.6</b>

Source: based on data of Sub-NIAPP, Ho Chi Minh city, updated

Table 1.17 Crop Budget, Groundnuts

Name of crop: groundnuts, in case of the unit yield of 1.75 ton/ha in shelled form.

	Material			Labour		Total Value(1000d)
	Qty(kg) (/ha)	Price (d/kg)	Value (1000d)	(day/ha)	Unit rate (d/day)	
<b>1. Production Cost</b>						
1) Land preparation						692.2
2) Seed bed preparation				6.0	5500.0	33.0
3) Seeding						0.0
- Seed preparation (shelling)				5.0	7333.3	36.7
- Sowing	200.0	4399.6	879.9	12.0	5500.0	66.0
4) Fertilizing			0.0			0.0
- Organic	5000.0	117.3	586.6	3.0	5500.0	16.5
- Urea	200.0	2840.0	568.0	2.0	5500.0	11.0
- Super phosphate	300.0	800.0	240.0	2.0	5500.0	11.0
- Kcl	100.0	1840.0	184.0	1.0	5500.0	5.5
- Ash	600.0	220.0	132.0	2.0	5500.0	11.0
5) Earthing				4.0	5500.0	22.0
6) Weeding				30.0	5500.0	165.0
7) Spraying of agrochemical						0.0
- flour	10.0	13198.7	132.0	2.0	7333.3	14.7
- liquid	6.0	26397.4	158.4	2.0	7333.3	14.7
8) Irrigation			422.4			105.6
9) Harvesting						
- Uprooting				10.0	5500.0	55.0
- Detaching				15.0	5500.0	82.5
- Drying				9.0	9166.7	82.5
- Shelling				60.0	5500.0	330.0
- Hauling				4.0	9166.7	36.7
10) Miscellaneous				8.0	5500.0	44.0
<b>2. Others</b>						
1) Interests			237.6			237.6
2) Administration costs						146.652
<b>Total</b>						<b>5522.9</b>
<b>3. Gross Income</b>	Unit yield in shelled form (ton/ha)			Unit Price (1000dong/ton)		
	1.75			8172		14301
<b>4. Net Income =</b>	61 % of the gross income					8778.1

Source: Based of data of Sub-NIAPP, Ho Chi Minh city, updated

**Table 1.18 Crop Budget, Maize**

Name of crop: maize, in case of 5.5 ton/ha yield.

	Material			Labour			Total
	Qty(kg) (/ha)	Price (d/kg)	Value (1000d)	(day/ha)	Unit rate (d/day)	Value (1000d)	Value(1000d) /ha
<b>I. Production Cost</b>							
1) Land preparation							492.8
2) Nursery preparation				4.0	5500.0	22.0	22.0
3) Sowing							
-Seed treatment				2.0	5500.0	11.0	11.0
-Sowing	15.0	55727.8	835.9	6.0	5500.0	33.0	868.9
5) Fertilizing							
-Urea	200.0	2840.0	568.0	3.0	5500.0	16.5	584.5
-Super phosphate	200.0	800.0	160.0	2.0	5500.0	11.0	171.0
-Kcl	100.0	1840.0	184.0	1.0	5500.0	5.5	189.5
6) Earthing				6.0	5500.0	33.0	33.0
7) Weeding				10.0	5500.0	55.0	55.0
8) Spraying of agrochemical	15.0	13198.7	198.0	6.0	7333.3	44.0	242.0
9) Irrigating			70.4	1.0	5500.0	5.5	75.9
10) Harvesting							
-Picking				12.0	5500.0	66.0	66.0
-Packing				8.0	9166.7	73.3	73.3
-Clearing plants				10.0	5500.0	55.0	55.0
-Hauling				6.0	9166.7	55.0	55.0
11) Miscellaneous				9.0	5500.0	49.5	49.5
<b>2. Others</b>							
1) Interests			118.8				118.8
2) Administration costs						146.7	146.7
<b>Total</b>				86.0			3309.8
<b>3. Gross Income</b>	Unit yield (ton/ha)		Unit Price(1000d/ton)		Gross Income		
	5.5		1882		10351		
<b>4. Net Income=</b>	68 % of the gross income.						7041.2

Source: based on data of Sub-NAAPP, Ho Chi Minh city, updated

**Table 2.1 Provincial Operation and Maintenance Organization for Water Resources (Irrigation)**

**(1) Provincial Water Resources Department and Staff**

Province	Type of Department		Staff Number			Consulting Company (*)		
	Type "W"	Type "A&W"	Engineer	Other	Total	Engineer	Other	Total
Lam Dong			7	0	7	20	20	40
Dac Lac			17	8	25	30	80	110
Ninh Thuan			11	4	15	3	70	73
Binh Thuan			13	10	23	20	30	50
Song Be			6	4	10	-	-	-
Dong Nai			8	8	16	-	-	-
Ba Ria - Vung Tau			0	2	2	-	-	-
Tay Ninh			12	20	32	-	-	-
HCMC			13	2	15	-	-	-
Long An			15	15	30	-	-	-

Type "W": Department of Water Resources

Type "A&W": Department of Agriculture, Forestry and Water Resources

(\*): Consulting Company belonging to Provincial People's Committee covering water resources and other sectors. The staff number given above are those in charge of water resources.

**(2) Provincial Water Resources Related Company and Staff**

Province	Management Company			Construction Company			Survey and Design Company		
	Engineer	Other Staff	Total	Engineer	Other Staff	Total	Engineer	Other Staff	Total
Lam Dong (*1)	7	49	56	9	171	180	-	-	-
Dac Lac	30	5	35	60	290	350	-	-	-
Ninh Thuan	17	50	67	30	125	155	-	-	-
Binh Thuan	6	10	16	20	200	220	-	-	-
Song Be (*2)	15	33	48	11	51	62	-	-	-
Dong Nai	16	73	89	12	80	92	16	62	78
Ba Ria-Vung Tau (*3)	7	32	39	-	-	-	-	-	-
Tay Ninh	15	50	65	6	16	22	7	25	32
HCMC (*4)	35	85	120	14	11	25	30	45	75
Long An	20	130	150	20	280	300	8	26	34

(\*1): Two (2) Construction Companies

(\*2): including 7-Engineer and 2-Other Staff of "Construction Management Board"

(\*3): including 2-Engineers and 6-Other Staff of "Irrigation Project Management Board"

(\*4): Water Resources Company, having two Divisions of "Construction" and "Survey and Design"

**(3) District Water Resources Management Company and Staff**

Province	Nos. of District (*)	Nos. of Company	Management Company		
			Engineer	Other Staff	Total
Lam Dong	10	7	8	41	49
Dac Lac	17	15	30	75	105
Ninh Thuan	4	4	2	20	22
Binh Thuan	9	7	11	180	191
Song Be	9	5	2	29	31
Dong Nai	8	4	4	32	36
Ba Ria - Vung Tau	5	4	2	36	38
Tay Ninh	9	5	10	75	85
HCMC	18	3	21	75	96
Long An	14	8	16	112	128

(\*) : including City and Town

**Table 2.2 Objectives and Items of Irrigation Planning Study**

Code	Schemes Classification		Study Objectives	Study Items	Name of Schemes		
	Main	Sub					
A	Existing Irrigation Schemes	A.1 Large and Medium Irrigation Schemes (Area larger than 1,000 ha)	<ul style="list-style-type: none"> <li>- Formulate rehabilitation and improvement plans</li> <li>- Estimate scheme water requirements</li> </ul>	<ul style="list-style-type: none"> <li>- Identify and plot schemes location</li> <li>- Confirm present conditions</li> <li>- Plan rehabilitation and improvement works</li> <li>- Estimate scheme water requirement</li> <li>- Estimate costs and evaluate project viability</li> <li>- Prepare implementation plan and TOR for further study</li> </ul>	(A.1) Vo Xu, Phan Rang, Song Pha, Dai Don, Quan Hiep/Tuyen Lam and Phuoc Chi (6 schemes)		
		A.2 Small Irrigation Schemes (Area larger than 100 ha and less than 2,000 ha)			(A.2) 161 schemes in total		
		A.3 Extension or Proposed Small Irrigation Schemes			(A.3) 65 schemes in total		
B	On-going and Planned Irrigation Schemes		<ul style="list-style-type: none"> <li>- Confirm and evaluate development plans</li> <li>- Estimate scheme water requirements</li> </ul>	<ul style="list-style-type: none"> <li>- Confirm present status of project implementation and project formulation</li> <li>- Evaluate project formulation</li> <li>- Re-formulate project development plan, if any</li> <li>- Confirm or re-estimate scheme water requirement</li> </ul>	Dau Tieng, Phuoc Hoa, Hoc Mon - Bac Binh Chan and Song Quao irrigation schemes		
C	Potential Irrigation Schemes	C.1 Potential Schemes in HCMC - Long An Delta (Deltatic and saline water affected area)	<ul style="list-style-type: none"> <li>- Confirm and evaluate present and proposed development plans</li> <li>- Formulate irrigation development plan towards the year 2015</li> <li>- Estimate requirement of fresh water</li> </ul>	<ul style="list-style-type: none"> <li>- Delineate present agricultural and fishery lands</li> <li>- Confirm present status of development plans and future land use</li> <li>- Confirm development progress and further development plans</li> <li>- Estimate fresh water requirement</li> <li>- Confirm water distribution networks</li> <li>- Assessment of benefit by supplying fresh water</li> </ul>	(C.1) HCMC Long An Province : Duc Hoa, Duc Hoe, Ben Luc, Gan Giouc, Can Duoc, Tran Tru, Thu Thua, Thanh Hoa and Moc Hoa (9 Int. Blocks)		
		C.2 Potential Schemes in East Coast expecting water resources diverted from Dong Nai river basin			<ul style="list-style-type: none"> <li>- Formulate irrigation development plan towards the year 2015</li> <li>- Estimate scheme water requirements</li> </ul>	<ul style="list-style-type: none"> <li>- Delineate potential irrigated agricultural development area</li> <li>- Formulate agricultural development plan and cropping plan</li> <li>- Estimate water requirements</li> </ul>	(C.2) Phan Ri Plain, Phan Thiet Plain and Ham Tan Plain (3 schemes)
		C.3 Potential Schemes in La Nga River and Other Basins				<ul style="list-style-type: none"> <li>- Estimate water resources potential available in own basin</li> <li>- Estimate required additional water amount diverted from other river basins</li> <li>- Make water balance calculation</li> <li>- Decide optimal scale of irrigated agricultural development schemes</li> <li>- Prepare preliminary plan of project facilities</li> <li>- Estimate implementation costs</li> <li>- Estimate project benefits and assess project viability</li> <li>- Prepare implementation plan and TOR for further study</li> </ul>	(C.3) Ta Pao and Vo Dat in La Nga River basin Phan Rang Plain, Tuy Phong Plain, Song Phan Plain, Song Ray and Song Dinh Plain (7 schemes)

**Table 2.3 Meteorological Data for Calculation of Water Requirements**

**1. Mean Temperature (°C)**

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1. Phan Rang (*)	24.6	25.3	26.9	28.2	28.9	28.8	28.6	28.6	27.2	26.4	25.9	24.8
2. Lien Khuong	19.5	20.5	21.6	22.7	22.8	22.1	21.7	21.7	21.4	21.0	20.3	19.4
3. Di Linh	15.8	16.7	18.0	18.9	19.4	19.0	18.7	18.5	18.4	18.0	17.2	15.9
4. Bao Loc	20.1	20.9	22.2	23.0	23.2	22.7	22.2	22.0	22.0	21.8	21.1	19.9
5. Phan Thiet	25.1	25.3	26.6	28.4	28.8	27.8	27.2	27.1	26.9	27.1	26.4	25.1
6. Xuan Loc	24.9	25.7	26.7	28.1	27.8	25.9	25.6	25.5	25.6	25.1	24.7	24.4
7. Vung Tau	25.6	25.8	27.0	28.7	28.9	28.1	27.7	27.5	27.1	27.2	26.6	25.6
8. Tan Son Hoa	26.2	26.8	28.1	29.3	29.1	27.8	27.4	27.3	27.1	27.0	26.5	25.9
9. Bien Hoa	23.5	26.6	28.1	29.0	28.6	27.3	26.9	26.7	26.7	26.3	25.9	25.0

Source (\*) Feasibility study on rehabilitation and improvement of the Phan Rang Irrigation Project, measured at Nha Ho Research Center

**2. Mean Relative Humidity (%)**

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1. Phan Rang (*)	71.0	71.0	72.0	74.0	76.0	76.0	75.0	75.0	82.0	84.0	79.0	73.0
2. Lien Khuong	72.8	70.4	70.2	75.9	82.2	86.5	87.2	87.5	88.5	88.7	82.9	76.4
3. Di Linh	80.5	77.4	78.5	84.1	87.6	89.7	90.0	91.2	90.5	89.2	85.8	82.7
4. Bao Loc	79.1	77.4	79.1	83.2	85.9	90.3	90.6	92.3	89.8	89.6	87.0	83.4
5. Phan Thiet	74.3	75.2	76.2	76.5	79.0	81.5	83.0	83.5	85.3	83.3	78.8	74.8
6. Xuan Loc	74.0	73.0	72.5	74.0	81.0	87.5	88.5	89.0	89.5	88.5	84.0	78.5
7. Vung Tau	76.0	76.5	76.0	75.3	77.7	80.7	81.7	82.5	84.5	83.5	80.3	76.8
8. Tan Son Hoa	71.5	69.8	70.3	71.6	76.3	81.8	82.7	83.2	84.3	83.7	80.1	74.3
9. Bien Hoa	72.7	69.2	69.3	71.3	78.3	83.5	85.5	85.0	85.7	85.8	83.0	78.0

Source (\*) Feasibility study on rehabilitation and improvement of the Phan Rang Irrigation Project, measured at Nha Ho Research Center

**3. Maximum Humidity (%)**

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1. Phan Rang (*)	85.5	85.6	85.0	88.1	92.0	89.0	85.4	86.3	92.6	97.1	94.7	88.9
2. Lien Khuong	95.0	94.2	95.7	97.5	97.5	98.5	99.0	99.0	99.2	98.8	98.2	98.7
3. Di Linh (*)	96.7	98.6	98.1	99.8	98.6	97.8	98.0	97.6	99.7	98.4	97.4	97.7
4. Bao Loc	98.7	98.6	98.6	98.7	98.6	98.5	98.7	98.8	98.9	98.8	98.8	98.5
5. Phan Thiet	91.2	91.3	93.0	90.7	94.7	95.3	95.0	95.8	95.5	96.5	95.0	91.8
6. Xuan Loc	97.5	97.5	97.5	98.0	98.5	98.5	98.5	99.0	98.5	99.5	98.5	98.5
7. Vung Tau	92.0	91.5	88.8	90.0	95.0	94.7	94.8	95.2	95.0	96.3	95.7	92.8
8. Tan Son Hoa	94.5	94.5	91.5	91.2	93.2	96.5	95.8	97.2	97.8	97.0	96.8	96.0
9. Bien Hoa (*)	94.5	94.5	91.5	91.2	94.2	96.5	95.8	97.2	97.8	97.0	96.8	96.0

Source (\*) Estimated from records of Phan Thiet and Vung Tau  
 (\*) Estimated from records of Bao Loc  
 (\*) Estimated from records of Tan Son Hoa

**4. Sunshine Hour (Hours)**

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1. Phan Rang (*)	8.0	9.5	10.1	9.0	8.2	6.6	7.5	6.8	6.5	5.9	6.3	7.5
2. Lien Khuong	8.9	9.5	8.8	8.5	6.9	5.9	5.8	5.4	5.4	5.5	6.4	9.0
3. Di Linh (*)	8.9	8.2	8.2	7.3	6.3	5.3	5.2	4.6	4.6	4.1	5.8	8.2
4. Bao Loc	7.1	7.4	7.1	6.9	5.9	5.0	4.7	3.8	4.1	4.5	5.2	6.7
5. Phan Thiet	9.4	9.7	9.8	9.8	8.1	7.2	7.3	6.7	6.5	6.7	7.3	8.8
6. Xuan Loc	8.9	9.0	9.4	8.9	7.3	4.9	5.7	4.8	5.2	6.0	7.0	7.9
7. Vung Tau	9.2	9.6	9.8	9.8	7.6	6.9	6.7	6.3	6.3	6.7	7.2	8.5
8. Tan Son Hoa	8.6	9.3	9.2	9.0	6.9	6.1	6.3	5.7	5.4	5.6	6.5	7.8
9. Bien Hoa (*)	8.8	9.2	9.3	9.0	7.1	5.5	6.0	5.3	5.3	5.8	6.8	7.9

Source (\*) Feasibility study on rehabilitation and improvement of the Phan Rang Irrigation Project, measured at Nha Ho Research Center  
 (\*) Estimated from records of Bao Loc  
 (\*) Estimated values

**5. Wind Velocity (km/day)**

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1. Phan Rang (*)	215	216	172.8	172.8	172.8	172.8	302.4	302.4	172.8	216	216	216
2. Lien Khuong	233.28	224.64	224.64	155.52	120.96	164.16	138.24	164.16	112.32	112.32	155.52	190.08
3. Di Linh	181.44	129.6	112.32	103.68	138.24	241.92	224.64	293.76	146.88	146.88	267.84	276.48
4. Bao Loc	112.32	95.04	103.68	95.04	103.68	155.52	146.88	181.44	103.68	86.4	95.04	112.32
5. Phan Thiet	328.32	328.32	319.68	302.4	216	224.64	224.64	259.2	190.08	198.72	267.84	276.48
6. Xuan Loc	103.68	172.8	164.16	155.52	86.4	146.88	112.32	172.8	95.04	86.4	77.76	77.76
7. Vung Tau	267.84	328.32	362.88	328.32	207.36	207.36	216	216	146.88	138.24	164.16	164.16
8. Tan Son Hoa	198.72	250.56	293.76	267.84	233.28	216	216	216	198.72	146.88	164.16	172.8
9. Bien Hoa	156	181	216	242	173	147	156	173	147	147	147	156

Source (\*) Feasibility study on rehabilitation and improvement of the Phan Rang Irrigation Project, measured at Nha Ho Research Center (to be verified)

**6. Evaporation (mm/month)**

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1. Phan Rang (*)	154.6	152.1	184.5	166.4	158.5	146.6	164.4	177.6	103.7	77.1	90.0	
2. Lien Khuong	142.0	136.7	154.3	116.1	88.9	69.5	65.6	72.4	46.7	47.5	70.6	107.9
3. Di Linh	100.7	107.7	111.8	82.9	63.3	57.2	48.7	46.0	42.9	50.7	74.2	92.4
4. Bao Loc	76.3	78.8	85.6	65.1	51.4	39.7	38.5	34.1	33.2	34.9	44.3	62.3
5. Phan Thiet	146.2	132.3	146.6	143.6	131.1	112.1	104.8	100.2	83.7	92.4	115.2	144.5
6. Xuan Loc	133.1	141.0	167.5	152.4	113.3	67.4	65.4	67.2	58.9	54.0	71.9	103.9
7. Vung Tau	137.9	134.5	152.1	160.3	123.6	101.2	96.4	89.7	71.2	81.7	89.2	114.2
8. Tan Son Hoa	136.6	143.2	168.6	155.5	127.8	94.2	95.0	96.9	80.9	78.3	91.9	114.8
9. Bien Hoa	140.2	169.8	215.9	180.1	128.5	88.1	82.8	91.4	77.0	71.3	75.8	102.5

Source (\*) Feasibility study on rehabilitation and improvement of the Phan Rang Irrigation Project, measured at Nha Ho Research Center (to be verified)

**Table 2.4 Wind Velocity Data**

<b>Phan Thiet</b>													
Year	Time	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1990	7:00	11	0.9	1.4	1.1	0.6	2.4	2.0	2.0	1.9	1.5	1.7	1.3
	13:00	7.0	5.9	6.7	6.5	4.5	4.6	4.8	4.8	3.3	4.4	4.7	6.0
	19:00	5.5	4.1	5.0	4.3	2.3	2.6	2.5	2.5	2.3	2.8	4.1	4.5
	1:00	1.0	2.1	2.5	1.4	1.5	1.6	1.2	1.2	2.2	1.0	2.0	1.9
1991	7:00	11	1.2	1.6	1.0	1.0	2.2	2.2	3.5	2.4	1.8	1.4	1.3
	13:00	7.0	6.7	5.5	6.1	4.9	4.6	3.8	5.8	4.0	4.1	4.8	7.0
	19:00	6.5	6.1	4.2	4.9	2.7	3.4	2.5	3.5	2.5	1.7	5.3	6.5
	1:00	2.7	2.4	4.5	3.2	1.7	2.9	2.4	3.6	2.7	1.2	2.0	2.3
1992	7:00	13	1.5	1.3	1.6	1.8	2.9	2.0	3.5	3.3	1.6	1.5	1.1
	13:00	8.2	6.4	6.6	6.7	5.8	5.2	3.9	5.3	4.4	4.2	6.8	7.3
	19:00	8.3	5.0	4.8	3.3	3.0	3.1	3.7	3.4	3.3	3.6	5.3	5.6
	1:00	2.7	3.0	2.6	1.1	0.7	2.9	2.5	3.2	2.3	1.7	1.7	1.2
1993	7:00	16	1.0	1.4	1.1	1.2	2.6	2.7	3.5	2.0	1.4	1.0	1.4
	13:00	8.2	7.8	7.3	5.6	4.4	4.5	4.6	5.2	4.1	4.5	5.1	4.9
	19:00	7.6	6.7	6.4	4.0	3.0	2.3	3.5	3.7	2.8	3.2	4.3	4.1
	1:00	2.4	2.1	3.3	1.7	1.5	2.4	2.7	3.3	1.7	1.1	1.0	2.6
1994	7:00	0.9	1.1	1.6	0.9	1.8	2.3	3.7	3.4	3.2	1.7	1.0	1.2
	13:00	7.0	6.5	7.8	6.1	5.7	5.1	5.9	5.2	4.6	4.0	7.3	6.2
	19:00	6.2	5.3	6.4	3.3	3.0	3.3	3.4	3.9	2.5	2.9	6.6	4.3
	1:00	1.8	1.8	2.9	1.2	1.8	2.5	3.8	3.3	3.2	1.4	1.7	1.1
Av.	Day	5.75	4.98	5.10	4.38	3.55	3.76	3.71	4.28	3.35	3.23	4.43	4.71
	Night	3.07	2.79	3.29	2.14	1.74	2.59	2.67	3.11	2.52	1.75	2.45	2.48
	Rate	1.87	1.79	1.55	2.05	2.04	1.45	1.39	1.38	1.33	1.85	1.83	1.90

<b>Bao Loc</b>													
Year	Time	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1990	7:00	0.1	0.3	0.1	0.2	0.3	1.2	0.8	4.2	0.8	0.2	0.4	0.4
	13:00	2.4	2.5	2.0	2.1	1.8	2.6	2.4	2.3	2.2	2.1	2.3	2.1
	19:00	0.5	1.5	0.9	0.9	0.6	0.9	0.6	3.8	0.4	0.2	0.5	0.5
	1:00	0.0	0.3	0.0	0.1	0.1	1.0	0.5	1.4	0.4	0.1	0.4	0.0
1991	7:00	0.3	0.3	0.3	0.3	0.0	1.0	1.0	1.4	0.7	0.0	0.8	0.5
	13:00	1.7	2.1	2.8	2.1	1.9	2.5	2.5	2.2	2.1	1.9	2.3	2.7
	19:00	2.5	0.8	0.7	0.6	0.1	1.0	1.0	1.2	0.7	0.1	0.5	0.6
	1:00	0.0	0.1	0.0	0.0	0.2	0.4	0.4	1.4	0.6	0.2	0.0	0.0
1992	7:00	0.2	0.3	0.4	1.2	1.8	2.2	2.2	2.0	2.1	1.8	1.6	0.9
	13:00	2.0	2.8	2.3	2.9	2.4	3.7	3.7	2.7	3.3	2.4	2.9	2.6
	19:00	0.6	0.3	1.0	1.4	2.0	2.4	2.4	1.9	2.1	2.0	2.0	2.0
	1:00	0.1	0.1	0.0	0.2	0.2	1.2	1.2	1.8	0.6	0.2	0.2	0.2
1993	7:00	0.5	1.0	0.7	0.6	0.5	1.0	1.0	2.3	1.1	0.5	0.2	1.1
	13:00	2.9	3.0	2.9	3.0	2.5	2.6	2.6	3.1	2.3	2.5	2.5	3.4
	19:00	1.9	2.0	2.0	2.1	1.1	2.2	2.2	1.7	0.8	1.1	1.4	2.1
	1:00	0.0	0.5	0.0	0.0	0.0	0.3	0.3	2.3	0.2	0.0	0.1	0.5
1994	7:00	0.3	0.2	0.8	0.4	0.4	1.0	1.0	1.4		0.4		
	13:00	1.9	2.7	2.8	2.9	2.3	2.9	2.9	2.7		2.3		
	19:00	1.4	1.4	1.8	0.9	1.0	1.2	1.2	1.0		1.0		
	1:00	0.0	0.1	0.1	0.0	0.2	0.3	0.3	1.0		0.2		
Av.	Day	1.505	1.715	1.715	1.73	1.43	2.135	2.08	2.345	1.7813	1.435	1.7125	1.8563
	Night	0.425	0.515	0.445	0.46	0.46	1.025	0.94	1.835	0.7688	0.435	0.55	0.5938
	Rate	3.54	3.33	3.85	3.76	3.22	2.08	2.21	1.28	2.32	3.41	3.11	3.13

<b>Tan Son Hoa</b>													
Year	Time	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1990	7:00	1.0	1.6	2.0	1.8	1.5	1.6	1.5	1.4	1.8	0.9	1.2	1.4
	13:00	2.4	3.7	3.1	3.1	2.6	3.5	3.9	4.0	3.2	2.8	3.0	2.7
	19:00	2.9	4.2	4.3	3.9	2.4	2.1	2.0	2.0	1.9	1.4	2.0	2.6
	1:00	1.7	2.6	3.0	2.6	1.8	1.6	1.6	1.6	1.4	0.5	1.0	1.2
1991	7:00	1.2	1.7	1.9	1.5	1.5	1.7	1.3	1.5	1.5	1.3	1.6	1.8
	13:00	2.5	2.9	3.2	2.9	2.4	2.9	2.5	3.2	3.3	2.8	2.7	2.8
	19:00	3.5	3.9	4.0	3.3	3.2	1.4	2.2	2.1	1.6	1.1	2.2	2.5
	1:00	2.1	2.1	2.1	1.9	1.0	1.4	0.9	1.8	0.9	0.4	1.0	1.5
1992	7:00	1.5	1.6	2.2	2.2	2.1	2.1	1.7	2.5	2.2	2.1	2.2	2.0
	13:00	2.6	2.9	3.7	3.6	3.0	3.9	3.2	4.0	3.7	3.5	2.8	2.5
	19:00	3.0	4.4	4.5	4.0	2.8	2.9	2.2	2.7	2.2	1.8	2.1	1.7
	1:00	1.5	2.5	2.9	2.2	1.6	1.8	1.1	2.1	1.6	1.7	1.6	0.7
1993	7:00	1.9	1.9	2.2	2.1	1.5	1.3	1.7	1.8	1.5	1.9	1.8	2.2
	13:00	2.8	3.0	3.1	3.0	3.3	3.1	3.4	3.8	3.6	2.7	2.6	2.4
	19:00	2.5	3.7	4.0	3.6	3.3	2.3	2.5	2.1	1.7	2.1	1.9	2.3
	1:00	1.3	1.5	1.5	2.3	1.5	0.7	1.4	1.3	0.8	0.9	1.3	1.4
1994	7:00	1.5	1.6	1.3	1.4	1.4	1.9	2.2	2.2	1.3	1.3	1.5	1.8
	13:00	2.1	2.4	2.3	2.4	2.7	2.7	3.6	3.5	3.0	2.5	2.3	2.5
	19:00	2.7	3.3	3.2	3.4	2.2	1.9	2.7	2.4	1.9	1.8	1.8	2.7
	1:00	1.7	1.8	1.6	1.3	0.9	1.0	1.7	1.9	1.6	1.1	0.6	1.3
Av.	Day	2.325	2.885	3.02	2.86	2.495	2.57	2.66	2.885	2.56	2.215	2.255	2.34
	Night	1.915	2.445	2.59	2.39	1.775	1.61	1.67	1.905	1.51	1.245	1.465	1.66
	Rate	1.21	1.18	1.17	1.20	1.41	1.60	1.59	1.51	1.70	1.78	1.54	1.41

Data Source : General Department of Meteorology and Hydrology

**Table 2.5 Potential Evapotranspiration**

Potential Evapotranspiration (ET <sub>o</sub> ) (mm/day)												
Place	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Phan Rang	5.0	5.9	6.5	6.6	6.2	5.4	6.1	5.9	4.9	4.5	4.4	4.7
Lien Khuong	5.3	6.0	6.7	6.1	4.9	4.1	4.0	3.9	3.8	3.7	3.8	4.5
Di Linh	4.1	4.3	4.9	4.6	4.2	3.6	3.6	3.3	3.3	3.3	3.5	3.9
Bao Loc	3.9	4.4	4.9	4.9	4.4	3.8	3.6	3.3	3.4	3.4	3.3	3.5
Phan Thiet	5.8	6.3	6.8	7.4	6.2	5.3	5.2	5.1	4.8	4.9	5.0	5.3
Xuan Loc	4.7	5.5	6.2	6.2	5.2	4.0	4.1	3.9	4.0	4.0	4.0	4.1
Vung Tau	5.3	6.0	6.8	7.2	5.8	5.3	5.1	5.0	4.8	4.8	4.6	4.7
Tan Son Hoa	5.2	6.2	6.9	7.0	5.8	4.9	4.9	4.8	4.5	4.3	4.4	4.7
Bien Hoa	4.8	6.2	7.0	7.0	5.7	4.6	4.6	4.5	4.4	4.3	4.3	4.4

Evaporation (mm/day)												
Place	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Phan Rang	5.0	5.4	6.0	5.5	5.1	4.9	5.3	5.7	3.5	2.5	3.0	4.4
Lien Khuong	4.6	4.9	5.0	3.9	2.9	2.3	2.1	2.3	1.6	1.6	2.4	3.5
Di Linh	3.2	3.8	3.6	2.8	2.0	1.7	1.6	1.5	1.4	1.6	2.5	3.0
Bao Loc	2.5	2.8	2.8	2.2	1.7	1.3	1.2	1.1	1.1	1.1	1.5	2.0
Phan Thiet	4.7	4.7	4.7	4.8	4.2	3.7	3.4	3.2	2.8	3.0	3.8	4.7
Xuan Loc	4.3	5.0	5.4	5.1	3.7	2.2	2.1	2.2	2.0	1.7	2.4	3.4
Vung Tau	4.4	4.8	4.9	5.3	4.0	3.4	3.1	2.9	2.4	2.6	3.0	3.7
Tan Son Hoa	4.4	5.1	5.4	5.2	4.1	3.1	3.1	3.1	2.7	2.5	3.1	3.7
Bien Hoa	4.5	6.1	7.0	6.0	4.1	2.9	2.7	2.9	2.6	2.3	2.5	3.3

ET <sub>o</sub> /Evaporation												
Place	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Phan Rang	1.00	1.09	1.09	1.19	1.21	1.11	1.15	1.03	1.42	1.81	1.47	1.07
Lien Khuong	1.16	1.23	1.35	1.58	1.71	1.77	1.89	1.67	2.44	2.32	1.61	1.29
Di Linh	1.26	1.12	1.36	1.66	2.06	2.07	2.29	2.22	2.31	2.02	1.42	1.31
Bao Loc	1.58	1.56	1.77	2.26	2.65	2.87	2.90	3.00	3.07	3.02	2.23	1.74
Phan Thiet	1.23	1.33	1.44	1.55	1.47	1.42	1.54	1.58	1.72	1.64	1.30	1.14
Xuan Loc	1.09	1.09	1.15	1.22	1.42	1.78	1.94	1.80	2.04	2.30	1.67	1.22
Vung Tau	1.19	1.25	1.39	1.35	1.45	1.57	1.64	1.75	2.02	1.82	1.55	1.28
Tan Son Hoa	1.18	1.21	1.27	1.35	1.41	1.56	1.60	1.54	1.67	1.70	1.44	1.27
Bien Hoa	1.07	1.02	1.00	1.17	1.39	1.59	1.70	1.55	1.69	1.87	1.72	1.33

**Table 2.6 Monthly Effective Rainfall for Paddy and Upland Crops**

Monthly Distribution of Annual Rainfall (25% Drought)													
Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Bao Loc	51	40	93	158	213	271	335	409	351	292	137	60	2,410
Ham Tan	0	0	7	37	158	201	253	241	247	179	45	10	1,380
Lien Khuong	4	15	42	103	193	163	174	172	252	208	64	20	1,410
Phan Rang	5	1	7	11	43	42	31	44	96	119	116	44	560
Phan Thiet	1	0	7	26	110	131	141	146	153	131	35	8	890
Song Luy	0	0	21	13	88	136	102	111	139	160	56	4	830
Ta Pao	4	3	16	43	202	368	371	506	338	244	73	11	2,180
Tan Son Nhat	11	2	11	40	176	274	264	242	286	246	103	35	1,690
Vung Tau	1	1	5	26	167	188	189	168	191	202	55	16	1,210

Paddy : Monthly Effective Rainfall (mm/month) (75% of 25% drought Month Rain)													
Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Bao Loc	38	30	70	119	159	204	251	307	263	219	103	45	1,808
Ham Tan	0	0	5	28	119	151	190	181	185	134	34	7	1,035
Lien Khuong	3	11	31	78	145	122	130	129	189	156	48	15	1,058
Phan Rang	4	1	5	8	33	32	24	33	72	89	87	33	420
Phan Thiet	1	0	5	20	83	98	106	110	115	98	26	6	668
Song Luy	0	0	16	10	66	102	77	83	104	120	42	3	622
Ta Pao	3	2	12	32	152	276	278	380	253	183	55	9	1,635
Tan Son Nhat	9	2	8	30	132	205	198	181	214	184	77	26	1,267
Vung Tau	1	1	4	19	125	141	142	126	144	152	42	12	908

Upland Crops : Monthly Effective Rainfall (mm/month)													
Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Bao Loc	34	28	68	102	131	112	112	112	112	112	86	43	1,052
Ham Tan	0	0	0	29	100	71	112	112	112	108	32	0	676
Lien Khuong	0	11	29	69	124	100	108	108	112	112	43	14	830
Phan Rang	0	0	0	0	33	33	23	32	65	73	73	32	364
Phan Thiet	0	0	0	20	75	83	85	88	92	82	27	0	553
Song Luy	0	0	18	9	61	89	65	71	86	98	39	0	536
Ta Pao	0	0	14	31	124	112	112	112	112	112	49	9	787
Tan Son Nhat	9	0	8	31	111	112	112	112	112	112	66	27	812
Vung Tau	0	0	0	20	105	112	112	100	112	112	39	12	724



Table 2.7 Mean Monthly Discharge

Unit: m<sup>3</sup>/sec

Name of Potential Area	Name of River	C. Area (km <sup>2</sup> )	Site	C. Area												Total
				Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
Phan Rang Plain	Cai/P. Rang	99	Song Pha Weir	0.52	0.28	0.21	0.23	1.19	1.46	0.95	1.04	2.48	7.67	5.07	1.06	1.86
	Song Sat	130	Song Sat Dam	0.68	0.37	0.28	0.30	1.57	1.92	1.25	1.36	3.26	10.07	6.65	1.39	2.44
	Song Trau	65	Song Trau Dam	0.34	0.19	0.14	0.15	0.78	0.96	0.63	0.68	1.63	5.04	3.33	0.70	1.22
Long Song Plain	Cai	2,140	Nha Trinh Weir	11.13	6.11	4.57	4.96	25.81	31.60	20.60	22.46	53.68	165.80	109.55	22.91	40.10
	Tan Giang	140	Tan Giang Dam	0.73	0.40	0.30	0.32	1.69	2.07	1.35	1.47	3.51	10.85	7.17	1.50	2.62
Phan Ri Plain	Long Song	394	Long Song Dam	1.25	1.08	1.11	1.84	2.24	5.53	7.05	9.44	13.69	17.51	7.09	2.19	5.86
	Ca Giay	146	Ca Giay Dam	0.46	0.40	0.41	0.68	0.83	2.05	2.61	3.50	5.07	6.49	2.63	0.81	2.17
Phan Thiet Plain	Song Luy	554	Song Luy Dam	1.76	1.52	1.56	2.59	3.15	7.77	9.92	13.27	19.25	24.62	9.97	3.08	8.24
	Ka Tot	140	Ka Tot Dam	0.44	0.38	0.40	0.65	0.80	1.96	2.51	3.35	4.86	6.22	2.52	0.78	2.08
	Cai/P. Thiet	296	Song Quao Dam	0.94	0.81	0.84	1.38	1.68	4.15	5.30	7.09	10.28	13.15	5.33	1.65	4.40
Song Phan Plain	Ca Ty	347	Ba Bau Weir	1.10	0.95	0.98	1.62	1.97	4.87	6.21	8.31	12.05	15.42	6.24	1.93	5.16
	Song Mong	101	Ke Bat Dam	0.43	0.37	0.38	0.64	0.77	1.91	2.43	3.26	4.72	6.04	2.45	0.76	2.02
Ham Tan Plain	Song Phan	136	Song Phan Dam	0.43	0.37	0.38	0.64	0.77	1.91	2.43	3.26	4.72	6.04	2.45	0.76	2.02
	Song Dinh	551	Song Dinh Dam	1.75	1.51	1.55	2.57	3.13	7.73	9.86	13.20	19.14	24.48	9.91	3.07	8.20
Lower La Nga Plain	Song Gieng	93	Song Gieng Dam	0.30	0.26	0.26	0.43	0.53	1.30	1.66	2.23	3.23	4.13	1.67	0.52	1.38
	La Nga	2,000	Ta Pao Weir	17.85	15.42	15.15	25.98	47.52	99.01	143.32	176.69	176.40	161.03	86.95	34.56	83.73
Song Ray Plain	Vo Dat Weir	3,080	Vo Dat Weir	26.80	23.16	22.74	39.01	71.36	148.67	215.21	265.31	264.88	241.80	130.57	51.90	125.73
	Song Ray	2,000	Ta Pao Weir (*)	51.29	50.60	50.40	51.03	56.82	74.86	93.44	122.68	159.90	149.74	85.56	56.29	83.72
Song Dinh Plain	Song Ray	3,080	Vo Dat Weir (*)	60.31	58.46	58.08	64.21	81.17	125.93	166.59	211.87	248.28	230.68	128.99	73.70	126.07
	Song Dinh	771	Song Ray Dam	6.35	5.15	3.49	4.57	10.09	23.46	34.15	41.94	44.37	44.94	22.03	10.00	20.88
Phuoc Hoa Scheme	Song Dinh	149	Da Den Dam	1.62	1.32	0.89	1.17	2.58	6.00	8.73	10.73	11.35	11.50	5.64	2.56	5.34
	Song Be	5,247	Phuoc Hoa Dam (*)	114.59	98.99	91.73	91.63	116.15	148.78	222.33	305.58	384.36	437.71	270.19	150.14	203.30
Dau Tieng Scheme	Saigon	2,700	Dau Tieng Dam	40.57	20.43	12.00	10.93	14.90	28.01	67.85	93.48	125.52	174.44	140.67	73.72	67.15
	Saigon	2,700	Dau Tieng Dam	40.57	20.43	12.00	10.93	14.90	28.01	67.85	93.48	125.52	174.44	140.67	73.72	67.15

Note (\*1) : Flow regulated by Ham Thuan and Dam Reservoirs

(\*2) : Flow regulated by Thac Mo Reservoir

Table 2.8. Monthly Discharge with 75% Probability

Name of Potential Area	Name of River Basin	Name of River	Site	C. Area (km <sup>2</sup> )	Unit: m <sup>3</sup> /sec												
					Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Phan Rang Plain	Cau/P. Rang	Song Pha	Song Pha Weir	99	0.40	0.22	0.17	0.18	0.93	1.14	0.75	0.81	1.94	6.00	3.96	0.83	1.45
		Song Sat	Song Sat Dam	130	0.53	0.29	0.22	0.24	1.23	1.50	0.98	1.07	2.55	7.88	5.20	1.09	1.90
		Song Trau	Song Trau Dam	65	0.26	0.15	0.11	0.12	0.61	0.75	0.49	0.53	1.27	3.94	2.60	0.54	0.95
Lower La Nga Plain	La Nga	Cau	Nha Trin Weir	2,140	8.71	4.78	3.57	3.88	20.18	24.71	16.10	17.56	41.97	129.64	85.65	17.92	31.35
		Song Ru	Tan Giang	140	0.57	0.31	0.23	0.25	1.32	1.62	1.05	1.15	2.75	8.48	5.60	1.17	2.05
Long Song Plain	Long Song	Long Song	Long Song Dam	394	0.80	0.69	0.71	1.17	1.43	3.53	4.50	6.02	8.73	11.17	4.52	1.40	3.74
		Song Luy	Ca Giay	146	0.30	0.26	0.26	0.44	0.53	1.31	1.67	2.23	3.24	4.14	1.68	0.52	1.39
		Song Luy	Song Luy Dam	554	1.12	0.97	1.00	1.65	2.01	4.96	6.33	8.47	12.28	15.71	6.36	1.97	5.26
Phan Thiet Plain	Cau/P. Thiet	Ka Tot	Ka Tot Dam	140	0.28	0.25	0.25	0.42	0.51	1.25	1.60	2.14	3.10	3.97	1.61	0.50	1.33
		Song Quao	Song Quao Dam	296	0.60	0.52	0.53	0.88	1.07	2.65	3.38	4.53	6.56	8.39	3.40	1.05	2.81
		Ca Ty	Ba Bau Weir	347	0.70	0.61	0.62	1.03	1.26	3.11	3.96	5.30	7.69	9.84	3.98	1.23	3.29
Song Phan Plain	Song Phan	Ca Ty	Ke Bat Dam	136	0.28	0.24	0.24	0.41	0.49	1.22	1.55	2.08	3.01	3.86	1.56	0.48	1.29
		Song Mong	Song Mong Dam	101	0.20	0.18	0.18	0.30	0.37	0.90	1.15	1.54	2.24	2.86	1.16	0.36	0.96
		Song Phan	Song Phan Dam	136	0.28	0.24	0.24	0.41	0.49	1.22	1.55	2.08	3.01	3.86	1.56	0.48	1.29
Ham Tan Plain	Song Dinh	Song Dinh	Song Dinh Dam	551	1.12	0.97	0.99	1.64	2.00	4.93	6.29	8.42	12.21	15.62	6.33	1.96	5.23
		Song Giang	Song Gian Dam	93	0.19	0.16	0.17	0.28	0.34	0.83	1.06	1.42	2.06	2.64	1.07	0.33	0.88
		La Nga	Ta Pao Weir	2,000	15.30	13.22	12.98	22.27	40.74	84.87	122.85	151.45	151.20	138.03	74.53	29.63	71.77
Lower La Nga Plain	La Nga	Vo Dat	Vo Dat Weir	3,080	22.97	19.85	19.49	33.44	61.17	127.43	184.47	227.41	227.05	207.26	111.92	44.49	107.77
		Ta Pao	Ta Pao Weir (*)	2,000	44.39	43.79	43.62	44.17	49.18	64.79	80.88	106.19	138.40	129.60	74.06	48.72	72.46
		Vo Dat	Vo Dat Weir (*)	3,080	52.10	50.49	50.17	55.46	70.11	108.77	143.89	183.00	214.45	199.25	111.42	63.65	108.89
Song Ray Plain	Song Ray	Song Ray	Song Ray Dam	771	5.42	4.40	2.98	3.90	8.60	20.01	29.12	35.77	37.84	38.33	18.79	8.53	17.81
		Song Dinh	Da Den Dam	149	1.39	1.12	0.76	1.00	2.20	5.12	7.45	9.15	9.68	9.81	4.81	2.18	4.56
		Phuoc Hoa	Phuoc Hoa Dam (*)	5,247	93.77	76.17	76.57	77.56	99.03	123.72	194.93	282.62	331.42	395.14	238.43	134.53	177.99
Dau Tieng Scheme	Saigon	Dau Tieng	Dau Tieng Dam	2,700	35.71	17.98	10.56	9.63	13.11	24.66	59.73	82.30	110.51	153.58	123.85	64.91	59.12
		Saigon	Saigon	2,700	35.71	17.98	10.56	9.63	13.11	24.66	59.73	82.30	110.51	153.58	123.85	64.91	59.12

Note  
 (\*) : Flow regulated by Ham Thuan and Dam Reservoirs  
 (\*\*) : Flow regulated by Thac Mo Reservoir

Table 2.9 List of Existing Irrigation Schemes with Designed Irrigation Area Larger than 100 ha

Province	Code	Name of Schemes	Name of River Basin	Name of River (Water Source)	Irrigation Facilities				Actual Irrigation Area (ha)				
					Type of Head Works	Storage (MCM)	Discharge (m <sup>3</sup> /sec)	M. Canal (km)	Area (ha)	Spring	Winter	Summer	Wet Season
1. Lam Dong	L1	Tyen Lam/Quang Hiep	Dong Nai	Da Tam	Reservoir/Weir	9.60	4.00	10.00	2,832	700	700	700	700
	L2	Cam Ly Thuong	Dong Nai	Cam Ly	Weir		5.50	5.87	400	5	5	5	5
	L3	Dai Don	Dong Nai	Da Dung	Weir				2,700	1,400	1,400	1,400	1,400
	L4	Dinh An	Dong Nai	Da Tam	Weir				150	86	86	86	86
	L5	Tan Rai	Dong Nai	Da Rgna	Reservoir			7.00	140	30	30	30	30
	L6	La On	Dong Nai	Da Rgna	Weir				100	65	65	65	65
	L7	Da Ham	Dong Nai	Da Ham	Reservoir	4.40	0.70	0.30	400	250	250	250	250
	L8	Ka La I	Dong Nai		Weir				150	35	35	35	35
	L9	Phoi	Dong Nai	Da Xong	Reservoir	2.30	0.60	3.00	415	215	215	215	215
	L10	Phu Hoi	Dong Nai		Pump				150	60	60	60	60
	L11	Da Mi	Dong Nai		Weir				120	50	50	50	50
	L12	Ta Nung	Dong Nai		Reservoir				200	50	50	50	50
	L13	Cho Mo Da Quyen	Dong Nai		Weir				200	60	60	60	60
	L14	Da Tien Tang	Dong Nai	Da Tien Tang	Weir		0.50	3.60	100	50	50	50	50
	L15	Da Sa	Dong Nai		Reservoir				150	100	100	100	100
	L16	Fiscron	Dong Nai		Weir				250	10	10	10	10
	L17	So 2	Dong Nai		Reservoir				152	120	120	120	120
	L18	So 5	Dong Nai		Reservoir				200	160	160	160	160
	L19	Loc An	Dong Nai		Reservoir				240	100	100	100	100
	L20	East Di Linh	Dong Nai		Reservoir				100	100	100	100	100
	L21	Darsuoi 1	Dong Nai		Reservoir				150	30	30	30	30
	L22	Chieng Thang	Dong Nai		Reservoir				250	250	250	250	250
	L23	West Di Linh	Dong Nai		Reservoir				620	250	250	250	250
	L24	Lien Khong	Dong Nai		Weir		1.20	9.00	160	10	10	10	10
	L25	Ro Men	Dong Nai		Weir				160	10	10	10	10
		(Sub-total)						(10,809)					
2. Dak Lac	DL1	Cau Tu	Bc	Dak Keh	Weir				120	NA	NA	NA	NA
3. Ninh Thuan	N1	Song Pha	Coast/Cai (PR)	Ong	Weir		7.07	27.96	4.710	400	400	400	400
	N2	Nha Trinh	Coast/Cai (PR)	Cai	Weir		19.04	63.00	11,100	2,828	2,828	2,828	2,828
	N3	Lam Cam	Coast/Cai (PR)	Cai	Weir		3.64	1.98	1,700	1,666	1,666	1,666	1,666
	N4	CK7	Coast/Cai (PR)	CKSET	Reservoir		0.78	3.00	100	30	30	30	30
	N5	O Cam - Nha Hui	Coast/Cai (PR)	Cho Mo	Weir		0.17	1.50	300	200	200	200	200
	N6	Binh Phu	Coast/Cai (PR)	Ong	Weir				100	65	65	65	65
	N7	Dong Nhep	Coast/Cai (PR)	Suoi Ba	Weir			1.55	392	NA	NA	NA	270
	N8	Ba Ho	Coast/Cai (PR)	Suoi Vang	Weir				110	NA	NA	NA	50
	N9	Ta Noi	Coast/Cai (PR)	Lu	Weir				120	NA	NA	NA	15
	N10	Ca Tien	Coast/Cai (PR)	Lu	Weir				420	NA	NA	NA	160
	N11	Cha Vinh	Coast/Cai (PR)	Lu	Weir				250	NA	NA	NA	170
	N12	Ma Ken	Coast/Cai (PR)	Lu	Weir				500	NA	NA	NA	464
	N13	Binh Tu	Coast/Cai (PR)	Lu	Weir				150	NA	NA	NA	100
	N14	Tuan Tu	Coast/Cai (PR)	Lu	Weir				100	NA	NA	NA	80
	N15	Ban Que	Coast/Cai (PR)	Lu	Weir				250	NA	NA	NA	85
	N16	Phuoc An	Coast/Cai (PR)	S. Canal of Nha Trin	Pump				560	NA	NA	NA	147

Table 2.9 List of Existing Irrigation Schemes with Designed Irrigation Area Larger than 100 ha

Province	Code	Name of Schemes	Name of River Basin	Name of (Water Source)	Type of Head Works	Irrigation Facilities			Actual Irrigation Area (ha)				
						Storage (MCM)	Discharge (m <sup>3</sup> /sec)	M. Canal (km)	Winter - Spring	Summer - Autumn	Wet Season		
	N17	Phuoc Thien	Coast/Cai (PK)	S. Canal of Nha Trinh	Pump				400	NA	NA	NA	243
	N18	Da	Coast/Da	Da	Weir				180	NA	NA	NA	50
		(sub-total)							(21,442)				
4. Binh Thuan	B1	Tuy Tinh	Coast/Long Song	Long Song	Weir				1,200	30	827	1,320	
	B2	Ba Ra	Coast/Long Song	Long Song	Weir				150	-	49	190	
	B3	Ba Nao	Coast/Long Song	Ao Ho	Weir				220	-	122	-	
	B4	Vinh Hao	Coast/Long Song	Da Bac	Weir				100	-	-	100	
	B5	Dong Moi	Coast/Luy	Luy	Weir				1,200	500	900	1,024	
	B6	Song Khieng	Coast/Luy	Luy	Weir				150	30	35	140	
	B7	Tu Son	Coast/Luy	Luy	Weir				135	20	25	90	
	B8	812	Coast/Luy	Luy	Weir				150	30	-	100	
	B9	Xuan Quang	Coast/Luy	Luy	Pump				1,000	50	300	767	
	B10	Uy Thay	Coast/Luy	Ca Giay	Weir				350	-	10	277	
	B11	Cha Vau	Coast/Luy	Mao	Weir				500	-	100	441	
	B12	E.Chim	Coast/Luy	Mao	Weir				179	-	-	179	
	B13	Ma Tang	Coast/Luy	Mao	Weir				250	-	100	210	
	B14	Ma O	Coast/Luy	Mao	Weir				324	-	-	324	
	B15	Tam Ru	Coast/Luy	Mao	Weir				225	-	70	274	
	B16	Can Rang	Coast/Luy	Mao	Weir				300	-	70	305	
	B17	Ta Mu	Coast/Luy	Mao	Weir				130	-	15	62	
	B18	Dong Mang	Coast/Luy	Mang	Weir				250	-	10	215	
	B19	Ma Ni	Coast/Luy	Mang	Weir				120	-	-	94	
	B20	Dong Gong	Coast/Luy	Mang	Weir				150	-	-	158	
	B21	Nha Mung	Coast/Luy	Can	Weir				130	-	100	100	
	B22	Phong Nam	Coast/CaTy	Ca Ty	Pump				130	-	100	130	
	B23	Tien Loi	Coast/CaTy	Cat	Pump				600	131	362	395	
	B24	Dong De	Coast/CaTy	Muong Cai	Weir				250	-	15	338	
	B25	Song Linh	Coast/CaTy	Linh	Weir				100	-	-	100	
	B26	Phu Sung	Coast/CaTy	Phu Sung	Weir				120	-	130	180	
	B27	Cam Hang	Coast/CaTy	Cam Hang	Reservoir				1,800	850	1,478	1,515	
	B28	Cay Khe	Coast/Cai	Quao	Weir				1,500	-	1,049	1,264	
	B29	O Xuyen	Coast/Cai	Thang	Weir				1,500	350	881	1,181	
	B30	Kim Long	Coast/Cai	Quao	Weir				150	-	-	-	
	B31	Bat Tiet	Coast/Cai	Can	Weir				500	31	433	433	
	B32	Sieng Giang	Coast/Cai	Can	Weir				1,000	-	-	-	
	B33	Dan Sach	Coast/Cai	Da'sas	Weir				120	-	-	100	
	B34	Thay Nghe	Coast/Cai	Ma Tien	Weir				120	-	-	40	
	B35	Giang Ech	Coast/Cai	Ma Tien	Weir				100	-	20	60	
	B36	Ba Bao	Coast/Cai	Chu Don	Weir				650	34	521	521	
	B37	Suoi Da	Coast/Cai	Da	Reservoir				270	-	-	-	
	B38	Nui Dar	Coast/Dinh	Sau	Reservoir	4.92	0.60		120	-	-	-	
	B39	Tan Ha	Coast/Dinh	Da	Weir	0.13			230	50	90	90	
	B40	Co Kieu	Coast/Dinh	Co Kieu	Weir				120	80	100	100	
	B41	Suoi Do	Coast/Dinh	Do	Weir				200	30	77	77	
	B42	Lang Da	Coast/Dinh	Lang Da	Weir		0.40						

Table 2.9 List of Existing Irrigation Schemes with Designed Irrigation Area Larger than 100 ha

Province	Code No.	Name of Schemes	Name of River Basin	Name of (Water Source)	Type of Head Works	Irrigation Facilities		Actual Irrigation Area (ha)				
						Storage (MCM)	Discharge (m <sup>3</sup> /sec)	M. Canal (km)	Irrigation Area (ha)	Winter - Spring	Summer - Autumn	Wet Season
	B43	Suoi Le	Coast/Dinh	Le	Weir			150	15	80	80	80
	B44	Chu Lu	La Nga	Da R'Dai	Weir			150		25	25	25
	B45	Suoi Lach	La Nga	Lach	Weir			120		11	11	11
	B46	Uf Sang	La Nga	Damrin	Weir			200		34	34	34
	B47	K'Ho	La Nga	Me Pu	Weir			100		80	80	80
	B48	Cau Chay	La Nga	Da M'Brin	Weir			120		37	37	37
	B49	Tra Tan	La Nga	Chet	Reservoir			610		50	50	50
	B50	Vo Xu	La Nga	La Nga	Pump			5,000	300	200	200	200
	B51	Ta Bua	La Nga	Klong Du	Weir			500				
	B52	H74	La Nga	Klong Du	Weir			250		250	250	250
	B53	Suoi Cat	La Nga	Cat	Weir			110	24	40	40	65
	B54	Tra Cap	La Nga	Tra Cap	Weir			150	10	54	60	60
	B55	Suoi Chua	La Nga	Chua	Weir			300		70	70	70
	B56	Cay Xoai I, II	La Nga	La Nga	Weir			190		120	140	140
	B57	Cau Chay	La Nga	Da M'Brin	Weir			150	10	54	60	60
		(Sub-total)						(25,033)				
5. Song Be	S1	Can Nom	Saigon	Can Nom	Reservoir	3.60	2.40	350	210	280	350	350
	S2	Ta Te	Saigon	Ta Te	Reservoir	1.10	2.14	120	0	0	12	12
	S3	Tong Le Cham	Saigon	Tong Le Cham	Weir		6.04	120	40	40	40	40
	S4	Tan An	Saigon	Saigon	Dike - Sluice			411	350	370	380	380
	S5	Suoi Giai	Be	Giai	Reservoir	12.80	2.26	1,670	700	700	750	750
	S6	Bu Mon	Be	Dak Woa	Reservoir	0.15	0.50	180	90	110	150	150
	S7	Dak Toi	Be	Dak Toi	Reservoir	1.00	1.40	100	70	75	90	90
	S8	An Khuong	Be	Cay	Reservoir	1.00	1.30	110	60	60	60	60
	S9	Loc Khanh	Be	Can Le	Weir			150	35	55	70	70
	S10	Suoi Sau	Be	Sau	Weir		4.00	300	270	280	290	290
	S11	Da Ban	Dong Nai	Da Ban	Reservoir	1.60	2.40	400	250	270	300	300
	S12	Ong Huu	Dong Nai	Ong Huu	Weir		2.00	150	150	150	150	150
	S13	Rach Dang	Dong Nai	Dong Nai	Pump		1.50	140	110	110	130	130
	S14	Tan An	Dong Nai	Dong Nai	Pump		0.45	150	55	55	55	55
	S15	Tan My I	Dong Nai	Dong Nai	Pump		100.00	130	80	100	100	100
	S16	Thuong Tan 2	Dong Nai	Dong Nai	Pump		2.50	100	70	70	90	90
		(Sub-total)						(4,581)				
6. Dong Nai	D1	Cu Nhi	Coast/Ray	Suoi The	Weir		2.00	250	205	200	250	250
	D2	Gia Lieu I	Coast/Ray	Gia Lieu	Weir		2.00	150	50	50	150	150
	D3	Gia Lieu II	Coast/Ray	Gia Lieu	Weir		2.00	200	30	100	200	200
	D4	Suoi Ran	Coast/Ray	Suoi Ran	Reservoir	2.23		600	600	0	0	0
	D5	Gia Ui	Coast/Ray	Gia Ui	Reservoir	8.80	6.80	560	Completed in 1994			
	D6	Nui Le	Coast/Dinh	Gia Ui	Reservoir	3.21	2.00	400	130	0	100	100
	D7	Suoi Vong	Coast/Dinh	Suoi Vong	Reservoir	3.94	6.30	1,100	1,050	0	300	300
	D8	Phuoc Thai	Saigon	Thai Thien	Weir		2.00	100	70	0	100	100
	D9	Ong Keo	Saigon	Dong Nai	Sluice		5.400	100	45	0	45	45
	D10	Phuoc Tan	Dong Nai	La Buong	Pump		4.50	100	300	0	0	0
	D11	Long Thanh	Dong Nai	Quan Thu	Pump		2.20	450	300	0	0	0

Table 2.9 List of Existing Irrigation Schemes with Designed Irrigation Area Larger than 100 ha

Province	Code No.	Name of Schemes	Name of River Basin	Name of River (Water Source)	Type of Head Works	Storage (MCM)	Discharge (m <sup>3</sup> /sec)	M. Canal Area (ha)	Designed Irrigation Area (ha)		Actual Irrigation Area (ha)		Wet Season	
									Area (ha)	Area (ha)	Winter - Spring	Summer - Autumn		
7. Ba Ria - Vung Tau	D12	Tam Hanh	Dong Nai	Dong Nai	Pump		1.50	250	75	75	0	75	0	
	D13	Hoa An	Dong Nai	Dong Nai	Pump		1.87	110	90	0	0	150	0	
	D14	Hiep Hoa	Dong Nai	Dong Nai	Pump		4.45	350	180	0	0	100	0	
	D15	Tan An	Dong Nai	Dong Nai	Pump		5.00	100	80	0	0	100	0	
	D16	Thien Tan	Dong Nai	Dong Nai	Pump		8.80	350	230	0	0	100	0	
	D17	Long Chien	Dong Nai	Dong Nai	Pump		2.77	100	100	0	0	120	0	
	D18	Mieu Van	Dong Nai	Dong Nai	Pump		4.60	150	80	135	135	90	120	135
	D19	Lai Hoa	Dong Nai	Dong Nai	Pump		3.50	300	100	90	0	150	150	90
	D20	Binh Phuoc	Dong Nai	Dong Nai	Pump		2.20	100	350	150	150	150	150	150
	D21	Binh Hoa	Dong Nai	Dong Nai	Pump		6.80	350	150	87	0	450	450	150
	D22	Bau Ham	Dong Nai	Dong Nai	Weir		1.60	150	170	200	200	250	250	150
	D23	Suoi Ca	Dong Nai	Dong Nai	Weir			1.300	1,000	1,000	0	1,300	1,300	0
	D24	Long An	Dong Nai	Dong Nai	Reservoir		16.53	18.96	100	50	0	100	100	0
	D25	Song May	Dong Nai	Dong Nai	Reservoir		6.00	3.40	110	90	0	110	110	0
	D26	Thanh Nien	Dong Nai	Dong Nai	Reservoir		1.00	1.80	250	230	0	250	250	0
	D27	Ba Long	Dong Nai	Dong Nai	Reservoir		1.40	1.00	350	250	200	350	350	0
	D28	Suoi Dam	La Nga	La Nga	Weir			8.00	600	500	0	0	0	0
	D29	Nam Sao	La Nga	La Nga	Weir			0.80	150	87	0	100	100	0
	D31	Ong Tho	La Nga	La Nga	Weir			1.20	100	0	100	100	100	0
	D32	Ong Binh	La Nga	La Nga	Weir			16.91	1,400	1,400	0	1,400	1,400	0
	D33	Da Ton	La Nga	La Nga	Reservoir		17.88	16.91	1,400	1,400	0	1,400	1,400	0
			(Sub-total)					(16,930)						
	7. Ba Ria - Vung Tau	V1	Kim Long	Coast/Dinh	Can	Reservoir	2.18		200	0	0	0	0	0
		V2	Song Dinh I	Coast/Dinh	Dinh	Weir	7.00		600	179	110	110	NA	NA
		V3	Song Xoai	Coast/Dinh	Dinh	Weir		8.00	1,000	149	NA	NA	NA	NA
		V4	Chau Pha	Coast/Dinh	Chau Pha	Reservoir	8.00		150	50	NA	NA	NA	NA
		V5	Suoi Doi I	Coast/Ray	Da	Reservoir			300	20	NA	NA	NA	NA
		V6	Gia Hoc	Coast/Ray	Yanert	Reservoir	3.90		650	200	NA	NA	NA	NA
		V7	Suoi Chieu	Coast/Ray	Giau	Reservoir	11.30		1,200	245	NA	NA	NA	NA
		V8	Xuyen Moc	Coast/Ray	Cay	Reservoir	3.80		450	179	NA	NA	NA	NA
		V9	Lo O	Coast/Ray	Lo O	Reservoir	5.00		400	102	NA	NA	NA	NA
		V10	Song Ray	Coast/Ray	Ray	Weir			800	444	NA	NA	NA	NA
		V11	Cau Moi	Coast/Ray	Hoa	Weir			250	141	NA	NA	NA	NA
V12		Da Bang	Coast/Ba Dap	Ba	Reservoir	11.06		1,200	935	30	30	30	30	
V13		Sou Mon	Coast/Ba Dap	Mon	Reservoir	1.60		150	0	150	150	52	52	
V14		But Thieng	Coast/Ba Dap	But Thieng	Reservoir	2.30		250	120	NA	NA	NA	NA	
V15		Suoi Cac	Coast/Co Chi	Bang Chua	Reservoir	4.10		380	380	0	0	0	0	
		(Sub-total)					(8,080)							
8. Tay Ninh	T1	Phoci Chi	Vam Co	East Vam Co	Pump		2.00	2,260	150	150	150	2,300	150	
	T2	Long Thuan	Vam Co	East Vam Co	Pump		3.00	700	220	220	700	700	220	
	T3	Long Khanh	Vam Co	East Vam Co	Pump		2.00	300	130	130	300	300	130	
		(Sub-total)					(3,260)							

Table 2.9 List of Existing Irrigation Schemes with Designed Irrigation Area Larger than 100 ha

Province	Code No.	Name of Schemes	Name of River Basin	Name of River (Water Source)	Type of Head Works	Irrigation Facilities		Actual Irrigation Area (ha)			
						Storage (MCM)	Discharge M. Canal (km)	Designed Irrigation Area (ha)	Winter - Spring	Summer - Autumn	Wet Season
9. T. P. Ho Chi Minh	TP1	Tan Thoi Nhi	SGN - Vam Co	Tra	Pump			3,000	300	NA	NA
	TP2	Thu Duc	Dong Nai	Dong Nai	Dike - Sluice			3,000	1,500	NA	NA
	TP3	Nam Binh Chanh	Saigon	Can Giuoc/Cho Dem	Dike - Sluice			7,000	0	4,000	7,000
	TP4	Nha Be - Can Gio	Saigon	Soai Rap/Nha Be	Dike - Sluice			2,570	0	0	1,500
	TP5	Cu chi/B.M. Long The	Saigon	Saigon (East Canal of Dau Tien)	Dike - Sluice		11.00	14,000	7,500	7,000	8,000
	TP6	Ven Song Saigon (sub-total)	Saigon	Saigon	Dike - Sluice			1,760	530	0	1,760
							(31,330)				
10. Long An	LA1	Duc Hoa	Vam Co	East Vam Co.	Pump/Sluice		380.00	13,680	2,000	1,500	3,000
	LA2	Duc Hoc	Vam Co	East Vam Co	Pump/Sluice		256.00	7,500	4,000	1,500	500
	LA3	BenLuc	Vam Co	East Vam Co	Pump/Sluice		420.00	8,970	2,500	1,500	2,000
	LA4	Can Giuoc	Vam Co	East Vam Co-R. Tra	Pump/Sluice			5,640	2,500	1,500	1,500
	LA5	Can Duoc	Vam Co	East Vam Co-R. Tra	Pump/Sluice		230.00	6,470	3,000	1,500	1,000
	LA6	Tran Tru	Vam Co	East-West Vam Co	Pump/Sluice		140.00	3,090	1,200	800	0
	LA7	Thu Thua	Vam Co	West Vam Co	Pump/Sluice		240.00	6,220	4,470	3,130	1,340
	LA8	Thanh Hoa	Vam Co	West Vam Co	Pump/Sluice		420.00	1,110	970	360	0
	LA9	Moc Hoa (sub-total)	Vam Co	West Vam Co	Pump/Sluice		380.00	6,520	7,590	4,880	580
							(59,200)				

Data Source: SIWRP and Provinces

Table 2.10 Summary of Existing Irrigation Schemes

Province	Agricultural Area		Irr. Schemes and Designed Area (Total)		Schemes more than 2,000 ha		Schemes less than 2,000 ha and more than 100 ha		Schemes less than 100 ha or Unidentified		Data Source and Remarks
	Annual Crops	Perennial Crops, etc.	Total	Area (ha)	Nos.	Area (ha)	Nos.	Area (ha)	Nos.	Area (ha)	
1. Lam Dong	40,952	42,316	83,268	17,985	155	5,552	23	5,277	130	7,176	Source : SIWRP/Province
2. Dac Lac	4,461	1,552	6,013	394	12	0	1	120	11	274	(*) : Tuyen Lam/Q. Hiep and Dai Don Source : Province
3. Ninh Thuan	39,525	2,000	41,525	22,585	50	17,510	15	3,932	33	1,143	Source : Province
4. Binh Thuan	82,512	17,619	100,131	29,855	153	5,000	56	20,033	96	4,822	(*) : Song Pha and Phan Rang (Nha Trang and Lam Cam) Source : Province
5. Song Be	79,300	139,400	218,700	5,587	50	0	16	4,581	34	1,006	(*) : Vo Xu Source : Province
6. Dong Nai	181,607	153,142	334,749	18,322	59	0	33	16,930	26	1,392	(*) : Source SIWRP (*) : Source Province
7. Ba Ria - Vung Tau	44,019	64,934	108,953	8,885	24	0	15	8,080	9	805	Source : Province
8. Tay Ninh	182,707	93,393	276,100	56,675	4	2,260	3	37,000	-	17,415	(*) : Source Province (*) : Excluding drainage area (*) : Phuoc Chi (*) : include 36,000 ha by Dau Tien
9. H. C. M.	80,822	12,424	93,246	31,300	6	31,300	-	-	-	-	(*) : Source SIWRP (*) : Source Province
10. Long An	139,696	-	139,696	59,200	9	59,200	-	-	-	-	(*) : Source Province (*) : Estimated from inventory data
Total	875,601	526,780	1,402,381	250,788	522	120,802	162	95,953	339	34,033	

SIWRP: Sub-Institute of Water Resources Planning and Management



Table 2.11 Cropping Pattern in the Existing Irrigation Schemes

Province	Lam Dong	Dac Lac	Ninh Thuan	Binh Thuan	Song Be	Dong Nai	B.Ria-V.Tau	Tay Ninh	HCMC	Long An	Total/Mean
Nos. of Scheme	12	0	9	55	17	31	15	3	5	9	156
Designed Irr. Area (ha)	8,487	0	18,557	18,809	4,632	11,000	7,580	3,300	28,330	59,200	159,895
<b>Planted Area(ha)</b>											
Winter paddy	3,420	No Data	8,902	2,754	1,720	6,174	2,448	480	3,030	28,230	53,738
Winter other crops	725		885		847	1,830	366	20	5,000		8,948
Summer paddy	1,700		3,700	9,186	1,870	1,750	290	500	9,000	16,670	42,966
Summer other crops	40		225		882	50			2,000		3,157
Wet season paddy	3,940		9,415	14,345	2,135	6,585	82	3,300	18,260	9,920	64,042
Wet season other crops	675		445		952	50					1,447
<b>Total</b>	<b>10,500</b>	<b>0</b>	<b>23,572</b>	<b>26,285</b>	<b>8,406</b>	<b>16,439</b>	<b>3,186</b>	<b>4,300</b>	<b>37,290</b>	<b>54,820</b>	<b>174,298</b>
<b>Rate of Planted Area(%)</b>											
Winter paddy	40.3	No Data	48.0	14.6	37.1	56.1	32.3	14.5	10.7	47.7	33.6
Winter other crops	8.5		4.8	0.0	18.3	16.6	4.8	0.6	17.6	0.0	5.6
Summer paddy	20.0		19.9	48.8	40.4	15.9	3.8	15.2	31.8	28.2	26.9
Summer other crops	0.5		1.2	0.0	19.0	0.5	0.0	0.0	7.1	0.0	2.0
Wet season paddy	46.4		50.7	76.3	46.1	59.9	1.1	100.0	64.5	16.8	40.1
Wet season other crops	8.0		2.4	0.0	20.6	0.5	0.0	0.0	0.0	0.0	0.9
<b>Total</b>	<b>123.7</b>		<b>127.0</b>	<b>139.7</b>	<b>181.5</b>	<b>149.4</b>	<b>42.0</b>	<b>130.3</b>	<b>131.6</b>	<b>92.6</b>	<b>109.0</b>





**Table 2.15 List of Planned and On-going Irrigation Schemes with Designed Irrigation Area Larger than 100 ha**

Province	Code No.	Name of Schemes	Name of River Basin	Name of Rive Water Source	Type of Head Workstation	Designed Iri- Area (ha)	Status
1. Lam Dong	L26	Da Te	Dong Nai	Da Te	Reservoir	2,000	On-going
	L17	Da Klo	Dong Nai	Da Klo	Reservoir	800	Planning
	L28	Caden	Dong Nai		Dike	250	
						(3,050)	
2. Dac Lac							
3. Ninh Thuan	N19	Song Trau	Coast/Trau	Trau	Reservoir	2,500	Planning
	N20	Song Sat	Coast/Cai (PR)	Sat	Reservoir	1,600	Planning
	N21	Tan Giang	Coast/Cai (PR)	Lu	Reservoir	2,300	Planning
4. Binh Thuan	B58	Da Bac	Coast/Long Son	Da Bac	Reservoir	500	Planning
	B59	Ta Mon	Coast/Phan	Ta Mon	Reservoir	108	On-going
5. Sogn Be	S17	Loc Quang	Be	Cay	Reservoir	378	Planning
	S18	Suoi Ong	Be	Ong	Reservoir	100	Planning
	S19	Thanh Hoa	Be	Tum Bum	Reservoir	173	Planning
	S20	Suoi Kal	Be	Kal	Reservoir	324	Planning
	S21	Sock Trao	Be	Trau	Reservoir	800	Planning
	S22	Can Le	Be	Can Le	Reservoir	180	Planning
	S23	Dong Xoai	Be	Rat	Reservoir	4,600	Planning
	S24	Nuoc Trong	Be	Nuoc Trong	Reservoir	1,200	Planning
	S25	Duc Lieu	Be	Dak Woa	Reservoir	450	On - Feasibility
	S26	Thuong Tan	Dong Nai	Dong Nai	Pump	123	Planning
	S27	Tan Loi	Dong Nai	Dong Nai	Reservoir	383	Planning
	S28	Tong Nhiem	Dong Nai	Nuoc Trong	Reservoir	200	Planning
	S29	Cho Chet	Dong Nai	Cho Chet	Reservoir	110	Planning
	S30	Chanh My	Saigon	Saigon	Dike - Sluice	330	Planning
	S31	Phu Hoi	Saigon	Saigon	Dike - Sluice	250	Planning
	S32	Rung Cam	Saigon	Tom Le Chau	Reservoir	350	Planning
S33	M'Roa	Saigon	M'Roa	Reservoir	265	Planning	
S34	Da Yeu	Saigon	Da Yeu	Reservoir	250	Planning	
S35	An Tay - Phu An	Saigon	Saigon	Dike - Sluice	500	On - Feasibility	
S36	Bu Nau	Saigon	Bu Nau	Reservoir/W	128	Planning	
6. Dong Nai	D34	Da Vang	Saigon	Suoi Thai Ch	Reservoir	180	Planning
	D35	Cau Moi	Saigon	Suoi Ca	Reservoir	3,000	Planning
	D36	Suoi Nhan	Dong Nai	Suoi Nhan/Si	Reservoir	1,540	On-going
	D37	Da-Ka-Ya		Suoi Da-Ka-	Reservoir	350	Planning
	D38	Song Thao	Dong Nai	Song Rach D	Reservoir	700	Planning
	D39	La Buong	Dong Nai	Song La Buo	Reservoir	400	Planning
	D40	Xom Mai	Dong Nai	Suoi Soi Mat	Reservoir	200	Planning
7. Ba Ria - Vung Tau	V16	Bau Ngu	Coast/Ray	Bau La	Reservoir	800	Planning
	V17	Sum Duc	Coast/Ray	Hoa	Reservoir	900	Planning
	V18	Suoi Lao	Coast/Ray	Hoa	Reservoir	800	Planning
	V19	Suoi Soc	Coast/Ray	Hoa	Reservoir	800	Planning
	V20	Ben Ke	Coast/Ray	Hoa	Reservoir	900	Planning
	V21	Lo O 3	Coast/Ray	Lo O	Reservoir	200	Planning
	V22	Lo O 2	Coast/Ray	Lo O	Reservoir	500	Planning
	V23	Tam Bo	Coast/Ray	Tam Bo	Reservoir	1,000	Planning
	V24	Chau Pha	Coast/Dinh	Chau Pha	Reservoir	700	Planning
	V25	Giao Keo	Coast/Dinh	Chau Pha	Reservoir	500	Planning
V26	Ap Ba	Coast/Dinh	Son	Reservoir	100	Planning	
V27	Suoi Chich	Coast/Dinh	Chich	Reservoir	200	Planning	
V28	Bao Nop	Coast/Co Chi	Bang Chua	Reservoir	300	Planning	

**Table 2.15 List of Planned and On-going Irrigation Schemes with Designed Irrigation Area Larger than 100 ha**

Province	Code No.	Name of Schemes	Name of River Basin	Name of River Water Source	Type of Head Workstation	Designed Irrigation Area (ha)	Status
	V29	Bin Chau	Coast/Co Chi	Bang Chua	Reservoir	200	Planning
	V30	Da Bang 2	Coast/Ba Dap	Da Bang	Reservoir	200	Planning
	V31	Suoi Sao	Coast/Muong	Sao	Reservoir	150	Planning
	V32	Rach Chanh	Coast/Koch Tre	Koch Tre	Weir	100	Planning
	V33	Nuoc Ngot	Coast/Mo Nhat	Mo Nhat	Reservoir	100	Planning
8. Tay Ninh	T4	Phuoc Luu	Vam Co	East Vam Co	Pump	2,600	Planning
	T5	Long Khanh B	Vam Co	East Vam Co	Pump	700	Planning
	T6	Long Hung	Vam Co	East Vam Co	Pump	1,000	Planning
	T7	Dia Xu B	Vam Co	East Vam Co	Pump	2,500	Planning
	T8	Dia Xu A	Vam Co	East Vam Co	Pump	700	Planning
	T9	Long Thuan B	Vam Co	East Vam Co	Pump	1,000	Planning
	T10	Tra Cu	Vam Co	East Vam Co	Pump	2,700	Planning
	T11	Hoa Hoi	Vam Co	East Vam Co	Pump	3,100	Planning
	T12	Cu Ba Cham	Vam Co	East Vam Co	Pump	2,700	Planning
	T13	Ben Soi	Vam Co	East Vam Co	Pump	3,700	Planning
	T14	Cay Oi	Vam Co	East Vam Co	Pump	2,900	Planning
	T15	Ben Dinh	Vam Co	East Vam Co	Pump	2,500	Planning

Data Source: SIWRP and Provinces

Table 2.16 Water Balance of Dau Tieng Reservoir Under the Condition Without Diversion from the Be River in Future

Month	Inflow of Saigon		Demand					Total	Balance	Stored Volume	Spill - out
	River at Dau Tieng (75% Dis.)	D. Tieng Area	Evapo-ration	VCD Riparian Mandate Rel.	Saigon Rip.	HM - BBC					
		<b>49,000</b>	<b>0</b>	<b>18.5</b>	<b>13,000</b>	<b>12,197</b>					
Jan.	95.66	103.68	13.12	49.55	21.24	29.07	216.67	-121.01	979.22	0.00	
Feb.	43.51	114.98	10.95	44.76	22.64	32.16	225.49	-181.98	797.23	0.00	
Mar.	28.29	95.81	10.61	49.55	13.23	37.90	207.09	-178.80	618.43	0.00	
Apr.	24.95	30.48	8.83	47.95	8.42	30.35	126.04	-101.08	517.35	0.00	
May	35.13	89.24	8.28	49.55	41.43	9.47	197.99	-162.86	354.49	0.00	
Jun.	63.93	45.72	6.71	47.95	14.49	0.63	115.50	-51.58	302.91	0.00	
Jul.	159.99	27.56	6.50	49.55	17.06	9.15	109.82	50.17	353.08	0.00	
Aug.	220.44	38.06	6.92	49.55	3.83	22.54	120.90	99.54	452.62	0.00	
Sep.	286.43	57.15	7.50	47.95	2.02	6.01	120.63	165.80	618.42	0.00	
Oct.	411.34	63.00	9.12	49.55	4.18	5.55	131.40	279.94	898.36	0.00	
Nov.	321.01	24.13	11.08	47.95	7.75	21.81	112.73	208.29	1106.00	0.65	
Dec.	173.85	59.06	13.17	49.55	32.03	25.81	179.62	-5.77	1100.23	0.00	
Total	1864.52	748.88	112.78	583.42	188.34	230.46	1863.87	0.65		0.65	
Av. (m3/s)	59.12	23.75	3.58	18.50	5.97	7.31	59.10	0.02		0.02	

Unit: MCM

Table 2.17 Estimated Incremental Benefit of Dau Tieng Irrigation Scheme

Crop	Without-Project				With-Project				Remarks
	Area (ha)	Yield (ton/ha)	Product (ton)	Unit Net Income (US\$/ton)	Area (ha)	Yield (ton/ha)	Product (ton)	Unit Net Income (US\$/ton)	
S-A Paddy	0.5	2.5	1.25	75	0.56	3.5	1.96	75	147
W-S Paddy	0	2.5	0	75	0.39	4.5	1.755	75	132
Season Paddy	1	2.5	2.5	75	0.33	3.5	1.155	75	87
Groundnut	0.5	1.75	0.875	456	0.78	1.95	1.521	456	694 irrigated
<b>Total</b>					0.94	1.75	1.645	456	750 non-irrigated
Incr. Benefit per ha				680				1,809	1,129

Table 2.18 Cost Estimate of Pump Stations in Tay Ninh Riparian Schemes

	Area	Qmax	Pump Unit	Kw/unit	US\$/kw/unit	Pump Cost (US\$)	Building (US\$)	Total Cost (US\$)
<b>Tay Ninh Upper</b>								
Tra Cu	2,700	3.1	4	88	52,618	210,470	50,000	
Hoa Hoi	3,100	3.6	4	101	60,413	241,651	50,000	
Cu Ba Cham	2,700	3.1	4	88	52,618	210,470	50,000	
Ben Suoi	3,700	4.3	5	90	54,079	270,396	50,000	
Cay Oi	2,900	3.4	4	94	56,515	226,061	50,000	
<b>Sub-total</b>						1,159,049	250,000	1,409,049
<b>Tay Ninh Lower</b>								
Phuoc Luu	2,600	3.0	4	84	50,669	202,675	50,000	
Long Khanh B	700	0.8	3	34	20,462	61,387	50,000	
Long Hung	1,000	1.2	3	49	29,232	87,696	50,000	
Dia Xu B	2,500	2.9	4	81	48,720	194,880	50,000	
Dia Xu A	700	0.8	3	34	20,462	61,387	50,000	
Long Thuan B	1,000	1.2	3	49	29,232	87,696	50,000	
Ben Dinh	2,500	2.9	4	81	48,720	194,880	50,000	
<b>Sub-total</b>						890,602	350,000	1,240,602
<b>Exstang</b>								
Phuoc Chi	2,300	2.7	4	75	44,822	179,290	50,000	
Long Thuan	700	0.8	3	34	20,462	61,387	50,000	
Long Khanh	300	0.3	2	29	17,539	35,078	50,000	
<b>Sub-total</b>						275,755	150,000	425,755

Table 2.19 Present Land Use and Proposed Land Use with Project of Phuoc Hoa Irrigation Scheme Unit: ha

Land Use	Present Land Use		Proposed Land Use with Project									
	Area		Irrigated					Non-irrigated				
	Total	Arca	Paddy	Paddy + Upland Crops	Upland crops	Sugar Cane	Fruits	Total	Rubber	Cashew	Forest, Bare Land, etc.	
Agriculture	Single paddy	6,200	6,200					0				
	Double paddy	4,372	4,372	3,726	646			0				
	Triple paddy	430	430	143	287			0				
	Upland rice	175	175		175			0				
	2-paddy+1-upland	454	454		454			0				
	1-paddy+2-upland	744	744		700	44		0				
	1-paddy+1-upland	431	431			431		0				
	Upland crops	11,471	11,471	7,577	3,294	600		0				
	Garden crops	10,533	10,533	3,099	6,500	400	534	0				
	Sub-total	(34,810)	(34,810)					0				
Perennial crops	Rubber	28,925	744		576		168	28,181	28,181			
	Cashew	13,024	7,207	4,634		2,573		5,817	5,817			
	Fruits	1,983	1,983				1,983	0				
	Sub-total	(43,932)	(43,932)					0				
Grass land		261		261			0					
Total of Agricultural Land		79,003					0					
Forest and fallow land		13,492	675		675			313	313			
Infrastructure		13,257	0					25,761	25,761			
Other land (river, stream, etc.)		8,628	0					8,628	8,628			
Total Scheme Area		114,380	45,680	10,069	18,409	10,269	4,416	2,517	68,700	28,181	5,817	
Total area to be irrigated			45,680	10,069	18,409	10,269	4,416	2,517				
Gravity irrigated			30,649	5,152	12,656	9,050	2,638	1,153				
Pump irrigated			15,031	4,917	5,753	1,219	1,778	1,364				

Source : Ministry of Water Resources



Table 2.20 Water Balance of Phuoc Hoa Reservoir

Unit : MCM

Month	Inflow (75% Disch.)	Demand				Total	Balance	Stored Volume	Spill - out
		Irrigation	Mandate Release	Domestic Supply	To Thi Think Div. 49.8				
Jan.	251.16	64.85	21.96	10.71	133.38	230.91	66.61	20.26	
Feb.	184.27	86.20	19.84	9.68	120.48	236.19	14.69	0.00	
Mar.	205.08	34.26	21.96	10.71	133.38	200.32	19.45	0.00	
Apr.	201.03	56.83	21.25	10.37	129.08	217.54	2.94	0.00	
May	265.23	101.55	21.96	10.71	133.38	267.61	0.56	0.00	
Jun.	320.68	11.84	21.25	10.37	129.08	172.54	66.61	82.08	
Jul.	522.11	12.23	21.96	10.71	133.38	178.30	66.61	343.81	
Aug.	756.96	24.47	21.96	10.71	133.38	190.53	66.61	566.43	
Sep.	859.05	17.76	21.25	10.37	129.08	178.46	66.61	680.58	
Oct.	1069.05	8.56	21.96	10.71	133.38	174.63	66.61	894.42	
Nov.	618.01	33.15	21.25	10.37	129.08	193.86	66.61	424.16	
Dec.	360.33	46.49	21.96	10.71	133.38	212.55	66.61	147.78	
Total	5612.95	498.20	258.60	126.14	1570.49	2453.43		3159.52	
Av. (m3/s)	177.99	15.80	8.20	4.00	49.80	77.80		100.19	

Table 2.21 Construction Cost of Phuoc Hoa Irrigation Scheme

Unit: US\$ Mil

Case-A			Case-B.1			Case-B.2			Case-C		
Current Planning for 29,496 ha without hydropower plant			For 45,680 ha with diversion to Saigon river			For 45,680 ha without diversion to Saigon river			Pump-up intake without diversion to Saigon river		
No.	Description	Amount	No.	Description	Amount	No.	Description	Amount	No.	Description	Amount
1.	Headworks		1.	Headworks		1.	Headworks		1.	Headworks	
	Phuoc Hoa main dam	18.4		Phuoc Hoa main dam	18.4		Phuoc Hoa main dam	18.4		Division weir	15.0
	Auxiliary dam	6.9		Auxiliary dam	6.9		Spillway	52.8		Pump equipment and building	15.0
	Spillway	52.8		Spillway	52.8		Intake	3.1		Preparatory works	0.5
	Intake	3.1		Intake	3.1		Preparatory works	2.2			
	Connection canal	4.7		Connection canal	4.7						
	Preparatory works	2.6		Preparatory works	2.6						
	Sub - total	88.5		Sub - total	88.5		Sub - total	76.5		Sub - total	30.5
2.	Irrigation System		2.	Irrigation System		2.	Irrigation System		2.	Irrigation System	
	Main canal	41.4		Main canal	41.4		Main canal	41.4		Main canal	41.4
	Main-secondary canal	39		Main-secondary canal	60.4		Main-secondary canal	60.4		Main-secondary canal	60.4
	South canal system	8.2		South canal system	8.2		South canal system	8.2		South canal system	8.2
	South-secondary canal	9.5		South-secondary canal	9.5		South-secondary canal	9.5		South-secondary canal	9.5
	Drainage canal	10.4		Drainage canal	16.0		Drainage canal	16.0		Drainage canal	16.0
	Diversion to Saigon river	9.6		Diversion to Saigon river	9.6		Pump stations (7 places)	1.0		Pump stations (7 places)	1.0
	Preparatory works	3.5		Preparatory works	4.4		Preparatory works	4.1		Preparatory works	4.1
	Sub - total	121.6		Sub - total	146.1		Sub - total	140.6		Sub - total	140.6
	Direct Cost	210.1		Direct Cost	234.6		Direct Cost	217.1		Direct Cost	171.0
3.	Compensation for land		3.	Compensation for land		3.	Compensation for land		3.	Compensation for land	
	Headworks	7.6		Headworks	7.6		Headworks	6.8		Headworks	0.5
	Canals	4.5		Canals	4.5		Canals	4.5		Canals	4.5
	Sub - total	12.1		Sub - total	12.1		Sub - total	11.3		Sub - total	5.0
4.	Administration cost	2.1		Administration cost	2.3		Administration cost	2.2		Administration cost	1.7
5.	Engineering cost	16.8		Engineering cost	18.8		Engineering cost	17.4		Engineering cost	13.7
6.	Physical contingency	21.0		Physical contingency	23.5		Physical contingency	21.7		Physical contingency	17.1
	Sub-total (1. to 6.)	262.1		Sub-total (1. to 6.)	291.2		Sub-total (1. to 6.)	269.7		Sub-total (1. to 6.)	208.5
7.	On-farm Works		7.	On-farm Works		7.	On-farm Works		7.	On-farm Works	
	Existing rainfed area (37,729 ha)			Existing rainfed area (37,729 ha)	7.5		Existing rainfed area (37,729 ha)	7.5		Existing rainfed area (37,729 ha)	7.5
	New area (7,951 ha)	0.0		New area (7,951 ha)	2.4		New area (7,951 ha)	2.4		New area (7,951 ha)	2.4
	Sub - total	0.0		Sub - total	9.9		Sub - total	9.9		Sub - total	9.9
8.	Land preparation from cashew/rubber to annual crops (7,951 ha)	0.0		Land preparation from cashew/rubber to annual crops (7,951 ha)	1.8		Land preparation from cashew/rubber to annual crops (7,951 ha)	1.8		Land preparation from cashew/rubber to annual crops (7,951 ha)	1.8
	Sub-total (7. to 8.)	0.0		Sub-total (7. to 8.)	11.7		Sub-total (7. to 8.)	11.7		Sub-total (7. to 8.)	11.7
	Total	262.1		Total	302.9		Total	281.4		Total	220.2

Table 2.22 Breakdown for Cost Estimate of Phuoc Hoa Irrigation Scheme

Description	Unit	cost	Main dam		Aux. dam		Con. Channel		Spillway		Intake		Total
			Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount	
			Unit	Amount	Unit	Amount	Unit	Amount	Unit	Amount	Unit	Amount	
Common excav.	cu.m	5.3	1,982,200	105,000	556,500	452,800	2,399,840	1,717,000	9,100,100	61,500	325,950	14,364,590	
Rock excav.	cu.m	15.4	0	0	0	0	0	727,000	11,195,800	0	0	11,195,800	
Embankment	cu.m	9.0	1,222,000	10,998,000	362,000	3,258,000	4,500	40,500	268,900	2,420,100	11,900	107,100	16,823,700
Rock riprap	cu.m	10.5	6,600	69,300	470	4,935	0	0	0	0	0	0	74,235
Gravel filter	cu.m	28.8	41,000	1,180,800	16,400	472,320	0	0	600	17,280	250	7,200	1,677,600
Masonry	cu.m	50.0	17,000	850,000	8,500	425,000	321	16,050	2,000	100,000	650	32,500	1,423,550
Sand filter	cu.m	28.8	58,500	1,684,800	22,600	650,880	0	0	1,200	34,560	0	0	2,370,240
Re. concrete	cu.m	100.0	8,800	880,000	7,450	745,000	22,102	2,210,200	117,000	11,700,000	3,950	395,000	15,930,200
Plain concrete	cu.m	80.0	1,400	112,000	750	60,000	14	1,120	0	0	370	29,600	202,720
Re-bar	ton	590.0	350	206,500	160	94,400	125	73,750	7,050	4,159,500	370	218,300	4,752,450
Grouting	lin.m	100.0	1,025	102,500	5,050	505,000	0	0	6,700	670,000	0	0	1,277,500
Slope protection	sq.m	0.5	33,000	16,500	14,000	7,000	0	0	0	0	0	0	23,500
Metal work	ton	10,000	0	0	0	0	0	0	0	0	0	0	0
Cure of river	L.S		300,000		100,000			1,345	13,450,000	195	1,950,000		15,400,000
<b>Total</b>			18,382,600	6,879,035	4,741,460	52,847,340							85,516,085

  

Description	Unit	cost	Main Canal		Main/secondary canal		South main canal		South/secondary canal		Drainage canal		Total
			Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount	
			Unit	Amount	Unit	Amount	Unit	Amount	Unit	Amount	Unit	Amount	
Common excav.	cu.m	2.7	8,623,900	23,284,330	3,629,000	9,798,300	307,860	831,222	662,410	1,788,507	1,809,440	4,885,488	40,588,047
Embankment	cu.m	4.5	2,704,000	12,168,000	4,911,335	22,101,008	1,210,450	5,447,025	1,200,450	5,402,025	937,210	4,217,445	49,335,503
Structural excav.	cu.m	3.7	161,870	598,919	154,320	570,984	36,640	135,568	51,090	189,033	36,840	136,308	1,630,812
Structural embant	cu.m	6.3	186,070	1,172,241	177,200	1,116,360	104,390	657,657	56,830	358,029	37,630	237,069	3,541,356
Concrete	cu.m	120.0	20,620	2,474,400	26,240	3,148,800	4,650	558,000	8,300	996,000	3,912	469,440	7,646,640
Masonry	cu.m	50.0	10,867	543,350	15,340	767,000	6,430	321,500	4,560	228,000	4,100	205,000	2,064,850
Steel	ton	590.0	1,890	1,115,100	2,500	1,475,000	390	230,100	720	424,800	340	200,600	3,445,600
<b>Total</b>			41,556,540	38,977,452	8,181,072	10,351,350							108,252,808
(US\$/ha for 29,496 ha)			1,321										351
(US\$/ha for 45,680 ha)			905										179

Diversion canal to Saigon river

Description	Unit	cost	Unit	
			Qty	Amount
Common excav.	cu.m	2.7	2,040,600	5,509,620
Embankment	cu.m	4.5	428,000	1,926,000
Structural excav.	cu.m	3.7	0	0
Structural embant	cu.m	6.3	0	0
Concrete	cu.m	120.0	8,850	1,062,000
Masonry	cu.m	50.0	4,300	215,000
Steel	ton	590.0	550	324,500
River dredging	cu.m	1.0	528,000	528,000
<b>Total</b>			9,565,120	

**Table 2.23 Estimated Incremental Benefit of Phuoc Hoa Irrigation Scheme**

Crop	Paddy (10,069 ha)		Paddy + Upland Crops (18,409 ha)		Upland Crops (10,269 ha)		C. Cane		Total
	Area (ha)	Yield (ton/ha)	Area (ha)	Yield (ton/ha)	Area (ha)	Yield (ton/ha)	Area (ha)	Yield (ton/ha)	
Paddy	W-S	6,334							6,334
	S-A	6,334	3,735	1,020	1,078	4,169			16,336
	Wet		3,735	1,020	1,078	7,647			15,338
Upland crop	G. nut		1,020		7,647	4,169	4,927	5,342	23,105
	Tobacco								1,078
	Maize								7,200
Sugar cane									14,432
	Fruits							4,416	4,416
Total	12,668	7,470	3,060	3,234	5,574	22,941	8,338	9,854	10,684

Unit: ha

**Estimation of Incremental Benefit from Agriculture**

Crop	Future Without Project				Future With Project				Incremental Benefit		
	Area (ha)	Yield (ton/ha)	Product (ton)	Price (US\$/ton)	Amount (US\$/ha)	Area (ha)	Yield (ton/ha)	Product (ton)		Price (US\$/ton)	Amount (US\$/ha)
Paddy	W-S	430	3.00	1,290	75	0.10	6,334	4.50	28,503	75	2.14
	S-A	5,431	2.90	15,750	75	1.18	16,336	3.50	57,176	75	4.29
	Wet	11,887	1.90	22,585	75	1.69	15,338	3.50	53,683	75	4.03
Upland crop	G. nut	5,755	1.75	10,071	456	4.59	23,105	1.95	45,055	456	20.54
	Tobacco	1,974	1.50	2,961	820	2.43	1,078	1.70	1,833	820	1.50
	Maize	1,162	5.00	5,810	116	0.67	7,200	5.50	39,600	116	4.59
Sugar cane		2,647	5.00	13,235	116	1.54	14,432	5.50	79,376	116	9.21
	Fruits	2,306	40.00	92,240	12	1.11	4,416	60.00	264,960	12	3.18
Rubber	1,983	20.00	39,660	187	7.42	2,517	25.00	62,925	187	11.77	
Cashew	744	0.70	521	320	0.17	0	0	0	0	0	
Garden crops	7,207	1.00	7,207	440	3.17	0	0	0	0	0	
Total	10,533				2.89	0				61.25	
Benefit/ha (US\$/ha)					26.95					1,341	

**Benefit of Water Supply**

Q = 4 m<sup>3</sup>/sec (Gross)  
 Industrial Water Supply Q = 2.3 m<sup>3</sup>/sec  
 Drinking Water Supply Q = 1.0 m<sup>3</sup>/sec  
 Total Q = 3.3 m<sup>3</sup>/sec (Net)  
 Industry 2.3\*86400\*365\*VND2500/VND11000=US\$16485000  
 Drinking 1.0\*86400\*365\*VND1000/VND11000=US\$2867000  
 Total US\$19352000  
 Benefit/ha US\$424/ha

Table 2.24 Land Use in Long An Province

Unit : ha

Zone Code Area Name	XIX-112 North		XIX-113 Duc Hue		XX-116 and 117 Duc Hoa and Ben Luc		XX-118&119 Can Duc and Can Giouc		XIX-115 Tan Tru		XIX-114 Thu Thua (Bo Bo)		Total
	Long An	Moc Hoa	Long An	Duc Hue	Long An	Tay Ninh	HCM	Long An	Long An	Long An	Long An	Long An	
Land Use / Province	Long An		Long An		Long An	Tay Ninh	HCM	Long An	Long An	Long An	Long An	Long An	Total
Single paddy	5,050		10,600		9,210	3,300	350	15,260	5,970	9,000			58,740
Double paddy	15,510		10,700		10,560	0	1,800	18,940	11,650	13,650			82,810
Triple paddy	0		900		0	0	0	0	0	0			900
Single paddy + upland	3,570		0		7,750	0	0	0	0	0			11,320
Double paddy + upland	0		0		4,190	0	0	0	0	0			4,190
Sugar cane	0		1,350		12,860	0	1,000	0	0	5,550			20,760
Pineapple/Banana	0		1,550		0	0	0	0	0	2,350			3,900
Reed or cotton	0		0		2,540	0	1,700	0	0	0			4,240
Melaleuca forest	4,170		0		0	0	0	0	0	1,000			5,170
Fallow or wild land	12,700		11,250		2,290	0	2,350	220	0	9,350			38,160
Total	41,000		36,350		49,400	3,300	7,200	34,420	17,620	40,900			230,190

Source : SIWRP

Table 2.25 Land Use in HCM City (Proposed in the period from 1996 to 2010)

Crops	Zone	Zone I		Zone II		Zone III		Zone IV		Zone V		Total
		Cu Chi District	10-12 months	Hoc Mon Binh Chanh	10-12 months	Thu Duc District	> 8 months	South Binh Chanh	6-7 months	South Nha Be & North Can Gio	3-6 months	
Period fresh water available/year		6,000	3,770	1,000	6,700	0	17,470					
Double & triple paddy		3,000	500	0	0	0	3,500					
Annual industrial crops		14,700	0	0	0	200	14,900					
Orchard farm		3,000	3,500	3,500	0	250	10,250					
Rubber plantation		4,000	0	0	0	0	4,000					
Forest		210	200	340	0	0	750					
Paddy & upland crops		1,100	5,330	0	0	0	6,430					
Sugar cane		0	4,900	0	0	0	4,900					
Single paddy & aquaculture		0	0	0	1,400	7,000	8,400					
Cultivated land		32,010	18,200	4,840	8,100	7,450	70,600					

Source : HCM City

- Zone I - East canal area of Dau Tieng irrigation scheme  
 - Low land along Saigon, Ben Muong, Lang The and Rach Tra  
 - Upland in north eastern Cu Chi (An Phu, Pham Van Goi)
- Zone II - Hoc Mon - Bac Binh Chanh (Lowland 9,000 ha, Upland 5,500 ah)  
 - Low land area along Saigon river and Rach Tra creek , 3,100 ha  
 - Low land along Saigon river (Hiep Binh Chanh, Hiep Binh Phuoc, Tam Phu)
- Zone III - Low land in South Thu Duc
- Zone IV - South Cho Dem and West Can Giouc river  
 - In between Can Giouc river and Ba Lao, Cay Kho creek
- Zone V - South Nha Be  
 - North Can Gio

Table 2.26 Potential Irrigated Agricultural Area in HCMC - Long An Delta

Unit: ha

Zone Code	Irrigated from Vam Co Dong River				Irrigated from Saigon River			
	XIX-113	XIX-116/117	XIX-114	Total	Duc Hoa and Ben Luc	Long An	Rest	Total
Area Name	Duc Hue	Duc Hoa and Ben Luc	Thu Thua		Duc Hoa and Ben Luc	Long An		
Province	Long An	Long An	Tay Ninh	Long An	Long An	Long An	Zone - I	Zone - II
Existing Crop Category								
Single paddy	10,600	5,650	3,600	3,700	23,550	1,610	1,950	3,560
Double paddy	11,600	4,950	0	6,900	23,450	250	5,360	5,610
Single paddy + upland	0	1,300	0	0	1,300	250	6,200	6,450
Double paddy + upland	0	150	0	0	150	350	3,690	4,040
Sugar cane	1,350	5,900	0	4,700	11,950	0	6,960	6,960
Reed or cotton	0	0	0	0	0	1,700	840	2,540
Melaleuca forest	0	0	0	1,000	1,000	0	0	0
Vegetables	0	0	0	0	0	0	0	0
Fruits	1,550	0	0	2,350	3,900	0	0	0
Fallow or wild land	11,250	1,350	0	5,000	17,600	750	190	940
Total in Gross	36,350	19,300	3,600	23,650	82,900	4,910	25,190	30,100
Total in Net	27,000	13,500	2,500	11,000	54,000	3,500	17,700	21,200
	(*3)	(*4)	(*4)	(*3)		(*4)	(*4)	
								(*)

Note (\*1): The gross area commanded by the Hoc Mon - Bac Binh Chanh Irrigation Scheme  
 (\*2): Agricultural land in net area including Hoc Mon - Bac Binh Chanh Irrigation Scheme  
 (\*3): See Table 2.26  
 (\*4): Net = 70% of Gross

Data source: SIWRP and HCM City

Table 2.27

**Future Proposed Land Use in Duc Hue and Thu Thua Areas  
Irrigated from the East Vam Co River**

Unit : ha

Zone Code  Area Name	Future Land Use (Gross)			Future Agricultural Land Use (Net)		
	XIX-113	XIX-114	Total	XIX-113	XIX-114	Total
	Duc Hue	Thu Thua		Duc Hue	Thu Thua	
Double paddy	24,900	6,300	31,200	22,400	5,600	28,000
Single paddy + upland	3,250	0	3,250	2,900	0	2,900
Sugar cane	1,100	3,200	4,300	900	2,900	3,800
Pineapple	0	2,750	2,750	0	2,500	2,500
Banana	900	0	900	800	0	800
Forest land	1,650	8,800	10,450	-	-	-
Infrastructure, etc.	4,550	2,600	7,150	-	-	-
<b>Total</b>	<b>36,350</b>	<b>23,650</b>	<b>60,000</b>	<b>27,000</b>	<b>11,000</b>	<b>38,000</b>

Data source : SIWRP





**Table 2.29 Estimate of Investment Cost in HCMC - Long An Delta  
in the Study Area**

**(1) Reference Cost Data in Delta Area in HCMC  
Hoc Mon - Bac Binh Chanh Irrigation Project**

Economic Cost : US\$27,290,000

A = 12,197 ha

Unit cost = US\$2,237 /ha

O&M Cost = US\$15/ha

Pump cost = US\$35/ha

**(2) Reference Cost Data from Bo Bo - Duc Hue Areas (A = 69,290 ha)**

Work	Unit	Q'ty (*)	Rate (US\$)	Amount (US\$ mil)
Excavation	m <sup>3</sup>	42,057,000	1.5	63.09
Embankment	m <sup>3</sup>	13,449,000	4.5	60.52
Concrete	m <sup>3</sup>	25848	120	3.10
Wet Masonry	m <sup>3</sup>	13079	50	0.65
Steel Bar	ton	908	590	0.54
Adm. & others				38.37
<b>Total</b>				<b>166.27</b>

Investment Cost/ha (US\$/ha)

2,400

Table 2.30 Potential Irrigation Schemes in East Coast

Name of Potential Scheme	River Basin (Water Source)	Province	Existing Schemes included		New Aea (ha)	Total Potential Area (ha)	Proposed Hydraulic Structures
			Nos. of Scheme	Area (ha)			
1. Phan Rang Plain (Extension)	Cai (Phan Rang)	Ninh Thuan	Total 15 - Schemes (>100 ha) 33 - Schemes (<100 ha)	5,075 3,932 1,143	10,325	15,400 Song Sat, Song Trau and Tan Giang Dams (*1)	
2. Tuy Phong Plain	Long Song	Binh Thuan	Total 4 - Schemes (>100 ha) 4 - Schemes (<100 ha)	2,150 1,670 480	2,050	4,200 Long Song Dam	
3. Phan Ri Plain	Luy	Binh Thuan	Total 17 - Schemes (>100 ha) 10 - Schemes (<100 ha)	6,113 5,563 550	25,887	32,000 Ca Giay, Ca Tot and Luy Dams, Diversion from Dong Nai Basin	
4. Phan Thiet Plain	Cai (Phan Thiet) and Ca Ty	Binh Thuan	Total 16 - Schemes (>100 ha) 57 - Schemes (<100 ha)	11,605 8,770 2,835	12,795	24,400 Song Quao, Ba Bau, Ke Bat and Song Mong Dams, Diversion from Luy Basin	
5. Song Phan Plain	Phan	Binh Thuan		0	5,030	5,030 Song Phang Dam	
6. Ham Tan Plain	Dinh	Binh Thuan	Total 6 - Schemes (>100 ha) 3 - Schemes (<100 ha)	1,210 1,090 120	6,790	8,000 Gieng and Dinh-3 Dams, Diversion from La Nga Basin	
7. Lower La Nga Plain	La Nga	Binh Thuan Dong Nai	Total Binh Thuan Province 14 - Schemes (>100 ha) 15 - Schemes (<100 ha)	10,235 6,740 720	29,765	40,000 Ta Pao and Vo Dat Weirs	
8. Ray River Area	Ray	Ba Ria - Vung Tau	Dong Nai Province 5 - Schemes (>100 ha) 3 - Schemes (<100 ha)	2,600 175 4,050	9,660	13,710 Ray Dam and other 8 dams	
9. Dinh River Area	Dinh	Ba Ria - Vung Tau		1,950	2,790	4,740 Da Den Dam and other 4 dams	
Total				42,388	105,092	147,480	

Remarks (\*1) : Rehabilitation of Phan Rang and Song Pha Irrigation Schemes are excluded.

**Table 2.31 Present Land Use and Potential Irrigation Area in Phan Ri Plain**

Unit : ha

Present Land Use	Area in Scheme	Area Unsuitable for Irrigation	Potential Irrigation Area	
			Gross Area	Net Area
Single irri+rainfed rice	2,738	0	2,738	2,460
Single raifed rice	12,968	0	12,968	11,670
Upland crops	8,354	1,000	7,354	5,870
Shifting land	890	100	790	0
Bush/Grass	24,672	4,650	20,022	12,000
(Sub-total)	(49,622)	(5,750)	(43,872)	(32,000)
Evergreen forests	6,235	200	6,035	0
Settlement/Orchard	351	351	0	0
River	347	347	0	0
Road	67	67	0	0
Railroad	82	82	0	0
(Sub-total)	(7,082)	(1,047)	(6,035)	(0)
<b>Total</b>	<b>56,704</b>	<b>6,797</b>	<b>49,907</b>	<b>32,000</b>

**Table 2.32 Water Balance of Phan Ri Plain Scheme (32,000 ha) in Case of Maximum Water Requirement (3 Paddies/year) with Luy Reservoir Only**

Unit : m3 Million (MCM)

Month	Suoi Da Reservoir (6.2 MCM)				Dong Moi Weir				Luy Reservoir (226 MCM)				Spill - out						
	Irr. Demand		Stored		Inflow from (*)		Irr. Demand		Inflow from		Irrigation Demand			Total Balance					
	Da (ha)	400 Balance	Vol.	Spill - out	Luy Res.	Basin Rest	Total	(ha)	Luy Riv.	Dai Ninh	Total	Moi Dong			Rest (ha)				
Jan.	0.26	1.67	-1.41	3.87	0.00	4.19	2.91	7.10	7.10	0.00	3.01	65.51	68.52	4.19	121.17	125.36	-56.84	122.71	0.00
Feb.	0.20	1.78	-1.58	2.30	0.00	5.30	2.27	7.57	7.57	0.00	2.35	59.17	61.52	5.30	129.09	134.38	-72.86	49.85	0.00
Mar.	0.23	1.56	-1.33	0.96	0.00	4.06	2.58	6.65	6.65	0.00	2.67	65.51	68.19	4.06	113.40	117.47	-49.28	0.57	0.00
Apr.	0.37	0.76	-0.39	0.58	0.00	0.00	4.14	4.14	3.22	0.93	4.28	63.40	67.68	0.00	54.87	54.87	12.81	13.37	0.00
May	0.47	1.00	-0.53	0.05	0.00	0.00	5.21	5.21	4.23	0.97	5.38	65.51	70.90	0.00	72.24	72.24	-1.34	12.04	0.00
Jun.	1.11	0.97	0.14	0.19	0.00	0.00	12.43	12.43	4.14	8.29	12.85	63.40	76.25	0.00	70.66	70.66	5.59	17.63	0.00
Jul.	1.47	0.93	0.54	0.72	0.00	0.00	16.40	16.40	3.96	12.44	16.95	65.51	82.46	0.00	67.58	67.58	14.88	32.51	0.00
Aug.	1.97	0.00	1.97	2.69	0.00	0.00	21.95	21.95	0.00	21.95	22.68	65.51	88.20	0.00	0.00	0.00	88.20	120.71	0.00
Sep.	2.76	0.37	2.38	5.07	0.00	0.00	30.80	30.80	1.59	29.21	31.83	63.40	95.23	0.00	27.06	27.06	68.17	188.88	0.00
Oct.	3.64	0.93	2.71	6.20	1.59	0.00	40.70	40.70	3.96	36.74	42.07	65.51	107.58	0.00	67.58	67.58	40.01	226.00	2.89
Nov.	1.43	1.34	0.09	6.20	0.09	0.00	15.95	15.95	5.68	10.27	16.49	63.40	79.89	0.00	96.97	96.97	-17.08	208.92	0.00
Dec.	0.46	1.37	-0.91	5.29	0.00	0.73	5.10	5.83	5.83	0.00	5.27	65.51	70.78	0.73	99.42	100.15	-29.37	179.55	0.00
Total	14.37	12.69	1.68		1.68	14.28	160.44	174.72	53.93	120.79	165.83	771.37	937.20	14.28	920.03	934.31	2.89		2.89
Av.GMS	0.46	0.40	0.05		0.05	0.45	5.09	5.54	1.71	3.83	5.26	24.46	29.72	0.45	29.17	29.63	0.09		0.09

(\*) : Spill-out from Song Luy Res. is not included.

**Table 2.33 Area-Storage Capacity Curve of Luy Reservoir**

EL. (EL. m)	Area (km <sup>2</sup> )	Volume (MCM)
103	0.0	0.0
110	0.3	0.9
120	5.0	27
130	21.0	157
140	40.0	462
160	60.0	1,462
200	84.0	4,342

Source: SIWRP

Table 2.34 Water Balance of Phan Ri Plain Irrigation Scheme with Ca Giay Reservoir Only

Unit: m3 Million (MCM)

Month	Sum Da Reservoir (6.2 MCM)											
	Ca Giay Reservoir (19.5 MCM)	Ca Giay Reservoir (19.5 MCM)	Sum Da Reservoir (6.2 MCM)	Sum Da Reservoir (6.2 MCM)	Spill-out	Stored Vol.	Spill-out	Spill-out	Spill-out	Inflow from Dam	Inflow from River	Balance
Jan	0.79	4.18	1.19	1.19	0.00	11.91	0.00	0.00	0.00	0.00	0.00	3.55
Feb	0.62	5.71	-5.09	1.71	-1.51	6.87	0.00	0.00	0.00	2.58	4.85	0.00
Mar	0.70	4.18	-3.47	1.40	-1.02	3.55	0.00	0.00	0.00	2.58	3.55	0.00
Apr	1.13	2.49	-1.36	0.75	-0.38	1.22	0.00	0.00	0.00	4.14	2.12	2.03
May	1.42	3.32	-1.90	0.47	0.00	0.00	0.00	0.00	0.00	5.21	5.21	0.00
Jun	3.39	3.42	-0.03	1.11	0.09	0.76	0.00	0.00	0.00	12.43	2.91	9.52
Jul	4.47	3.32	1.15	1.00	0.07	1.25	0.00	0.00	0.00	16.40	2.82	13.57
Aug	5.98	1.56	5.44	0.00	0.00	1.80	0.00	0.00	0.00	21.95	0.46	21.49
Sep	11.09	1.56	6.83	13.52	0.00	2.76	0.00	0.00	0.00	30.80	1.32	29.47
Oct	1.36	3.70	7.39	19.50	1.41	3.64	1.11	0.00	0.00	40.70	3.14	37.56
Nov	1.36	4.23	1.71	18.19	0.00	1.41	0.00	0.00	0.00	15.95	4.80	11.15
Dec	1.39	4.23	2.44	15.15	0.00	0.00	0.00	0.00	0.00	5.10	3.60	1.50
Total	43.70	42.59	1.11	143.37	1.64	126.73	0.00	0.00	0.00	165.33	28.26	137.07
at start	1.39	1.39	0.04	0.46	0.05	0.00	0.00	0.00	0.00	5.26	4.08	1.18

(\*) Spill-out from Song Lay Res. is not included.

Unit: m3 Million (MCM)

Month	Sum Da Reservoir (6.2 MCM)											
	Ca Giay Reservoir (19.5 MCM)	Ca Giay Reservoir (19.5 MCM)	Sum Da Reservoir (6.2 MCM)	Sum Da Reservoir (6.2 MCM)	Spill-out	Stored Vol.	Spill-out	Spill-out	Inflow from Dam	Inflow from River	Balance	
Jan	0.79	4.18	1.19	1.19	0.00	11.91	0.00	0.00	0.00	0.00	3.55	
Feb	0.62	5.71	-5.09	1.71	-1.51	6.87	0.00	0.00	0.00	2.58	4.85	0.00
Mar	0.70	4.18	-3.47	1.40	-1.02	3.55	0.00	0.00	0.00	2.58	3.55	0.00
Apr	1.13	2.49	-1.36	0.75	-0.38	1.22	0.00	0.00	0.00	4.14	2.12	2.03
May	1.42	3.32	-1.90	0.47	0.00	0.00	0.00	0.00	0.00	5.21	5.21	0.00
Jun	3.39	3.42	-0.03	1.11	0.09	0.76	0.00	0.00	0.00	12.43	2.91	9.52
Jul	4.47	3.32	1.15	1.00	0.07	1.25	0.00	0.00	0.00	16.40	2.82	13.57
Aug	5.98	1.56	5.44	0.00	0.00	1.80	0.00	0.00	0.00	21.95	0.46	21.49
Sep	11.09	1.56	6.83	13.52	0.00	2.76	0.00	0.00	0.00	30.80	1.32	29.47
Oct	1.36	3.70	7.39	19.50	1.41	3.64	1.11	0.00	0.00	40.70	3.14	37.56
Nov	1.36	4.23	1.71	18.19	0.00	1.41	0.00	0.00	0.00	15.95	4.80	11.15
Dec	1.39	4.23	2.44	15.15	0.00	0.00	0.00	0.00	0.00	5.10	3.60	1.50
Total	43.70	42.59	1.11	143.37	1.64	126.73	0.00	0.00	0.00	165.33	28.26	137.07
at start	1.39	1.39	0.04	0.46	0.05	0.00	0.00	0.00	0.00	5.26	4.08	1.18

(\*) Spill-out from Song Lay Res. is not included.

Unit: m3 Million (MCM)

Month	Sum Da Reservoir (6.2 MCM)											
	Ca Giay Reservoir (19.5 MCM)	Ca Giay Reservoir (19.5 MCM)	Sum Da Reservoir (6.2 MCM)	Sum Da Reservoir (6.2 MCM)	Spill-out	Stored Vol.	Spill-out	Spill-out	Inflow from Dam	Inflow from River	Balance	
Jan	0.79	4.18	1.19	1.19	0.00	11.91	0.00	0.00	0.00	0.00	3.55	
Feb	0.62	5.71	-5.09	1.71	-1.51	6.87	0.00	0.00	0.00	2.58	4.85	0.00
Mar	0.70	4.18	-3.47	1.40	-1.02	3.55	0.00	0.00	0.00	2.58	3.55	0.00
Apr	1.13	2.49	-1.36	0.75	-0.38	1.22	0.00	0.00	0.00	4.14	2.12	2.03
May	1.42	3.32	-1.90	0.47	0.00	0.00	0.00	0.00	0.00	5.21	5.21	0.00
Jun	3.39	3.42	-0.03	1.11	0.09	0.76	0.00	0.00	0.00	12.43	2.91	9.52
Jul	4.47	3.32	1.15	1.00	0.07	1.25	0.00	0.00	0.00	16.40	2.82	13.57
Aug	5.98	1.56	5.44	0.00	0.00	1.80	0.00	0.00	0.00	21.95	0.46	21.49
Sep	11.09	1.56	6.83	13.52	0.00	2.76	0.00	0.00	0.00	30.80	1.32	29.47
Oct	1.36	3.70	7.39	19.50	1.41	3.64	1.11	0.00	0.00	40.70	3.14	37.56
Nov	1.36	4.23	1.71	18.19	0.00	1.41	0.00	0.00	0.00	15.95	4.80	11.15
Dec	1.39	4.23	2.44	15.15	0.00	0.00	0.00	0.00	0.00	5.10	3.60	1.50
Total	43.70	42.59	1.11	143.37	1.64	126.73	0.00	0.00	0.00	165.33	28.26	137.07
at start	1.39	1.39	0.04	0.46	0.05	0.00	0.00	0.00	0.00	5.26	4.08	1.18

(\*) Spill-out from Song Lay Res. is not included.

**Table 2.35 Water Balance of Phan Ri Plain Irrigation Scheme with Luy Reservoir Only**

(1) Discharge from Dai Ninh Power Station : 24.46 m<sup>3</sup>/sec  
Sun Da Reservoir (6.2 MCM)

Unit : m<sup>3</sup> Million (MCM)

Month	Sun Da Reservoir (6.2 MCM)		Dung Ma Weir		Inflow from (1)		In. Demand (ha)		Inflow from (2)		Spill-out	Stored Vol	Balance	Inflow from (3)		In. Demand (ha)		Supply to		Spill-out	Stored Vol	Balance
	Sun Da Riv.	Dm. Riv.	Luy Res.	Rest.	Luy Riv.	Dai Ninh	Total	1,700	Luy Riv.	Dai Ninh				Total	29,700	Dong Min	Rest	Total	29,700			
Jan.	0.26	1.25	0.00	0.00	0.64	0.00	0.64	3.55	0.00	0.00	0.00	4.13	0.00	3.01	0.00	3.01	65.51	0.64	62.05	62.69	26.06	5.94
Feb.	0.20	1.71	-1.51	0.00	2.58	0.00	2.58	4.85	0.00	0.00	0.00	2.58	0.00	2.35	0.00	2.35	59.17	2.58	61.75	87.36	0.16	0.00
Mar.	0.23	1.25	-1.02	0.00	0.97	0.00	0.97	3.55	0.00	0.00	0.00	0.97	0.00	2.67	0.00	2.67	65.51	0.97	66.48	63.01	5.33	0.00
Apr.	0.37	0.75	-0.38	0.00	0.00	0.00	0.00	4.14	0.00	0.00	0.00	0.00	0.00	4.28	0.00	4.28	63.40	0.00	63.40	36.95	26.00	10.06
May	0.47	1.00	-0.53	0.00	0.00	0.00	0.00	5.21	0.00	0.00	0.00	0.00	0.00	5.38	0.00	5.38	65.51	0.00	65.51	49.32	26.00	21.88
Jun.	1.11	1.00	0.09	0.00	0.00	0.00	12.43	2.91	0.00	0.00	0.00	12.43	0.00	12.85	0.00	12.85	70.90	0.00	70.90	50.81	26.00	25.44
Jul.	1.47	1.00	0.47	0.00	0.00	0.00	16.40	2.82	0.00	0.00	0.00	16.40	0.00	16.98	0.00	16.98	65.51	0.00	65.51	49.32	26.00	33.14
Aug.	1.97	1.00	0.97	0.00	0.00	0.00	21.95	2.82	0.00	0.00	0.00	21.95	0.00	22.68	0.00	22.68	65.51	0.00	65.51	7.95	26.00	80.24
Sep.	2.76	0.47	2.29	0.00	0.00	0.00	30.80	3.14	0.00	0.00	0.00	30.80	0.00	42.07	0.00	42.07	65.51	0.00	65.51	23.09	26.00	72.14
Oct.	3.64	1.11	2.54	0.00	0.00	0.00	40.70	4.80	0.00	0.00	0.00	40.70	0.00	54.89	0.00	54.89	65.51	0.00	65.51	54.89	26.00	52.69
Nov.	1.43	1.70	-0.27	0.00	0.00	0.00	15.95	3.60	0.00	0.00	0.00	15.95	0.00	16.49	0.00	16.49	65.51	0.00	65.51	83.91	26.00	21.94
Dec.	0.46	1.27	-0.81	0.00	0.00	0.00	5.10	3.60	0.00	0.00	0.00	5.10	0.00	5.27	0.00	5.27	65.51	0.00	65.51	62.84	26.00	3.91
Total	14.37	12.69	1.68	0.00	4.19	160.44	164.63	35.94	0.00	0.00	0.00	164.63	0.00	165.83	0.00	165.83	771.37	4.19	627.97	632.16	305.04	305.04
Av. CMS	0.46	0.40	0.05	0.00	0.13	5.09	5.22	1.14	4.08	0.00	0.00	5.22	0.00	5.26	0.00	5.26	24.46	0.13	19.91	20.05	9.67	9.67

(\*) Spill-out from Song Luy Res. is not included.

(2) Discharge from Dai Ninh Power Station : 20 m<sup>3</sup>/sec  
Sun Da Reservoir (6.2 MCM)

Unit : m<sup>3</sup> Million (MCM)

Month	Sun Da Reservoir (6.2 MCM)		Dung Ma Weir		Inflow from (1)		In. Demand (ha)		Inflow from (2)		Spill-out	Stored Vol	Balance	Inflow from (3)		In. Demand (ha)		Supply to		Spill-out	Stored Vol	Balance
	Sun Da Riv.	Dm. Riv.	Luy Res.	Rest.	Luy Riv.	Dai Ninh	Total	1,700	Luy Riv.	Dai Ninh				Total	29,700	Dong Min	Rest	Total	29,700			
Jan.	0.26	1.25	-0.99	0.00	0.64	0.00	0.64	3.55	0.00	0.00	0.00	4.13	0.00	3.01	0.00	3.01	65.51	0.64	62.05	62.69	44.30	0.00
Feb.	0.20	1.71	-1.51	0.00	2.58	0.00	2.58	4.85	0.00	0.00	0.00	2.58	0.00	2.35	0.00	2.35	48.38	2.58	50.73	87.36	7.67	0.00
Mar.	0.23	1.25	-1.02	0.00	0.97	0.00	0.97	3.55	0.00	0.00	0.00	0.97	0.00	2.67	0.00	2.67	53.57	0.97	54.54	63.01	0.89	0.00
Apr.	0.37	0.75	-0.38	0.00	0.00	0.00	4.14	2.12	0.00	0.00	0.00	4.14	0.00	4.28	0.00	4.28	56.24	0.00	56.24	36.95	20.06	0.00
May	0.47	1.00	-0.53	0.00	0.00	0.00	5.21	2.82	0.00	0.00	0.00	5.21	0.00	5.38	0.00	5.38	58.95	0.00	58.95	49.32	20.06	0.00
Jun.	1.11	1.00	0.09	0.00	0.00	0.00	12.43	2.91	0.00	0.00	0.00	12.43	0.00	12.85	0.00	12.85	64.69	0.00	64.69	50.81	43.57	0.00
Jul.	1.47	1.00	0.47	0.00	0.00	0.00	16.40	2.82	0.00	0.00	0.00	16.40	0.00	16.98	0.00	16.98	70.52	0.00	70.52	49.32	64.77	0.00
Aug.	1.97	1.00	0.97	0.00	0.00	0.00	21.95	2.82	0.00	0.00	0.00	21.95	0.00	22.68	0.00	22.68	68.30	0.00	68.30	7.95	70.00	63.07
Sep.	2.76	0.47	2.29	0.00	0.00	0.00	30.80	3.14	0.00	0.00	0.00	30.80	0.00	42.07	0.00	42.07	51.94	0.00	51.94	23.09	70.00	60.58
Oct.	3.64	1.11	2.54	0.00	0.00	0.00	40.70	4.80	0.00	0.00	0.00	40.70	0.00	54.89	0.00	54.89	65.51	0.00	65.51	54.89	70.00	40.75
Nov.	1.43	1.70	-0.27	0.00	0.00	0.00	15.95	3.60	0.00	0.00	0.00	15.95	0.00	16.49	0.00	16.49	65.51	0.00	65.51	83.91	70.00	40.75
Dec.	0.46	1.27	-0.81	0.00	0.00	0.00	5.10	3.60	0.00	0.00	0.00	5.10	0.00	5.27	0.00	5.27	65.51	0.00	65.51	62.84	54.42	0.00
Total	14.37	12.69	1.68	0.00	4.19	160.44	164.63	35.94	0.00	0.00	0.00	164.63	0.00	165.83	0.00	165.83	771.37	4.19	627.97	632.16	64.39	164.39
Av. CMS	0.46	0.40	0.05	0.00	0.13	5.09	5.22	1.14	4.08	0.00	0.00	5.22	0.00	5.26	0.00	5.26	20.00	0.13	19.91	20.05	5.21	5.21

(\*) Spill-out from Song Luy Res. is not included.

(3) Discharge from Dai Ninh Power Station : 15 m<sup>3</sup>/sec  
Sun Da Reservoir (6.2 MCM)

Unit : m<sup>3</sup> Million (MCM)

Month	Sun Da Reservoir (6.2 MCM)		Dung Ma Weir		Inflow from (1)		In. Demand (ha)		Inflow from (2)		Spill-out	Speed Vol	Balance	Inflow from (3)		In. Demand (ha)		Supply to		Spill-out	Stored Vol	Balance
	Sun Da Riv.	Dm. Riv.	Luy Res.	Rest.	Luy Riv.	Dai Ninh	Total	1,700	Luy Riv.	Dai Ninh				Total	29,700	Dong Min	Rest	Total	29,700			
Jan.	0.26	1.25	-0.99	0.00	0.64	0.00	0.64	3.55	0.00	0.00	0.00	4.13	0.00	3.01	0.00	3.01	65.51	0.64	62.05	62.69	69.55	0.00
Feb.	0.20	1.71	-1.51	0.00	2.58	0.00	2.58	4.85	0.00	0.00	0.00	2.58	0.00	2.35	0.00	2.35	38.29	2.58	40.64	87.36	20.83	0.00
Mar.	0.23	1.25	-1.02	0.00	0.97	0.00	0.97	3.55	0.00	0.00	0.00	0.97	0.00	2.67	0.00	2.67	40.18	0.97	41.15	63.01	6.66	0.00
Apr.	0.37	0.75	-0.38	0.00	0.00	0.00	4.14	2.12	0.00	0.00	0.00	4.14	0.00	4.28	0.00	4.28	43.16	0.00	43.16	36.95	6.87	0.00
May	0.47	1.00	-0.53	0.00	0.00	0.00	5.21	2.82	0.00	0.00	0.00	5.21	0.00	5.38	0.00	5.38	45.56	0.00	45.56	49.32	3.11	0.00
Jun.	1.11	1.00	0.09	0.00	0.00	0.00	12.43	2.91	0.00	0.00	0.00	12.43	0.00	12.85	0.00	12.85	51.73	0.00	51.73	50.81	4.03	0.00
Jul.	1.47	1.00	0.47	0.00	0.00	0.00	16.40	2.82	0.00	0.00	0.00	16.40	0.00	16.98	0.00	16.98	57.12	0.00	57.12	49.32	11.83	0.00
Aug.	1.97	1.00	0.97	0.00	0.00	0.00	21.95	2.82	0.00	0.00	0.00	21.95	0.00	22.68	0.00	22.68	40.18	0.00	40.18	7.95	66.74	0.00
Sep.	2.76	0.47	2.29	0.00	0.00	0.00	30.80	3.14	0.00	0.00	0.00	30.80	0.00	42.07	0.00	42.07	70.71	0.00	70.71	23.09	114.35	0.00
Oct.	3.64	1.11	2.54	0.00	0.00	0.00	40.70	4.80	0.00	0.00	0.00	40.70	0.00	54.89	0.00	54.89	38.88	0.00	38.88	54.89	135.00	6.71
Nov.	1.43	1.70	-0.27	0.00	0.00	0.00	15.95	3.60	0.00	0.00	0.00	15.95	0.00	16.49	0.00	16.49	38.88	0.00	38.88	83.91	26.54	106.46
Dec.	0.46	1.27	-0.81	0.00	0.00	0.00	5.10	3.60	0.00	0.00	0.00	5.10	0.00	5.27	0.00	5.27	40.18	0.00	40.18	62.84	89.06	0.00
Total	14.37	12.69	1.68	0.00	4.19	160.44	164.63	35.94	0.00	0.00	0.00	164.63	0.00	165.83	0.00	165.83	771.37	4.19	627.97	632.16	67.21	67.21
Av. CMS	0.46	0.40	0.05	0.00	0.13	5.09	5.22	1.14	4.08	0.00	0.00	5.22	0.00	5.26	0.00	5.26	15.00	0.13	19.91	20.05	6.21	6.21

(\*) Spill-out from Song Luy Res. is not included.

Table 2.36 Water Balance of Phan Ri Plain Irrigation Scheme with Luy and Ca Gray Reservoirs

(1) Discharge from Dai Ninh Power Station : 24.46 m3/sec

Unit : m3 Million (MCM)

Month	Ca Gray Reservoir (9.5 MCM)						Dung Mui Weir						Luy Reservoir (20.5 MCM)						Irrigation Demand					
	Ca Gray R. 2,000	Infl.		Spill-out	Stored Vol.	Balance	Suoi Da Riv. 600	Infl.		Spill-out	Stored Vol.	Balance	Luy Riv.	Dai Ninh Riv.	Total	Supply to Dong Mui	Res. (ha)	Total	Balance	Spill-out				
		Demand (ha)	Demand (ha)					Demand (ha)	Demand (ha)												Demand (ha)	Demand (ha)	Demand (ha)	Demand (ha)
Jan.	0.79	4.18	-3.39	11.97	-0.98	1.25	0.26	2.91	3.55	0.00	0.00	0.00	2.71	24.46	68.52	0.64	57.79	38.53	27.76	40.50	10.00			
Feb.	0.62	5.71	-5.09	6.87	-1.51	1.71	0.20	2.27	3.55	0.00	0.00	2.58	2.35	59.17	61.52	2.58	79.07	81.65	61.52	0.37	0.00			
Mar.	0.70	4.18	-3.47	3.40	-1.02	1.51	0.23	2.58	3.55	0.00	0.00	0.97	2.67	65.51	68.19	0.97	57.87	58.84	9.15	9.72	0.00			
Apr.	1.15	2.49	-1.36	2.04	-0.38	0.75	0.25	4.14	4.14	0.00	0.00	0.00	4.28	63.60	67.68	0.00	34.46	34.46	20.50	20.50	22.43			
May	1.42	3.32	-1.90	0.14	0.00	0.47	0.00	5.21	5.21	0.00	0.00	0.00	5.38	65.51	70.90	0.00	46.00	46.00	24.90	20.50	24.90			
Jun.	3.39	3.42	-0.03	0.10	0.00	1.11	0.00	12.43	12.43	0.00	0.00	0.00	12.85	63.60	76.25	0.00	47.39	47.39	20.50	20.50	24.86			
Jul.	4.47	3.32	-1.15	1.25	0.00	1.00	0.00	16.40	16.40	0.00	0.00	0.00	16.95	65.51	88.20	0.00	46.00	46.00	20.50	20.50	36.78			
Aug.	5.98	0.54	5.44	6.69	1.89	0.16	1.97	21.95	21.95	0.00	0.00	0.00	22.68	63.60	95.23	0.00	21.54	71.69	20.50	20.50	78.49			
Sep.	8.39	1.56	6.83	13.52	2.29	0.47	3.00	30.80	30.80	0.00	0.00	0.00	31.83	65.51	107.58	0.00	51.19	56.39	20.50	20.50	56.39			
Oct.	11.09	3.70	7.39	19.50	2.54	1.11	3.64	40.70	40.70	0.00	0.00	0.00	42.07	63.60	124.13	0.00	78.26	78.26	20.50	20.50	116.3			
Nov.	4.34	5.65	-1.31	18.19	0.00	1.70	0.00	15.05	15.05	0.00	0.00	0.00	16.49	63.60	70.78	0.00	58.61	58.61	20.50	20.50	12.17			
Dec.	1.39	4.25	-2.86	15.35	0.41	1.27	0.00	3.10	3.10	0.00	0.00	0.00	3.27	65.51	93.20	0.00	35.88	35.88	20.50	20.50	17.53			
AVGMS	1.39	4.25	-2.86	15.35	0.41	1.27	0.00	3.10	3.10	0.00	0.00	0.00	3.27	65.51	93.20	0.00	35.88	35.88	20.50	20.50	17.53			

(2) Discharge from Dai Ninh Power Station : 20 m3/sec

Unit : m3 Million (MCM)

Month	Ca Gray Reservoir (9.5 MCM)						Dung Mui Weir						Luy Reservoir (20.5 MCM)						Irrigation Demand					
	Ca Gray R. 2,000	Infl.		Spill-out	Stored Vol.	Balance	Suoi Da Riv. 600	Infl.		Spill-out	Stored Vol.	Balance	Luy Riv.	Dai Ninh Riv.	Total	Supply to Dong Mui	Res. (ha)	Total	Balance	Spill-out				
		Demand (ha)	Demand (ha)					Demand (ha)	Demand (ha)												Demand (ha)	Demand (ha)	Demand (ha)	
Jan.	0.79	4.18	-3.39	11.97	-0.98	1.25	0.26	2.91	3.55	0.00	0.00	0.00	2.71	20.00	53.57	0.64	57.79	38.53	27.76	40.50	10.00			
Feb.	0.62	5.71	-5.09	6.87	-1.51	1.71	0.20	2.27	3.55	0.00	0.00	2.58	2.35	48.34	50.73	2.58	79.07	81.65	50.92	2.94	0.00			
Mar.	0.70	4.18	-3.47	3.40	-1.02	1.51	0.23	2.58	3.55	0.00	0.00	0.97	2.67	53.57	56.24	0.97	57.87	58.84	21.60	0.34	0.00			
Apr.	1.15	2.49	-1.36	2.04	0.00	0.75	0.25	4.14	4.14	0.00	0.00	0.00	4.28	53.57	58.12	0.00	34.46	34.46	27.00	0.00	0.00			
May	1.42	3.32	-1.90	0.14	0.00	0.47	0.00	5.21	5.21	0.00	0.00	0.00	5.38	53.57	64.69	0.00	46.00	46.00	21.68	0.00	0.00			
Jun.	3.39	3.42	-0.03	0.10	0.00	1.11	0.00	12.43	12.43	0.00	0.00	0.00	12.85	53.57	77.52	0.00	47.39	47.39	21.50	0.00	0.00			
Jul.	4.47	3.32	-1.15	1.25	0.00	1.00	0.00	16.40	16.40	0.00	0.00	0.00	16.95	53.57	90.47	0.00	46.00	46.00	24.52	0.00	0.00			
Aug.	5.98	0.54	5.44	6.69	1.89	0.16	1.97	21.95	21.95	0.00	0.00	0.00	22.68	53.57	97.42	0.00	21.54	68.45	45.50	48.82	0.00			
Sep.	8.39	1.56	6.83	13.52	2.29	0.47	3.00	30.80	30.80	0.00	0.00	0.00	31.83	53.57	104.37	0.00	51.19	62.13	45.50	62.13	0.00			
Oct.	11.09	3.70	7.39	19.50	2.54	1.11	3.64	40.70	40.70	0.00	0.00	0.00	42.07	53.57	111.34	0.00	78.26	78.26	42.50	44.64	0.00			
Nov.	4.34	5.65	-1.31	18.19	0.00	1.70	0.00	15.05	15.05	0.00	0.00	0.00	16.49	53.57	86.33	0.00	58.61	58.61	35.79	0.00	0.00			
Dec.	1.39	4.25	-2.86	15.35	0.41	1.27	0.00	3.10	3.10	0.00	0.00	0.00	3.27	53.57	98.24	0.00	35.88	35.88	20.68	20.68	0.00			
AVGMS	1.39	4.25	-2.86	15.35	0.41	1.27	0.00	3.10	3.10	0.00	0.00	0.00	3.27	53.57	98.24	0.00	35.88	35.88	20.68	20.68	0.00			

(3) Discharge from Dai Ninh Power Station : 15 m3/sec

Unit : m3 Million (MCM)

Month	Ca Gray Reservoir (9.5 MCM)						Dung Mui Weir						Luy Reservoir (20.5 MCM)						Irrigation Demand					
	Ca Gray R. 2,000	Infl.		Spill-out	Stored Vol.	Balance	Suoi Da Riv. 600	Infl.		Spill-out	Stored Vol.	Balance	Luy Riv.	Dai Ninh Riv.	Total	Supply to Dong Mui	Res. (ha)	Total	Balance	Spill-out				
		Demand (ha)	Demand (ha)					Demand (ha)	Demand (ha)												Demand (ha)	Demand (ha)	Demand (ha)	
Jan.	0.79	4.18	-3.39	11.97	-0.98	1.25	0.26	2.91	3.55	0.00	0.00	0.00	2.71	15.00	43.19	0.64	57.79	38.53	27.76	40.50	10.00			
Feb.	0.62	5.71	-5.09	6.87	-1.51	1.71	0.20	2.27	3.55	0.00	0.00	2.58	2.35	36.29	38.64	2.58	79.07	81.65	-43.02	16.10	0.00			
Mar.	0.70	4.18	-3.47	3.40	-1.02	1.51	0.23	2.58	3.55	0.00	0.00	0.97	2.67	40.18	42.85	0.97	57.87	58.84	-15.99	0.11	0.00			
Apr.	1.15	2.49	-1.36	2.04	0.00	0.75	0.25	4.14	4.14	0.00	0.00	0.00	4.28	38.88	43.16	0.00	34.46	34.46	8.70	8.81	0.00			
May	1.42	3.32	-1.90	0.14	0.00	0.47	0.00	5.21	5.21	0.00	0.00	0.00	5.38	40.18	45.56	0.00	46.00	46.00	-0.44	8.37	0.00			
Jun.	3.39	3.42	-0.03	0.10	0.00	1.11	0.00	12.43	12.43	0.00	0.00	0.00	12.85	38.88	51.73	0.00	47.39	47.39	4.34	12.71	0.00			
Jul.	4.47	3.32	-1.15	1.25	0.00	1.00	0.00	16.40	16.40	0.00	0.00	0.00	16.95	40.18	62.46	0.00	46.00	46.00	11.13	21.83	0.00			
Aug.	5.98	0.54	5.44	6.69	1.89	0.16	1.97	21.95	21.95	0.00	0.00	0.00	22.68	40.18	70.71	0.00	21.54	55.44	79.26	0.00				
Sep.	8.39	1.56	6.83	13.52	2.29	0.47	3.00	30.80	30.80	0.00	0.00	0.00	31.83	38.88	82.24	0.00	51.19	62.13	110.50	0.00				
Oct.	11.09	3.70	7.39	19.50	2.54	1.11	3.64	40.70	40.70	0.00	0.00	0.00	42.07	38.88	94.37	0.00	78.26	78.26	110.50	0.00				
Nov.	4.34	5.65	-1.31	18.19	0.00	1.70	0.00	15.05	15.05	0.00	0.00	0.00	16.49	38.88	102.19	0.00	58.61	58.61	74.44	0.00				
Dec.	1.39	4.25	-2.86	15.35	0.41	1.27	0.00	3.10	3.10	0.00	0.00	0.00	3.27	40.18	110.50	0.00	35.88	35.88	20.68	20.68				
AVGMS	1.39	4.25	-2.86	15.35	0.41	1.27	0.00	3.10	3.10	0.00	0.00	0.00	3.27	40.18	110.50	0.00	35.88	35.88	20.68	20.68				

(\*) : Spill-out from Song Luy Res. is not included.



Table 2.37 Present Land Use and Potential Irrigation Area in Phan Thiet Plain

Present Land Use	Area in Scheme	Area unsuitable for Irrigation	Gross Irrigation Area	Gross Irrigation Area		Net Irrigation Area		Unit : ha
				Area (*1)	Extension Area (*2)	Proper Area	Extension Area	
Triple irri. rice	4,574	0	4,574	3,574	1,000	3,210	900	
Double irri. rice	437	0	437	387	50	340	40	
Single raifed rice	17,339	0	17,339	15,989	1,350	14,390	1,210	
Upland crops	6,675	0	6,675	3,575	3,100	2,820	2,480	
Cashew	785	0	785	0	785	0	0	
Bush/Grass	15,138	1650	13,488	6,138	7,350	3,640	3,370	
(Sub-total)	(44,948)	(1,650)	(43,298)	(29,663)	(13,635)	(24,400)	(8,000)	
Salt Pan	297	297	0	0	0	0	0	
Settlement/Orchard	988	988	0	0	0	0	0	
River	1,038	1,038	0	0	0	0	0	
Road	126	126	0	0	0	0	0	
Railroad	89	89	0	0	0	0	0	
(Sub-total)	(2,538)	(2,538)	(0)	(0)	(0)	(0)	(0)	
Total	47,486	4,188	43,298	29,663	13,635	24,400	8,000	

Note

(\*1) : Irrigable area by Quao reservoir and Ba Bau weir under construction

(\*2) : Irrigable area by diversion scheme from the proposed La Nga No.3 reservoir

Present Land Use	Gross Irrigation Area in Proper Area			Net Irrigation Area in Proper Area			Unit : ha
	Area in Quao Basin	Area in Ca Ty Basin	Total	Area in Quao Basin	Area in Ca Ty Basin	Total	
Triple irri. rice	2,824	750	3,574	2,540	670	3,210	
Double irri. rice	387	0	387	340	0	340	
Single raifed rice	12,639	3,350	15,989	11,370	3,020	14,390	
Upland crops	2,925	650	3,575	2,300	520	2,820	
Bush/Grass	2,488	3,650	6,138	1,450	2,190	3,640	
Total	21,263	8,400	29,663	18,000	6,400	24,400	

Table 2.38 Water Balance of Phan Thiet Plain Irrigation Scheme in Case of Maximum Water Requirement (3 Paddies/year)

Month	Song Quao Reservoir (67.3 MCM)					Song Mong Reservoir (15.5 MCM)					Ba Bau Weir					Ka Bet Reservoir (20 MCM)					Unit: m3 Million (MCM)				
	Inflow		Im.		Demand (ha)	Spill-out	Stored Vol.	Spill-out	Inflow	Im.	Demand (ha)	Spill-out	Stored Vol.	Spill-out	Inflow	Im.	Demand (ha)	Spill-out	Stored Vol.	Spill-out	Im.	Demand (ha)	Spill-out	Required Supply from Other Basin	Required Supplemental Supply from Other Basin
	Song Cai	Dun Sath	Total Inflow	Total Demand																					
Jan.	1.61	2.21	3.82	24.03	-20.20	34.48	0.00	0.55	3.93	4.18	3.76	9.72	0.00	0.60	0.46	0.14	0.74	5.22	-4.48	12.59	0.00	0.00	101.74	101.74	
Feb.	1.25	1.73	2.98	25.60	-22.61	11.87	0.00	0.43	4.18	-3.76	5.97	0.00	0.52	0.49	0.03	0.58	5.56	-4.99	-7.40	0.00	0.00	120.00	120.00		
Mar.	1.43	1.88	3.30	22.49	-19.18	-7.31	0.00	0.49	3.68	-3.19	2.78	0.00	0.53	0.43	0.10	0.66	4.89	-4.23	3.17	0.00	0.00	95.22	95.22		
Apr.	2.29	3.12	5.40	10.88	-5.48	-12.79	0.00	0.78	1.78	-1.00	1.78	0.00	0.88	0.21	0.67	1.05	2.37	-1.31	1.86	0.00	0.00	47.61	47.61		
May	2.88	5.89	8.77	14.32	-5.55	-18.34	0.00	0.98	2.34	-1.36	0.42	0.00	1.07	0.27	0.80	1.32	3.11	-1.79	0.07	0.00	0.00	60.65	60.65		
Jun.	6.87	11.88	18.74	14.01	4.73	-13.61	0.00	2.34	2.29	0.05	0.47	0.00	2.64	0.27	2.37	3.15	3.05	0.11	0.17	0.00	0.00	61.31	61.31		
Jul.	9.05	13.39	22.45	13.40	9.05	-4.56	0.00	3.09	2.19	0.90	1.37	0.00	3.36	0.26	3.11	4.16	2.91	1.25	1.42	0.00	0.00	56.74	56.74		
Aug.	12.12	13.39	25.51	0.00	25.51	20.95	0.00	4.14	0.00	4.14	5.51	0.00	4.50	0.00	4.50	5.57	0.00	5.57	6.99	0.00	0.00	0.00	0.00		
Sep.	17.01	12.96	29.97	5.37	24.60	45.56	0.00	3.80	0.88	4.93	10.43	0.00	6.53	0.10	6.43	7.81	1.17	6.65	13.64	0.00	0.00	23.48	23.48		
Oct.	22.48	13.39	35.87	13.40	22.47	67.30	0.73	7.67	2.19	5.48	15.50	0.41	8.35	0.26	8.10	10.33	2.91	7.41	20.00	1.05	1.05	56.74	56.74		
Nov.	8.81	10.43	19.24	19.23	0.01	67.30	0.01	3.01	3.14	-0.14	15.36	0.00	3.38	0.37	3.01	4.05	4.18	-0.13	19.87	0.00	0.00	84.13	84.13		
Dec.	2.81	4.29	7.10	19.71	-12.61	54.69	0.00	0.96	3.22	-2.26	13.10	0.00	1.05	0.38	0.67	1.29	4.29	-2.99	16.88	0.00	0.00	83.48	83.48		
Total	88.60	94.56	183.16	182.42	0.74	74.00	0.74	30.23	29.82	0.41	0.41	0.41	33.41	3.49	29.92	40.71	39.66	1.05	1.05	1.05	1.05	791.11	791.11		
Average	2.81	3.00	5.81	5.78	0.02	0.02	0.02	0.96	0.95	0.01	0.01	0.01	1.06	0.11	0.95	1.29	1.26	0.03	0.03	0.03	0.03	25.09	25.09		

Table 2.39 Water Balance of Phan Thiet Plain Irrigation Scheme in Case of Diversified Agriculture

Month	Song Quao Reservoir (67.3 MCM)					Song Mong Reservoir (14 MCM)					Ba Bau Weir					Ka Bet Reservoir (19 MCM)					Unit: m3 Million (MCM)				
	Inflow		Im.		Demand (ha)	Spill-out	Stored Vol.	Spill-out	Inflow	Im.	Demand (ha)	Spill-out	Stored Vol.	Spill-out	Inflow	Im.	Demand (ha)	Spill-out	Stored Vol.	Spill-out	Im.	Demand (ha)	Spill-out	Required Supply from Other Basin	Required Supplemental Supply from Other Basin
	Song Cai	Dun Sath	Total Inflow	Total Demand																					
Jan.	1.61	2.21	3.82	16.50	-12.68	41.92	0.00	0.55	2.92	4.00	-3.57	5.10	0.00	0.60	0.38	0.22	0.74	3.97	-3.23	11.72	0.00	0.00	43.91	43.91	
Feb.	1.25	1.73	2.98	22.55	-19.57	22.35	0.00	0.43	4.00	-3.57	5.10	0.00	0.52	0.51	0.00	0.58	5.42	-4.85	6.87	0.00	0.00	66.43	66.43		
Mar.	1.43	1.88	3.30	16.50	-13.20	9.15	0.00	0.49	2.92	-2.44	2.67	0.00	0.53	0.38	0.15	0.66	3.97	-3.31	3.56	0.00	0.00	43.91	43.91		
Apr.	2.29	3.12	5.40	9.83	-4.42	4.73	0.00	0.78	1.74	-0.96	1.70	0.00	0.88	0.22	0.65	1.05	2.36	-1.31	2.25	0.00	0.00	27.02	27.02		
May	2.88	5.89	8.77	13.12	-4.35	0.38	0.00	0.98	2.32	-1.34	0.36	0.00	1.07	0.30	0.77	1.32	3.16	-1.83	0.41	0.00	0.00	34.91	34.91		
Jun.	6.87	11.88	18.74	13.51	5.23	5.61	0.00	2.34	2.40	-0.05	0.31	0.00	2.64	0.31	2.33	3.15	3.25	-0.10	0.32	0.00	0.00	37.16	37.16		
Jul.	9.05	13.39	22.45	13.12	9.33	14.93	0.00	3.09	2.32	0.76	1.07	0.00	3.36	0.30	3.07	4.16	3.16	1.01	1.32	0.00	0.00	34.91	34.91		
Aug.	12.12	13.39	25.51	2.12	23.40	38.33	0.00	4.14	0.37	3.76	4.83	0.00	4.50	0.05	4.46	5.57	0.51	5.06	6.38	0.00	0.00	5.63	5.63		
Sep.	17.01	12.96	29.97	6.14	23.82	62.15	0.00	5.80	1.09	4.71	9.55	0.00	6.53	0.14	6.39	7.81	1.48	6.34	12.72	0.00	0.00	16.89	16.89		
Oct.	22.48	13.39	35.87	14.60	21.27	67.30	16.12	7.67	2.59	5.08	14.00	0.63	8.35	0.33	8.02	10.33	3.51	6.82	19.00	0.54	0.54	38.85	38.85		
Nov.	8.81	10.43	19.24	22.32	-3.08	64.22	0.00	3.01	3.96	-0.95	13.05	0.00	3.38	0.51	2.87	4.05	5.37	-1.32	17.68	0.00	0.00	61.37	61.37		
Dec.	2.81	4.29	7.10	16.72	-9.62	54.61	0.00	0.96	2.96	-2.00	11.05	0.00	1.05	0.38	0.67	1.29	4.07	-2.73	14.95	0.00	0.00	44.48	44.48		
Total	88.60	94.56	183.16	167.04	16.12	16.12	16.12	30.23	29.60	0.63	0.63	0.63	33.41	3.81	29.60	40.71	40.17	0.54	0.54	0.54	0.54	455.47	455.47		
Average	2.81	3.00	5.81	5.30	0.51	0.51	0.51	0.96	0.94	0.02	0.02	0.02	1.06	0.12	0.94	1.29	1.27	0.02	0.02	0.02	0.02	14.44	14.44		

**Table 2.40 Water Balance of Luy Reservoir for Phan Ri - Phan Thiet Diversion Scheme (Without Ca Glay Reservoir)**

**(1) Discharge from Dai Ninh Power Station : 24.46 m<sup>3</sup>/sec**

Unit: m<sup>3</sup> Million (MCM)

Month	Song Luy Reservoir (131 MCM)		Irrigation Demand		Balance	Stored Vol.	Spill - out
	Inflow to Song Luy Res.	Phan Ri Plain 32,000 ha	Phan Thiet Plain 10,000 ha	Total			
Jan.	68.52	62.69	20.89	83.58	-15.06	70.45	0.00
Feb.	61.52	87.36	28.55	115.91	-54.39	16.06	0.00
Mar.	68.19	63.01	20.89	83.91	-15.72	0.34	0.00
Apr.	67.68	36.95	12.44	49.39	18.29	18.62	0.00
May	70.90	49.32	16.61	65.93	4.97	23.60	0.00
Jun.	76.25	50.81	17.11	67.92	8.33	31.93	0.00
Jul.	82.46	49.32	16.61	65.93	16.53	48.47	0.00
Aug.	88.20	7.95	2.68	10.63	77.56	126.03	0.00
Sep.	95.23	23.09	7.78	30.87	64.36	131.00	59.39
Oct.	107.58	54.89	18.48	73.37	34.21	131.00	34.21
Nov.	79.89	83.91	28.25	112.16	-32.28	98.72	0.00
Dec.	70.78	62.84	21.16	84.00	-13.22	85.50	0.00
<b>Total</b>	<b>937.20</b>	<b>632.16</b>	<b>211.44</b>	<b>843.60</b>	<b>93.60</b>		<b>93.60</b>
<b>Aver. (m<sup>3</sup>/se)</b>	<b>29.72</b>	<b>20.05</b>	<b>6.70</b>	<b>26.75</b>	<b>2.97</b>		<b>2.97</b>

**(2) Discharge from Dai Ninh Power Station : 20 m<sup>3</sup>/sec**

Unit: m<sup>3</sup> Million (MCM)

Month	Song Luy Reservoir (162 MCM)		Irrigation Demand		Balance	Stored Vol.	Spill - out
	Inflow to Song Luy Res.	Phan Ri Plain 32,000 ha	Phan Thiet Plain 7,700 ha	Total			
Jan.	56.58	62.69	16.09	78.77	-22.20	82.16	0.00
Feb.	50.73	87.36	21.98	109.34	-58.61	23.55	0.00
Mar.	56.24	63.01	16.09	79.10	-22.86	0.69	0.00
Apr.	56.12	36.95	9.58	46.53	9.59	10.28	0.00
May	58.95	49.32	12.79	62.11	-3.15	7.12	0.00
Jun.	64.69	50.81	13.17	63.98	0.71	7.83	0.00
Jul.	70.52	49.32	12.79	62.11	8.41	16.24	0.00
Aug.	76.25	7.95	2.06	10.02	66.24	82.48	0.00
Sep.	83.67	23.09	5.99	29.08	54.59	137.07	0.00
Oct.	95.64	54.89	14.23	69.12	26.52	162.00	1.58
Nov.	68.33	83.91	21.75	105.67	-37.34	124.66	0.00
Dec.	58.84	62.84	16.29	79.14	-20.30	104.36	0.00
<b>Total</b>	<b>796.55</b>	<b>632.16</b>	<b>162.81</b>	<b>794.97</b>	<b>1.58</b>		<b>1.58</b>
<b>Aver. (m<sup>3</sup>/se)</b>	<b>25.26</b>	<b>20.05</b>	<b>5.16</b>	<b>25.21</b>	<b>0.05</b>		<b>0.05</b>

**(3) Discharge from Dai Ninh Power Station : 15 m<sup>3</sup>/sec**

Unit: m<sup>3</sup> Million (MCM)

Month	Song Luy Reservoir (135 MCM)		Irrigation Demand		Balance	Stored Vol.	Spill - out
	Inflow to Song Luy Res.	Phan Ri Plain 32,000 ha	Phan Thiet Plain 0 ha	Total			
Jan.	43.19	62.69	0.00	62.69	-19.50	69.55	0.00
Feb.	38.64	87.36	0.00	87.36	-48.73	20.83	0.00
Mar.	42.85	63.01	0.00	63.01	-20.17	0.66	0.00
Apr.	43.16	36.95	0.00	36.95	6.21	6.87	0.00
May	45.56	49.32	0.00	49.32	-3.76	3.11	0.00
Jun.	51.73	50.81	0.00	50.81	0.92	4.03	0.00
Jul.	57.12	49.32	0.00	49.32	7.80	11.83	0.00
Aug.	62.86	7.95	0.00	7.95	54.91	66.74	0.00
Sep.	70.71	23.09	0.00	23.09	47.62	114.35	0.00
Oct.	82.24	54.89	0.00	54.89	27.36	135.00	6.71
Nov.	55.37	83.91	0.00	83.91	-28.54	106.46	0.00
Dec.	45.44	62.84	0.00	62.84	-17.40	89.06	0.00
<b>Total</b>	<b>638.87</b>	<b>632.16</b>	<b>0.00</b>	<b>632.16</b>	<b>6.71</b>		<b>6.71</b>
<b>Aver. (m<sup>3</sup>/se)</b>	<b>20.26</b>	<b>20.05</b>	<b>0.00</b>	<b>20.05</b>	<b>0.21</b>		<b>0.21</b>

**Table 2.41 Water Balance of Luy Reservoir for Phan Ri - Phan Thiet Diversion Scheme (With Ca Giay Reservoir)**

**(1) Discharge from Dai Ninh Power Station : 24.46 m<sup>3</sup>/sec**

Unit: m<sup>3</sup> Million(MCM)

Month	Song Luy Reservoir (107 MCM)							
	Inflow to Song Luy Res.	Irrigation Demand			Balance	Stored Vol.	Spill-out	
		Phan Ri Plain 32,000 ha	Phan Thiet Plain 10,000 ha	Total				
Jan.	68.52	58.51	20.89	79.40	-10.88	60.51	0.00	
Feb.	61.52	81.65	28.55	110.20	-48.68	11.83	0.00	
Mar.	68.19	58.84	20.89	79.73	-11.54	0.28	0.00	
Apr.	67.68	34.46	12.44	46.90	20.78	21.06	0.00	
May	70.90	46.00	16.61	62.60	8.29	29.35	0.00	
Jun.	76.25	47.39	17.11	64.49	11.76	41.11	0.00	
Jul.	82.46	46.00	16.61	62.60	19.86	60.97	0.00	
Aug.	88.20	7.42	2.68	10.10	78.10	107.00	32.07	
Sep.	95.23	21.54	7.78	29.32	65.92	107.00	65.92	
Oct.	107.58	51.19	18.48	69.67	37.91	107.00	37.91	
Nov.	79.89	78.26	28.25	106.51	-26.63	80.37	0.00	
Dec.	70.78	58.61	21.16	79.77	-8.99	71.38	0.00	
Total	937.20	589.87	211.44	801.31	135.89		135.89	
Aver. (m <sup>3</sup> /se)	29.72	18.70	6.70	25.41	4.31		4.31	

**(2) Discharge from Dai Ninh Power Station : 20 m<sup>3</sup>/sec**

Unit: m<sup>3</sup> Million(MCM)

Month	Song Luy Reservoir (162 MCM)							
	Inflow to Song Luy Res.	Irrigation Demand			Balance	Stored Vol.	Spill-out	
		Phan Ri Plain 32,000 ha	Phan Thiet Plain 9,700 ha	Total				
Jan.	56.58	58.51	20.26	78.77	-22.20	82.16	0.00	
Feb.	50.73	81.65	27.69	109.34	-58.61	23.55	0.00	
Mar.	56.24	58.84	20.26	79.10	-22.86	0.69	0.00	
Apr.	56.12	34.46	12.07	46.53	9.59	10.28	0.00	
May	58.95	46.00	16.11	62.11	-3.15	7.12	0.00	
Jun.	64.69	47.39	16.59	63.98	0.71	7.83	0.00	
Jul.	70.52	46.00	16.11	62.11	8.41	16.24	0.00	
Aug.	76.25	7.42	2.60	10.02	66.24	82.48	0.00	
Sep.	83.67	21.54	7.54	29.08	54.59	137.07	0.00	
Oct.	95.64	51.19	17.93	69.12	26.52	162.00	1.58	
Nov.	68.33	78.26	27.41	105.67	-37.34	124.66	0.00	
Dec.	58.84	58.61	20.52	79.14	-20.30	104.36	0.00	
Total	796.55	589.87	205.09	794.97	1.58		1.58	
Aver. (m <sup>3</sup> /se)	25.26	18.70	6.50	25.21	0.05		0.05	

**(3) Discharge from Dai Ninh Power Station : 15 m<sup>3</sup>/sec**

Unit: m<sup>3</sup> Million(MCM)

Month	Song Luy Reservoir (138 MCM)							
	Inflow to Song Luy Res.	Irrigation Demand			Balance	Stored Vol.	Spill-out	
		Phan Ri Plain 32,000 ha	Phan Thiet Plain 2,300 ha	Total				
Jan.	43.19	58.51	4.81	63.31	-20.13	70.44	0.00	
Feb.	38.64	81.65	6.57	88.22	-49.58	20.86	0.00	
Mar.	42.85	58.84	4.81	63.64	-20.79	0.07	0.00	
Apr.	43.16	34.46	2.86	37.32	5.84	5.90	0.00	
May	45.56	46.00	3.82	49.82	-4.26	1.64	0.00	
Jun.	51.73	47.39	3.93	51.32	0.41	2.05	0.00	
Jul.	57.12	46.00	3.82	49.82	7.30	9.36	0.00	
Aug.	62.86	7.42	0.62	8.04	54.83	64.18	0.00	
Sep.	70.71	21.54	1.79	23.33	47.38	111.57	0.00	
Oct.	82.24	51.19	4.25	55.44	26.80	138.00	0.37	
Nov.	55.37	78.26	6.50	84.76	-29.39	108.61	0.00	
Dec.	45.44	58.61	4.87	63.48	-18.03	90.57	0.00	
Total	638.87	589.87	48.63	638.50	0.37		0.37	
Aver. (m <sup>3</sup> /se)	20.26	18.70	1.54	20.25	0.01		0.01	

**Table 2.42 Estimated Incremental Benefit of Phan Ri Irrigation Scheme**

**(1) Present Land Use and Cropping Pattern**

Present Land Use	Area	W-S Paddy	S-A Paddy	Wet Paddy	Upland crops
Existing irri. scheme (*1)	6,113	672	2,323	6,113	
Rainfed area	8,017			8,017	
Upland crops area	5,870				5,870
Bush/Grass	12,000				
<b>Total</b>	<b>32,000</b>	<b>672</b>	<b>2,323</b>	<b>14,130</b>	<b>5,870</b>

(\*1) : Cropping area in Binh Thuan Province (Refer to inventory survey in Phase I)

W-S :	11%
S-A :	38%
Wet :	100%

**(2) Benefit without project condition (32,000 ha)**

Crop	Area	Benefit US\$/ha	Benefit (US\$)
W-S Paddy	672	263	176,400
S-A Paddy	2,323	225	522,675
Wet Paddy	14,130	188	2,649,375
Upland crops	5,870	612	3,592,440
<b>Total</b>			<b>6,940,890</b>
<b>Benefit per ha (US\$/ha)</b>			<b>217</b>

  

Unit Benefit	Yield	Net Benefit	Rate	Unit Benefit
W-S Paddy	3.5	75	1	263
S-A Paddy	3	75	1	225
Wet Paddy	2.5	75	1	188
Upland crops				612
Maize	33%	640	0.9	190
Sugar cane	33%	598	0.9	178
G. Nut	34%	798	0.9	244

**(3) With Project Condition (32,000 ha)**

Crop	Area	Benefit US\$/ha	Benefit (US\$)
W-S Paddy	9,600	338	3,240,000
S-A Paddy	19,200	300	5,760,000
Wet Paddy	19,200	300	5,760,000
W-S Upland crops	16,000	719	11,504,000
Cotton	6,400	1,335	8,544,000
Sugar cane	6,400	598	3,827,200
<b>Total</b>			<b>38,635,200</b>
<b>Benefit per ha (US\$/ha)</b>			<b>1,207</b>

  

Unit Benefit	Yield	Net Benefit	Rate	Unit Benefit
W-S Paddy	4.5	75	1	338
S-A Paddy	4	75	1	300
Wet Paddy	4	75	1	300
Upland crops				719
Maize	50%	640	1	320
G. Nut	50%	798	1	399
Cotton		1335	1	1,335
Sugar cane		598	1	598

**(4) Incremental Benefit per ha**

**US\$990/ha**

Table 2.43 Estimated Incremental Benefit of Phan Thiet Irrigation Scheme

(1) Present Land Use and Cropping Pattern

Present Land Use	Area	W-S Paddy	S-A Paddy	Wet Paddy	Upland crops
Existing irri. scheme (*1)	2,880	317	1,095	2,880	
Rainfed area	11,370			11,370	
Upland crops area	2,300				2,300
Bush/Grass	1,450				
<b>Total</b>	<b>18,000</b>	<b>317</b>	<b>1,095</b>	<b>14,250</b>	<b>2,300</b>

(\*1): Cropping area in Binh Thuan Province (Refer to inventory survey in Phase I)

W-S :	11%
S-A :	38%
Wet :	100%

(2) Benefit without project condition (18,000 ha)

Crop	Area	Benefit US\$/ha	Benefit (US\$)
W-S Paddy	317	263	83,213
S-A Paddy	1,095	225	246,375
Wet Paddy	14,250	188	2,671,875
Upland crops	2,300	612	1,407,600
<b>Total</b>			<b>4,409,063</b>
<b>Benefit per ha (US\$/ha)</b>			<b>245</b>

  

Unit Benefit	Yield	Net Benefit	Rate	Unit Benefit
W-S Paddy	3.5	75	1	263
S-A Paddy	3	75	1	225
Wet Paddy	2.5	75	1	188
Upland crops				612
Maize	33%	640	0.9	190
Sugar cane	33%	598	0.9	178
G. Nut	34%	798	0.9	244

(3) With Project Condition (18,000 ha)

Crop	Area	Benefit US\$/ha	Benefit (US\$)
W-S Paddy	5,400	338	1,822,500
S-A Paddy	10,800	300	3,240,000
Wet Paddy	10,800	300	3,240,000
W-S Upland crops	9,000	719	6,471,000
Cotton	3,600	1,335	4,806,000
Sugar cane	3,600	598	2,152,800
<b>Total</b>			<b>21,732,300</b>
<b>Benefit per ha (US\$/ha)</b>			<b>1,207</b>

  

Unit Benefit	Yield	Net Benefit	Rate	Unit Benefit
W-S Paddy	4.5	75	1	338
S-A Paddy	4	75	1	300
Wet Paddy	4	75	1	300
Upland crops				719
Maize	50%	640	1	320
G. Nut	50%	798	1	399
Cotton		1335	1	1,335
Sugar cane		598	1	598

(4) Incremental Benefit per ha

US\$962/ha

**Table 2.44 Present Land Use and Potential Irrigation Area of Ta Pao Irrigation Scheme in Lower La Nga Plain**

Unit : ha

Present Land Use	Area in Scheme	Area Unsuitable for Irrigation	Irrigation Area	
			Gross	Net
Triple irri. rice	2,678	0	2,678	2,410
Double irri. rice	1,050	0	1,050	950
Single raised rice	19,016	50	18,966	17,070
Upland crops	3,091	0	3,091	2,570
Sugar cane	12	0	12	0
Cashew	3,881	350	3,531	0
Bush/Grass	0	0	0	0
(Sub-total)	(29,728)	(400)	(29,328)	(23,000)
Settlement/Orchard	305	305	0	0
River	336	336	0	0
Road	31	31	0	0
(Sub-total)	(672)	(672)	(0)	(0)
<b>Total</b>	<b>30,400</b>	<b>1,072</b>	<b>29,328</b>	<b>23,000</b>

**Table 2.45 Present Land Use and Potential Irrigation Area of Vo Dat Irrigation Scheme in Lower La Nga Plain**

Unit : ha

Present Land Use	Area in Scheme	Area Unsuitable for Irrigation	Irrigation Area	
			Gross	Net
<b>Binh Thuan Province (*1)</b>				
Single raised rice	200	0	200	180
Upland crops	3,250	0	3,250	2,600
Cashew	850	0	850	0
Bush/Grass	528	100	428	220
Forests	2,130	0	2,130	1,200
Settlement/Orchard	305	305	0	0
River	336	336	0	0
Road	31	31	0	0
(Sub-total)	(7,630)	(772)	(6,858)	(4,200)
<b>Dong Nai Province (*2)</b>				
Single raised rice	810	0	810	800
Upland crops	3,610	0	3,610	3,600
Cashew/Coffee	1,280	0	1,280	0
Bush/Grass	4,440	0	4,440	2,800
Forests (Right Bank)	5,100	500	4,600	2,800
Forests (Left Bank)	1,320	0	1,320	800
Settlement/Orchard	820	820	0	0
River	380	380	0	0
Road	30	30	0	0
(Sub-total)	(17,790)	(1,730)	(16,060)	(10,800)
<b>Total</b>	<b>25,420</b>	<b>2,502</b>	<b>22,918</b>	<b>15,000</b>

Data Source

(\*1) : Land use and land evaluation by LANDSAT imagery

(\*2) : Ministry of Agriculture and Rural Development

**Table 2.46 Water Balance of Lower La Nga Plain Scheme**

Unit : m<sup>3</sup>/sec

Month	Ta Pao (23,000 ha)			Vo Dat (15,000 ha)		
	Inflow	Demand 23,000	Balance	Inflow (*)	Demand 15,000	Balance
Jan.	44.39	26.45	17.94	20.28	18.15	2.13
Feb.	43.79	22.77	21.02	21.68	15.30	6.38
Mar.	43.62	25.76	17.86	13.41	15.90	-2.50
Apr.	44.17	25.76	18.41	18.48	15.45	3.03
May	49.18	7.13	42.05	59.79	4.35	55.44
Jun.	64.79	0.00	64.79	108.77	0.00	108.77
Jul.	80.88	0.46	80.42	143.89	0.45	143.44
Aug.	106.19	0.46	105.73	183.00	0.60	182.40
Sep.	138.40	0.46	137.94	214.45	0.60	213.85
Oct.	129.60	0.69	128.91	199.25	0.75	198.50
Nov.	74.06	11.27	62.79	95.51	6.90	88.61
Dec.	48.72	19.32	29.40	34.84	11.85	22.99

(\*) : Run-off from the basin between Ta Pao and Vo Dat + Balance at Ta Pao.  
Return flow is not taken into consideration.



**Table 2.47 Estimated Incremental Benefit of Lower La Nga Plain Irrigation Scheme**  
 (1) Ta Pao Irrigation Scheme

(a) Present Land Use and Cropping Pattern

Present Land Use	Area	W-S Paddy	S-A Paddy	Wet Paddy	Upland crops
Vi-Xu m. scheme (*)	5,000	300	200	200	2,600
Other local schemes (*)	6,435	700	2,440	6,435	8,995
Rainfed area	8,995				2,570
Upland crops area	2,570				
Bush/Grass	0				
<b>Total</b>	<b>23,000</b>	<b>1,000</b>	<b>2,640</b>	<b>15,630</b>	<b>2,570</b>

(\*) : Cropping area in Binh Thuan Province (Refer to inventory survey in Phase I)

W-S : 11%  
 S-A : 38%  
 Wet : 100%

(b) Benefit without project condition (23,000 ha)

Crop	Area	Benefit USS/ha	Benefit	Unit Benefit
W-S Paddy	1,000	263	262,500	263
S-A Paddy	2,640	225	594,000	225
Wet Paddy	15,630	188	2,930,625	188
Upland crops	2,570	612	1,572,840	612
<b>Total</b>			<b>5,359,965</b>	<b>233</b>
Benefit per ha (USS/ha)				
W-S Paddy	Yield	Net Benefit	Rate	Unit Benefit
W-S Paddy	4	75	75	1
S-A Paddy	3	75	75	1
Wet Paddy	3	75	75	1
Upland crops	Maize	0	640	1
	Sugar cane	0	598	1
	G. Nut	0	798	1
				244

(c) Benefit with project condition (23,000 ha)

Crop	Area	Benefit USS/ha	Benefit	Unit Benefit
W-S Paddy	10,679	338	3,604,163	338
S-A Paddy	14,858	300	4,457,400	300
Wet Paddy	14,394	300	4,318,200	300
W-S Upland crops	6,965	719	5,007,835	719
Cotton	2,786	1,335	3,719,310	1,335
Sugar cane	2,470	598	1,477,060	598
<b>Total</b>			<b>22,583,968</b>	<b>986</b>
Benefit per ha (USS/ha)				
W-S Paddy	Yield	Net Benefit	Rate	Unit Benefit
W-S Paddy	5	75	75	1
S-A Paddy	4	75	75	1
Wet Paddy	4	75	75	1
Upland crops	Maize	1	640	1
	G. Nut	1	798	1
				1,335
				598

(d) Incremental Benefit per ha **USS\$753/ha**

(a) Present Land Use and Cropping Pattern (7,000 ha)

Present Land Use	Area	W-S Paddy	S-A Paddy	Wet Paddy	Upland crops
Rainfed area	180				180
Upland crops area	2,600				0
Bush/Grass	220				
Forest	4,000				
<b>Total</b>	<b>7,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,600</b>

(b) Benefit without project condition (7,000 ha)

Crop	Area	Benefit USS/ha	Benefit	Unit Benefit
W-S Paddy	0	263	0	0
S-A Paddy	0	225	0	0
Wet Paddy	180	188	33,750	188
Upland crops	2,600	612	1,591,200	612
<b>Total</b>			<b>1,624,950</b>	<b>232</b>
Benefit per ha (7,000ha)				
W-S Paddy	Yield	Net Benefit	Rate	Unit Benefit
W-S Paddy	4	75	75	1
S-A Paddy	3	75	75	1
Wet Paddy	3	75	75	1
Upland crops	Maize	0	640	1
	Sugar cane	0	598	1
	G. Nut	0	798	1
				244

(c) Benefit with project condition (7,000 ha)

Crop	Area	Benefit USS/ha	Benefit	Unit Benefit
W-S Paddy	2,100	338	708,750	338
S-A Paddy	4,200	300	1,260,000	300
Wet Paddy	4,200	300	1,260,000	300
W-S Upland crops	3,500	719	2,516,500	719
Cotton	1,400	1,335	1,869,000	1,335
Sugar cane	1,400	598	837,200	598
<b>Total</b>			<b>8,451,450</b>	<b>1,207</b>
Benefit per ha (7,000ha)				
W-S Paddy	Yield	Net Benefit	Rate	Unit Benefit
W-S Paddy	5	75	75	1
S-A Paddy	4	75	75	1
Wet Paddy	4	75	75	1
Upland crops	Maize	1	640	1
	G. Nut	1	798	1
				1,335
				598

(d) Incremental Benefit per ha **USS\$975/ha**

**Table 2.48 Water Balance of Phan Rang Plain Irrigation Schemes** Unit : m<sup>3</sup> Million (MCM)

Month	Song Pha Irr. Scheme (Existing)				Song Sat. Irr. Scheme (Proposed)				Phan Rang Irrigation Scheme (Gravity and Pump)				Reservoir in Song Cai River (26 MCM)						
	Inflow		Irr. Demand (ha)	Balance	Inflow	Irr. Demand (ha)	Balance	Spill-out	From Song Pha and Song Sat. Basin (km <sup>2</sup> )	Inflow Remain	Irrigation Demand		Total	Inflow From Cai (km <sup>2</sup> )	Irr. Demand	Spill-out			
	Natural Flow	Da Nhim									Phan Rang (ha)	Extension (ha)					Phan Rang (Pump) (ha)	Total (ha)	Shortfall
Jan.	1.07	40.18	41.25	9.59	31.66	31.66	1.42	3.26	-1.84	11.88	43.54	18.12	44.17	-0.63	7.25	0.63	6.62	26.00	6.62
Feb.	0.53	36.29	36.82	10.25	26.57	26.57	0.70	3.48	-2.78	5.76	32.32	19.38	50.23	-17.91	3.51	17.91	-14.40	11.60	0.00
Mar.	0.46	40.18	40.63	10.72	29.91	29.91	0.59	3.64	-3.05	4.93	34.84	20.25	49.40	-14.57	3.01	14.57	-11.56	0.04	0.00
Apr.	0.47	38.88	39.35	7.45	31.90	31.90	0.62	2.53	-1.91	5.05	36.95	14.07	34.98	1.96	3.08	0.00	3.08	3.12	0.00
May	2.49	40.18	42.67	14.13	28.54	28.54	3.29	4.80	-1.51	27.24	55.78	26.70	65.10	-9.32	16.62	9.32	7.30	10.42	0.00
Jun.	2.95	38.88	41.83	14.04	27.80	27.80	3.89	4.77	-0.88	32.25	60.05	26.53	65.96	-5.91	19.67	5.91	13.77	24.19	0.00
Jul.	2.01	40.18	42.18	13.37	28.81	28.81	2.62	4.54	-1.92	21.74	50.55	25.27	61.61	-11.06	13.26	11.06	2.20	26.00	0.38
Aug.	2.17	40.18	42.35	3.78	38.56	38.56	2.87	1.29	1.58	23.76	62.32	7.15	17.44	44.89	14.50	0.00	14.50	26.00	14.50
Sep.	5.03	38.88	43.91	6.23	37.68	37.68	6.61	2.12	4.49	54.97	92.65	17.48	29.25	63.40	33.53	0.00	33.53	26.00	33.53
Oct.	16.07	40.18	56.25	8.58	47.67	47.67	21.11	2.91	18.19	175.62	233.67	23.31	39.52	194.15	107.13	0.00	107.13	26.00	107.13
Nov.	10.26	38.88	49.14	10.87	38.28	38.28	13.48	3.69	9.79	112.18	160.25	30.51	51.04	109.20	68.43	0.00	68.43	26.00	68.43
Dec.	2.22	40.18	42.40	2.40	40.00	40.00	2.92	0.81	2.11	24.34	66.45	6.51	11.04	55.41	14.85	0.00	14.85	26.00	14.85
Total	45.74	473.04	518.78	111.40	407.37	407.37	60.12	37.84	22.27	429.65	929.37	309.24	519.75	409.62	304.82	59.39	245.43	245.43	245.43
Average	1.45	15.00	16.45	3.53	12.92	12.92	1.91	1.20	0.71	13.62	15.85	9.81	6.68	16.48	9.67	1.88	7.78	7.78	7.78

**Table 2.49 Water Balance of Tuy Phong Reservoir**

**Case-A : Maximum potential water use (3 paddies/year)**

Unit : MCM

Month	Inflow (75% Disch.)	Irrigation 2500	Balance	Stored Volume	Spill - out
Jan.	2.36	10.45	-8.09	27.94	0.00
Feb.	1.79	11.13	-9.34	18.61	0.00
Mar.	1.79	9.78	-7.99	10.62	0.00
Apr.	1.63	4.73	-3.10	7.52	0.00
May	1.63	6.23	-4.60	2.92	0.00
Jun.	3.47	6.09	-2.62	0.30	0.00
Jul.	7.45	5.83	1.62	1.92	0.00
Aug.	10.77	0.00	10.77	12.69	0.00
Sep.	20.63	2.33	18.30	30.99	0.00
Oct.	31.71	5.83	25.88	40.50	16.38
Nov.	10.91	8.36	2.55	40.50	2.55
Dec.	4.10	8.57	-4.47	36.03	0.00
<b>Total</b>	<b>98.24</b>	<b>79.31</b>	<b>18.93</b>		<b>18.93</b>
<b>Av. (m3/s)</b>	<b>3.12</b>	<b>2.52</b>	<b>0.60</b>		<b>0.60</b>

**Case-B : Water use for diversified agriculture**

Unit : MCM

Month	Inflow (75% Disch.)	Irrigation 4100	Balance	Stored Volume	Spill - out
Jan.	2.36	8.57	-6.21	29.05	0.00
Feb.	1.79	11.70	-9.91	19.13	0.00
Mar.	1.79	8.57	-6.78	12.36	0.00
Apr.	1.63	5.10	-3.47	8.88	0.00
May	1.63	6.81	-5.18	3.71	0.00
Jun.	3.47	7.01	-3.54	0.16	0.00
Jul.	7.45	6.81	0.64	0.80	0.00
Aug.	10.77	1.10	9.67	10.48	0.00
Sep.	20.63	3.19	17.44	27.92	0.00
Oct.	31.71	7.58	24.13	40.50	11.55
Nov.	10.91	11.58	-0.67	39.83	0.00
Dec.	4.10	8.68	-4.58	35.25	0.00
<b>Total</b>	<b>98.24</b>	<b>86.69</b>	<b>11.55</b>		<b>11.55</b>
<b>Av. (m3/s)</b>	<b>3.12</b>	<b>2.75</b>	<b>0.37</b>		<b>0.37</b>

**Table 2.50 Water Balance of Song Phan Plain Irrigation Scheme**

**Case-A : Maximum potential water use (3 Paddies/year)**

**Unit : MCM**

Month	Song Phan Reservoir (20 MCM)					Dang-2 Weir				
	Natural Flow	Irr. Demand (ha)	Balance	Stored Vol.	Spill - out	Inflow			S. Phan Demand (ha)	Balance
		1,250				From S. Phan Res.	Remain Basin(km <sup>2</sup> ) 166	Total		
Jan.	0.75	5.22	-4.47	12.39	0.00	0.00	0.90	0.90	0.63	0.28
Feb.	0.58	5.56	-4.98	7.41	0.00	0.00	0.70	0.70	0.67	0.04
Mar.	0.64	4.89	-4.25	3.16	0.00	0.00	0.80	0.80	0.59	0.21
Apr.	1.06	2.37	-1.30	1.86	0.00	0.00	1.28	1.28	0.28	1.00
May	1.31	3.11	-1.80	0.06	0.00	0.00	1.61	1.61	0.37	1.24
Jun.	3.16	3.05	0.12	0.18	0.00	0.00	3.85	3.85	0.37	3.48
Jul.	4.15	2.91	1.24	1.41	0.00	0.00	5.03	5.03	0.35	4.73
Aug.	5.57	0.00	5.57	6.99	0.00	0.00	6.80	6.80	0.00	6.80
Sep.	7.80	1.17	6.64	13.62	0.00	0.00	9.54	9.54	0.14	9.40
Oct.	10.34	2.91	7.43	20.00	1.05	1.05	12.61	13.65	0.35	13.30
Nov.	4.04	4.18	-0.14	19.86	0.00	0.00	4.94	4.94	0.50	4.44
Dec.	1.29	4.29	-3.00	16.86	0.00	0.00	1.58	1.58	0.51	1.06
<b>Total</b>	<b>40.70</b>	<b>39.66</b>	<b>1.05</b>		<b>1.05</b>	<b>1.05</b>	<b>49.69</b>	<b>50.74</b>	<b>4.76</b>	<b>45.98</b>
<b>Av.CMS</b>	<b>1.29</b>	<b>1.26</b>	<b>0.03</b>		<b>0.03</b>	<b>0.03</b>	<b>1.58</b>	<b>1.61</b>	<b>0.15</b>	<b>1.46</b>

**Case-B : Water use for diversified agriculture**

**Unit : MCM**

Month	Song Phan Reservoir (19MCM)					Dang-2 Weir				
	Natural Flow	Irr. Demand (ha)	Balance	Stored Vol.	Spill - out	Inflow			S. Phan Demand (ha)	Balance
		1,900				From S. Phan Res.	Remain Basin(km <sup>2</sup> ) 166	Total		
Jan.	0.75	3.97	-3.22	11.72	0.00	0.00	0.90	0.90	0.63	0.28
Feb.	0.58	5.42	-4.84	6.88	0.00	0.00	0.70	0.70	0.86	-0.15
Mar.	0.64	3.97	-3.33	3.55	0.00	0.00	0.80	0.80	0.63	0.17
Apr.	1.06	2.36	-1.30	2.25	0.00	0.00	1.28	1.28	0.37	0.91
May	1.31	3.16	-1.84	0.41	0.00	0.00	1.61	1.61	0.50	1.12
Jun.	3.16	3.25	-0.09	0.32	0.00	0.00	3.85	3.85	0.51	3.34
Jul.	4.15	3.16	1.00	1.32	0.00	0.00	5.03	5.03	0.50	4.58
Aug.	5.57	0.51	5.06	6.38	0.00	0.00	6.80	6.80	0.08	6.72
Sep.	7.80	1.48	6.32	12.70	0.00	0.00	9.54	9.54	0.23	9.30
Oct.	10.34	3.51	6.83	19.00	0.53	0.53	12.61	13.13	0.55	12.58
Nov.	4.04	5.37	-1.32	17.68	0.00	0.00	4.94	4.94	0.85	4.09
Dec.	1.29	4.02	-2.73	14.94	0.00	0.00	1.58	1.58	0.63	0.94
<b>Total</b>	<b>40.70</b>	<b>40.17</b>	<b>0.53</b>		<b>0.53</b>	<b>0.53</b>	<b>49.69</b>	<b>50.22</b>	<b>6.34</b>	<b>43.88</b>
<b>Av.CMS</b>	<b>1.29</b>	<b>1.27</b>	<b>0.02</b>		<b>0.02</b>	<b>0.02</b>	<b>1.58</b>	<b>1.59</b>	<b>0.20</b>	<b>1.39</b>

**Table 2.51 Water Balance of Ham Tan Plain Scheme (19,300ha)**

**Case-A Maximum potential water use (3 Paddies/year)** Unit : MCM

Month	Song Gieng Reservoir (14 MCM)					Song Dinh Reservoir (70 MCM)							Supply from Other Basin		
	Inflow	Irr.	Balance	Stored Vol.	Spill - out	Inflow			Irr. Demand (ha)	Balance	Stored Vol.	Spill - out	Irr. Demand (ha)	Supplemental Supply from Other Basin	
		Demand (ha)				From Song Gieng	Remain Basin(km2)	Total						14,150	MCM
Jan.	0.51	3.55	-3.04	8.86	0.00	0.00	2.49	2.49	17.97	-15.48	43.40	0.00	59.12	59.12	22.07
Feb.	0.39	3.78	-3.40	5.46	0.00	0.00	1.96	1.96	19.14	-17.18	26.22	0.00	69.73	69.73	28.83
Mar.	0.46	3.32	-2.87	2.59	0.00	0.00	2.20	2.20	16.81	-14.62	11.60	0.00	55.33	55.33	20.66
Apr.	0.73	1.61	-0.88	1.71	0.00	0.00	3.53	3.53	8.14	-4.61	6.99	0.00	27.67	27.67	10.67
May	0.91	2.12	-1.21	0.50	0.00	0.00	4.45	4.45	10.71	-6.26	0.73	0.00	35.25	35.25	13.16
Jun.	2.15	2.07	0.08	0.58	0.00	0.00	10.63	10.63	10.48	0.15	0.88	0.00	35.63	35.63	13.74
Jul.	2.84	1.98	0.86	1.44	0.00	0.00	14.01	14.01	10.02	3.99	4.87	0.00	32.97	32.97	12.31
Aug.	3.80	0.00	3.80	5.25	0.00	0.00	18.75	18.75	0.00	18.75	23.62	0.00	0.00	0.00	0.00
Sep.	5.34	0.79	4.55	9.79	0.00	0.00	26.31	26.31	4.01	22.30	45.91	0.00	13.64	13.64	5.26
Oct.	7.07	1.98	5.09	14.00	0.88	0.88	34.77	35.65	10.02	25.63	70.00	1.54	32.97	32.97	12.31
Nov.	2.77	2.84	-0.07	13.93	0.00	0.00	13.63	13.63	14.38	-0.74	69.26	0.00	48.89	48.89	18.86
Dec.	0.88	2.91	-2.03	11.90	0.00	0.00	4.37	4.37	14.74	-10.38	58.88	0.00	48.51	48.51	18.11
Total	27.85	26.97	0.88		0.88	0.88	137.08	137.96	136.42	1.54		1.54	459.72	459.72	
Av. CMS	0.88	0.86	0.03		0.03	0.03	4.35	4.37	4.33	0.05		0.05	14.58	14.58	

**Case-B Water use for diversified agriculture** Unit : MCM

Month	Song Gieng Reservoir (13 MCM)					Song Dinh Reservoir (62 MCM)							Supply from Other Basin		
	Inflow	Irr.	Balance	Stored Vol.	Spill - out	Inflow			Irr. Demand (ha)	Balance	Stored Vol.	Spill - out	Irr. Demand (ha)	Supplemental Supply from Other Basin	
		Demand (ha)				From Song Gieng	Remain Basin(km2)	Total						11,500	MCM
Jan.	0.51	2.72	-2.21	8.03	0.00	0.00	2.49	2.49	12.36	-9.87	38.01	0.00	29.56	29.56	11.04
Feb.	0.39	3.71	-3.32	4.70	0.00	0.00	1.96	1.96	14.78	-12.82	25.19	0.00	44.72	44.72	18.49
Mar.	0.46	2.72	-2.26	2.44	0.00	0.00	2.20	2.20	12.19	-9.99	15.20	0.00	29.56	29.56	11.04
Apr.	0.73	1.62	-0.89	1.55	0.00	0.00	3.53	3.53	9.94	-6.42	8.78	0.00	18.19	18.19	7.02
May	0.91	2.16	-1.25	0.30	0.00	0.00	4.45	4.45	12.88	-8.44	0.35	0.00	23.50	23.50	8.77
Jun.	2.15	2.22	-0.07	0.23	0.00	0.00	10.63	10.63	12.30	-1.67	-1.32	0.00	25.01	25.01	9.65
Jul.	2.84	2.16	0.68	0.91	0.00	0.00	14.01	14.01	10.79	3.21	1.89	0.00	23.50	23.50	8.77
Aug.	3.80	0.35	3.46	4.37	0.00	0.00	18.75	18.75	1.74	17.01	18.90	0.00	3.79	3.79	1.42
Sep.	5.34	1.01	4.33	8.69	0.00	0.00	26.31	26.31	5.05	21.25	40.15	0.00	11.37	11.37	4.39
Oct.	7.07	2.40	4.67	13.00	0.36	0.36	34.77	35.13	12.01	23.12	62.00	1.27	26.15	26.15	9.76
Nov.	2.77	3.67	-0.90	12.10	0.00	0.00	13.63	13.63	18.36	-4.73	57.27	0.00	41.31	41.31	15.94
Dec.	0.88	2.75	-1.87	10.23	0.00	0.00	4.37	4.37	13.75	-9.39	47.88	0.00	29.94	29.94	11.18
Total	27.85	27.49	0.36		0.36	0.36	137.08	137.44	136.17	1.27		1.27	306.61	306.61	
Av. CMS	0.88	0.87	0.01		0.01	0.01	4.35	4.36	4.32	0.04		0.04	9.72	9.72	



**Table 2.53 Screening of Candidate Schemes for Master Plan Projects**

Code	Schemes Classification		Identified Irrigation Schemes		Factors for Screening					Formulation and Area of Candidate M/P Projects			
	Main	Sub	Name of Scheme	Area (ha)	Source of Irrigation Water	Availability of Water Resource	Maturity of Planning	Social Impact	Natural Environ. Impact	Economic Viability	Formulation	Area (ha)	
A	Existing Irrigation Schemes (excluding Minor Existing Irrigation Schemes (smaller than 100 ha), 339 schemes with 34,033 ha in total)	A.1 Large and Medium Irrigation Schemes (Area larger than 2,000 ha)	- Vo Xu	5,000	D	F	C (for rehabili.)	P	S+, G+, H+ & C+	-	Included in Ta Pao Irri. Scheme Rehabilitated independently Rehabilitated independently with Phan Rang Formulated as Rural Agricultural Development Project (RADP) including Tay Ninh Riparian Schemes, comprising of:  (1) Small Existing Irri. Schemes including Dai Dong, Tuyen Lam/Quan Hiep and Phuoc Chi schemes (164 schemes) 67,745 (2) New Small Irri. Scheme (65 schemes) 61,242  (Total : Initially screened 231 schemes) (128,987)		
			- Phan Rang	12,800	S + DV	F	A (for rehabili.)	P	S+, G+, H+ & C+	H			
			- Song Pha	4,710	S + DV	F	C (for rehabili.)	P	S+, G+, H+ & C+	M			
			- Dai Don	2,700	D	F	C (for rehabili.)	P	S+, G+, H+ & C+				
			- Tuyen Lam/Quan Hiep	2,832	D	F	C (for rehabili.)	P	S+, G+, H+ & C+				
		- Phuoc Chi	2,260	S	F	C (for rehabili.)	P						
	A.2 Small Irrigation Schemes (Area larger than 2,000 ha)	161 schemes including 2 - Tay Ninh Riparian Schemes (1,000 ha in total)	59,953	D + S + DV	A & P	C (for rehabili.)	P & J	S+, G+, H+ & C+	M				
	A.3 New Small Irrigation Schemes	65 schemes including 12 - Tay Ninh Riparian Schemes (21,870 ha in total)	61,242	D + S + DV	A & P	C (for rehabili.)	P & J	S+, G+, H+ & C+					
B	On-going and Planning Irrigation Schemes		- Dau Tieng Existing	45,000	D	F	In operation	P & J	G+	-	In operation		
			- Dau Tieng Extension	48,390	D	A	B	P & J	G+	H	Selected as candidate M/P project	48,390	
			- Phuoc Hoa	45,680	D	F	B	P & J	S+ & H+	M	Selected as candidate M/P project	45,680	
			- Hoc Mon - Bac Binh Chan	12,197	D	F	In implement.	P & J	H+ & C-	H	In implementation		
			- Song Quao	8,000	S + DV	P	In implement.	P & J	H+	-	In implementation		
C	Potential Irrigation Schemes	C.1 Potential Irrigation Schemes in HCMC - Long An Delta (including on-going Hoc Mon - Bac Binh Chan Irrigation Scheme of 12,197 ha)	- HCMC	46,000	D	A	C	P & J	H+ & C-	M	Selected as candidate M/P project	46,000	
			- Long An	54,000	D	A	B	P & J	H+ & C-	M	Selected as candidate M/P project	54,000	
												(Total) (100,000)	
		C.2 Potential Schemes expecting water resources diverted from Dong Nai river basin (including existing irrigation schemes with 18,928 ha in total)	- Phan Ri	32,000	S + DV	A	B	P, J & T	S+, H+ & C+	H		Formulated as Phan Ri - Phan Thiet Irrigation Project, comprising (1) Phan Ri Irrigation Scheme 32,000 (2) Phan Thiet Irrigation Scheme (excluding on-going Song Quao Irri. Scheme 8,000 ha) 10,000	
			- Phan Thiet	24,400	S + DV	A	B	P & J	S+, H+ & C+	H (18,000 ha in Quao river basin) L (6,400 ha in Ca Ty river basin)		(Total) (42,000)	
												Omitted 6,400 ha in Ca Ty river basin from candidate M/P Project	
		C.3 Potential Schemes fed by own river basin (including existing irrigation schemes with 24,660 ha in total)	- Ham Tan	8,000	S + DV	P	B	P & J	S+, H+ & C+	L		Omitted from candidate M/P project	
			- Phan Rang Extension	15,400	S	P	C	P & J	S+, H+ & C+	L		Omitted from candidate M/P project	
			- Tuy Phong	4,200	S	A	C	P & J	S+, H+ & C+	L		Omitted from candidate M/P project	
			- Song Phang	5,030	S	P	C	P & J	S+, H+ & C+	L		Omitted from candidate M/P project	
- Lower La Nga	38,000		D	F	B	P & J	H+	H (Ta Pao Scheme) M (Vo Dat Scheme)		Selected as M/P project, comprising (1) Ta Pao Irrigation Scheme 23,000 (2) Vo Dat Irrigation Scheme 15,000			
										(Total) (38,000)			
			- Song Ray	13,710	S	P	B	P & J	S+, H+ & C+	M	Omitted from candidate M/P project		
			- Song Dinh	4,740	S	P	B	P & J	S+, H+ & C+	M	Omitted from candidate M/P project		
Abbreviation of Screening Factors			D: Dong Nai River Basin	F: Fully available	A: F/S by Ministry	P: Poverty alleviation	+: Positive	H: High					
			DV: Diversion from Dong Nai River Basin (including Possibility)	A: Available subject to water resources development	B: Pre-F/S by Ministry	J: Job opportunity	-: Negative	M: Marginal					
			S: Surrounding Basin	P: Poor or insufficient	C: Preliminary Study by Province	T: Transmigration	T: Topography	L: Low					
							S: Soil erosion						
							G: Groundwater						
							H: Hydro. situation						
							C: Coastal zone						
							F: Flora & fauna						





Table 2.54 Preliminary Screening of Irrigation Schemes for Rural Agricultural Development Project (RADP)

Province	Identified Irrigation Schemes		Schemes included in Master Plan Projects		Schemes On-going or to be implemented soon		Schemes for Integrated Rural Develop. Project	
	Nos. of Scheme	Total Iri. Area	Nos. of Scheme	Total Iri. Area	Nos. of Scheme	Total Iri. Area	Nos. of Scheme	Total Iri. Area
<b>A. Existing Small Scale Irrigation Schemes</b>								
Lam Dong	25	10,809	0	0	0	0	25	10,809
Dac Lac	1	120	0	0	0	0	1	120
Ninh Thuan	15	3,932	0	0	5	1,420	10	2,512
Binh Thuan	56	20,033	41	15,943	0	0	15	4,090
Ba Ria - Vung Tau	15	8,080	0	0	0	0	15	8,080
Dong Nai	33	16,930	0	0	0	0	33	16,930
Song Be	16	4,581	0	0	0	0	16	4,581
Tay Ninh	3	3,260	0	0	0	0	3	3,260
<b>Total</b>	<b>164</b>	<b>67,745</b>	<b>41</b>	<b>15,943</b>	<b>5</b>	<b>1,420</b>	<b>118</b>	<b>50,382</b>
<b>B. Proposed Small Scale Irrigation Schemes</b>								
Lam Dong	3	3,050	0	0	2	2,000	1	1,050
Dac Lac	0	0	0	0	0	0	0	0
Ninh Thuan	3	6,400	0	0	2	4,800	1	1,600
Binh Thuan	2	608	2	608	0	0	0	0
Ba Ria - Vung Tau	18	8,450	0	0	0	0	18	8,450
Dong Nai	7	9,770	0	0	1	1,540	6	8,230
Song Be	20	11,094	0	0	0	0	20	11,094
Tay Ninh (*1)	12	21,870	0	0	0	0	12	21,870
<b>Total</b>	<b>65</b>	<b>61,242</b>	<b>2</b>	<b>608</b>	<b>5</b>	<b>8,340</b>	<b>58</b>	<b>52,294</b>

Note (\*1): 25,130 ha (Results of water allocation for Tay Ninh Riparian Schemes) - 3,260 ha (Existing Irrigation) = 21,870 ha

Table 2.55 Cost Estimate of Rehabilitation Works for Reference Existing Irrigation Schemes

1. Vo Xu pump Irrigation scheme (5,000 ha) (*1)											Unit : US\$	
No.	Description	Unit	Rate	Main Facilities		On-farm Facilities		Total		Quantity	Amount	
				Quantity	Amount	Quantity	Amount	Quantity	Amount			
1.	Excavation, common	cu m	3	190,200	513,540	625,000	1,637,500	815,200	2,201,040			
2.	Excavation, rock	cu m	8	0	0	0	0	0	0			
3.	Embankment	cu m	5	493,200	2,219,400	625,000	2,812,500	1,118,200	5,031,900			
4.	Re-concrete	cu m	135	53,400	7,209,000	0	0	53,400	7,209,000			
5.	Plain concrete	cu m	120	6,100	732,000	2,730	327,600	8,830	1,059,600			
6.	Wet masonry	cu m	50	6,900	345,000	7,800	390,000	14,700	735,000			
7.	Gate	ton	10,000	70	700,000	0	0	70	700,000			
Total					11,718,940		5,217,600		16,936,540			
Cost/ha					2,344		1,044		3,387			

  

2. Song Pha Irrigation system (3,000 ha) (*2)											Unit : US\$	
No.	Description	Unit	Rate	West Main Canal (3,000 ha)		2nd Canal (385 ha)		Tertiary Canal (385 ha)		Quantity	Amount	
				Quantity	Amount	Quantity	Amount	Quantity	Amount			
1.	Excavation, common	cu m	3	39,900	107,730	30,800	83,160	4,060	10,962			
2.	Excavation, rock	cu m	8	3,290	26,320	16,500	132,000	0	0			
3.	Embankment	cu m	5	15,000	67,500	4,700	21,150	2,500	11,250			
4.	Re-concrete	cu m	135	0	0	0	0	0	0			
5.	Plain concrete	cu m	120	440	52,800	1,240	148,800	100	12,000			
6.	Wet masonry	cu m	50	200	10,000	860	43,000	500	25,000			
7.	Gate	ton	10,000	0	0	0	0	0	0			
Total					264,350		428,110		39,212			
Cost/ha					88		1,112		154			

  

3. Phan Rang Irrigation Project (12,800 ha) (*3)														Unit : US\$	
No.	Description	Unit	Rate	Main canal		2nd Canal		On-farm		Drainage		Road		Quantity	Amount
				Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount		
1.	Excavation, common	cu m	3	154,800	417,960	107,600	290,520	450,000	1,296,000	3,937,200	10,630,440	0	0		
2.	Excavation, rock	cu m	8	0	0	0	0	0	0	0	0	0	0		
3.	Embankment	cu m	5	45,000	202,500	337,300	1,517,850	430,000	2,160,000	0	0	247,200	1,112,400		
4.	Re-concrete	cu m	135	4,000	540,000	800	108,000	400	54,000	4,000	540,000	2,600	351,000		
5.	Plain concrete	cu m	120	11,000	1,320,000	0	0	0	0	0	0	0	0		
6.	Wet masonry	cu m	50	3,800	190,000	760	38,000	380	19,000	3,800	190,000	2,500	125,000		
7.	Gate	ton	10,000	60	600,000	0	0	0	0	0	0	0	0		
Total					3,270,460		1,954,370		3,529,000		11,460,440		1,588,400		
Cost/ha					256		153		276		888		124		

  

4. Phuoc Chi pump Irrigation scheme (2,260 ha) (*4)											Unit : US\$	
No.	Description	Unit	Rate	Main Facilities		On-farm Facilities		Total		Quantity	Amount	
				Quantity	Amount	Quantity	Amount	Quantity	Amount			
1.	Excavation, common	cu m	3	80,000	216,000	0	0	80,000	216,000			
2.	Excavation, rock	cu m	8	0	0	0	0	0	0			
3.	Embankment	cu m	5	20,000	90,000	350,000	1,575,000	370,000	1,665,000			
4.	Re-concrete	cu m	135	2,000	270,000	0	0	2,000	270,000			
5.	Plain concrete	cu m	120	0	0	0	0	0	0			
6.	Wet masonry	cu m	50	230	11,500	0	0	230	11,500			
7.	Gate	ton	10,000	0	0	0	0	0	0			
Total					587,500		1,575,000		2,162,500			
Cost/ha					260		697		957			

Data Source

- (\*1): Department of Water Resources, Binh Thuan Province
- (\*2): Department of Water Resources, Ninh Thuan Province
- (\*3): Feasibility Study on Rehabilitation and Improvement of the Phan Rang Irrigation Project, August 1990, Ministry of Water Resources
- (\*4): Department of Water Resources, Tay Ninh Province

**Table 2.56 Preliminary Estimates of RADP Investment Cost and Annual Economic Benefit**

**(1) Investment Cost**

Scheme	Area (ha)	Unit Cost (US\$/ha)	Investment Cost (US\$ Mil.)	Remarks
<b>I. Direct Cost</b>				
A. Existing Small Scale Irrigation Schemes	50,382	1,500	45.34	(*1)
B. New Small Scale Irrigation Schemes	52,294	2,540	132.83	
<b>Direct Cost Total</b>			<b>178.17</b>	
<b>II. Indirect Cost</b>			<b>53.45</b>	
<b>Total</b>		<b>102,676</b>	<b>231.62</b>	

(\*1) : 40% reduction for areas actually irrigated at present

**(2) Annual Economic Benefit**

Scheme	Area (ha)	Unit Incre. Benefit (US\$/ha)	Annual Incre. Benefit (US\$ Mil.)	Remarks
1. Existing Schemes	50,382	360	10.88	(*1)
2. New Schemes	52,294	630	32.95	
<b>Total</b>		<b>102,676</b>	<b>43.83</b>	

(\*1) : 40% reduction for areas actually irrigated at present

**Table 2.57 Estimate of Construction Costs of Luy and Ca Clay Dams**

No.	Description	Unit	Unit Price (US\$)	Luy Dam		Ca Clay Dam (*1)	
				Work Quantity	Amount (US\$ mil)	Work Quantity	Amount (US\$ mil)
1.	Preparatory Works				2,292		1,490
	Access road	km	100,000	20	2,000	13	1,300
	Power supply	km	14,600	20	292	13	190
2.	Care of River	LS	-	1	1,479	1	550
3.	Main Dam				36,975		13,749
	Common excavation	m3	5.5	206,000	1,133	93,000	512
	Rock excavation	m3	16.0	51,000	816	23,000	368
	Embankment:core	m3	9.4	409,300	3,847	1,177,000	11,064
	Embankment:filter	m3	29.5	136,430	4,025	10,500	310
	Embankment:rock	m3	10.9	2,182,800	23,793	22,500	245
	Grouting & others	LS	-	1	3,361	1	1,250
4.	Auxiliary Dam 1				138		0
	Common excavation	m3	5.5	12,300	68	0	0
	Embankment:core	m3	9.4	4,590	43	0	0
	Embankment:filter	m3	29.5	270	8	0	0
	Embankment:rock	m3	10.9	540	6	0	0
	Grouting & others	LS	-	1	13	1	0
5.	Auxiliary Dam 2				417		0
	Common excavation	m3	5.5	36,100	199	0	0
	Embankment:core	m3	9.4	14,450	136	0	0
	Embankment:filter	m3	29.5	850	25	0	0
	Embankment:rock	m3	10.9	1,700	19	0	0
	Grouting & others	LS	-	1	38	1	0
6.	Spillway				8,844		1,763
	Common excavation	m3	5.5	68,180	375	55,500	305
	Rock excavation	m3	16.0	146,300	2,341	23,000	368
	Structural concrete	m3	142.0	34,330	4,875	6,000	852
	Reinforcement-bar	ton	650.0	690	449	120	78
	Others	LS	-	1	804	1	160
7.	River Outlet				3,807		350
	Common excavation	m3	5.5	15,630	86	1,000	6
	Rock excavation	m3	16.0	36,190	579	1,000	16
	Structural concrete	m3	142.0	13,520	1,920	1,200	170
	Reinforcement-bar	ton	650.0	270	176	40	26
	Intake gate	ton	10,000	70	700	10	100
	Others	LS	-	1	346	1	32
8.	Miscellaneous Works	LS	-	1	5,166	1	1,641
	Direct Cost Total (1. to 8.)				59,118		19,543
9.	Compensation Cost	km2	400,000	21	8,400	6	2,400
10.	Administration Cost	LS	-		1,182		391
11.	Engineering Fee	LS	-		4,729		1,563
12.	Physical Contingency	LS	-		7,343		2,390
	Indirect Cost Total (9. to 12.)				21,654		6,744
	<b>Total</b>				<b>80,772</b>		<b>26,287</b>

Data Source : Department of Water Resources, Binh Thuan Province

Table 2.58 Estimate of Construction Costs of Phan Ri - Phan Thiet Irrigation System

No.	Description	Unit	Unit Price (US\$)		Ca Giay (2,000 ha) (*)		Luy (30,000 ha)		Unit : US\$ Amount
			Price	Work Qty	Amount	Work Qty	Amount		
1.	Preparatory Works				28			1,068	
2.	Main Canal	Km		12.0	520	34.0		18,620	1,837,000
	Excavation, common	m3	2.7	90,000	243	1,160,000		3,132	0
	Excavation, rock	m3	8	500	4	480,000		3,340	480,000
	Embankment	m3	4.5	28,000	126	560,000		2,520	0
	Stone lining	m3	10.5	800	8	19,000		200	0
	Gravel	m3	28.8	200	6	6,200		179	0
	Masonry	m3	50	900	45	19,000		950	0
	Concrete	m3	120	400	48	60,000		7,200	0
	Metal work	ton	10,000	4	40	60		600	0
3.	2nd/3rd canal system				872			34,768	1,159
	Excavation	m3	2.7	55,000	149	3,460,000		9,342	0
	Embankment	m3	4.5	42,000	189	2,360,000		10,620	0
	Concrete	m3	120	1,300	156	74,000		8,880	0
	Masonry	m3	50	7,500	375	116,000		5,800	0
	Stone lining	m3	10.5	350	4	12,000		126	0
	Sub-total (Direct Cost)				1,420			54,456	
4.	Compensation cost	LS			36			1361	
5.	Administration cost	LS			28			1,089	
6.	Engineering fee	LS			114			4,356	
7.	Physical contingency	LS			240			9,189	
	Sub-total (Indirect Cost)				417			15,996	
	Total				1,837			70,452	
	Cost Allocation								
	Main canal				686			24,571	
	Canal and On-farm Works				1,151			45,881	
	Cost per Unit								
	Main Canal/Km	US\$000			57			723	
	Main Canal/ha	US\$			343			819	
	Canals system/ha	US\$			575			1,529	
	System total/ha	US\$			919			2,348	

(\*1) Data Source : STWRPM

(2) Estimate of Constructio Costs of Individual Irrigatio Systems

1. Ca Giay Irrigation System for 2,000 ha

Item	Unit	Rate	Qty	Unit : US\$ Amount
Canal system	ha	292	0	0
Bush clearing	ha	240	2,000	480,000
On-farm (Ex.)	ha	360	0	0
On-farm (new)	ha			
Total				2,317,000
Cost/ha				1,159

2. Phan Ri (Luy) Irrigation System for 30,000 ha

Item	Unit	Rate	Qty	Unit : US\$ Amount
Canal system	ha	292	13,200	3,854,400
Bush clearing	ha	240	18,000	4,320,000
On-farm (Ex.)	ha	360	12,000	4,320,000
On-farm (new)	ha			
Total				82,946,400
Cost/ha				2,592

3. Phan Thiet Irrigation System for 10,000 ha

Item	Unit	Rate	Qty	Unit : US\$ Amount
Canal system (*)	ha	1,440	10,000	14,400,000
Bush clearing	ha	292	0	0
On-farm (Ex.)	ha	240	10,000	2,400,000
On-farm (new)	ha	360	0	0
Total				16,800,000
Cost/ha (10,000 ha)				1,680

(\*1) : Unit construction cost estimated by Ca Giay/Phan Ri cost

Table 2.59 Cash Flow of Phan Ri - Phan Thiet Irrigation Project

(1) Alternative - 1 : Combined with Ca Gay Reservoir System

Unit : US\$ Mil.

Year	Economic Cost (Capital Cost and O&M Cost)							Benefit				B - C	
	Ca Gay Res. System			Luy Res. System			Phan Thiet Plain Canal	Cost Total	Ca Gay Res. System 2,000 ha	Luy Res. System 30,000 ha	Phan Thiet Plain 10,000 ha		Benefit Total
	Dam	Canal	Total	Dam	Canal	Total							
0	9.00	0.80	9.80					9.80					-9.80
1	6.70	0.60	7.30					7.30					-7.30
2	6.70	0.60	7.30		10.50	10.50		17.80					-17.80
3	0.05	0.03	0.08		10.58	10.58		10.66	0.39	0.29		0.68	-9.98
4	0.05	0.05	0.10		10.66	10.66		10.76	0.78	0.97		1.75	-9.01
5	0.05	0.05	0.10	20.61	10.75	31.36	4.20	35.66	1.16	2.33		3.49	-32.17
6	0.05	0.05	0.10	20.61	10.83	31.44	4.23	35.77	1.55	4.39	0.19	6.13	-29.63
7	0.05	0.05	0.10	13.74	3.92	17.66	4.30	22.06	1.94	6.67	0.96	9.58	-12.48
8	0.05	0.05	0.10	13.74	4.00	17.74	1.58	19.42	1.94	8.91	2.31	13.16	-6.26
9	0.05	0.05	0.10	0.14	4.08	4.22	0.25	4.57	1.94	10.99	4.23	17.16	12.59
10	0.05	0.05	0.10	0.14	4.17	4.31	0.25	4.66	1.94	13.36	6.16	21.45	16.79
11	0.05	0.05	0.10	0.14	4.25	4.39	0.25	4.74	1.94	15.99	7.89	25.81	21.07
12	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	19.36	9.04	30.34	29.10
13	1.70	0.45	2.15	0.14	0.75	0.89	0.25	3.29	1.94	22.49	9.62	34.05	30.76
14	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	25.39	9.62	36.95	35.71
15	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	27.32	9.62	38.88	37.64
16	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
17	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
18	0.05	0.05	0.10	0.14	7.75	7.89	0.25	8.24	1.94	28.29	9.62	39.85	31.61
19	0.05	0.05	0.10	4.90	0.75	5.65	1.65	7.40	1.94	28.29	9.62	39.85	32.45
20	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
21	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
22	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
23	1.70	0.45	2.15	0.14	0.75	0.89	0.25	3.29	1.94	28.29	9.62	39.85	36.56
24	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
25	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
26	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
27	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
28	0.05	0.05	0.10	0.14	7.75	7.89	0.25	8.24	1.94	28.29	9.62	39.85	31.61
29	0.05	0.05	0.10	4.90	0.75	5.65	1.65	7.40	1.94	28.29	9.62	39.85	32.45
30	0.05	0.05	0.10	0.14	0.75	0.89	0.25	1.24	1.94	28.29	9.62	39.85	38.61
Net Present Value (10%) Cost								111.10	EIRR :			12.57%	
Benefit								186.47					

(2) Alternative - 2 : Independent from Ca Gay Reservoir System

Unit : US\$ Mil.

Year	Economic Cost (Capital Cost and O&M Cost)							Benefit				B - C	
	Ca Gay Res. System			Luy Reservoir System			Phan Thiet Plain Canal	Cost Total	Ca Gay Res. System 2,000 ha	Luy Res. System 30,000 ha	Phan Thiet Plain 10,000 ha		Benefit Total
	Dam	Canal	Total	Dam	Canal	Total							
0						10.50		10.50					-10.50
1						10.50		10.50					-10.50
2						10.58		10.58					-10.00
3						10.66		10.66		0.58		0.58	-8.91
4				20.61	10.75	31.36	4.20	35.56		3.49		3.49	-32.07
5				20.61	3.83	24.44	4.23	28.67		5.85	0.19	6.04	-22.63
6				13.74	3.92	17.66	4.30	21.96		8.42	0.96	9.38	-12.58
7				13.74	4.00	17.74	1.58	19.32		10.65	2.31	12.96	-6.36
8				0.14	4.08	4.22	0.25	4.47		12.54	4.23	16.77	12.30
9				0.14	4.17	4.31	0.25	4.56		14.81	6.16	20.97	16.41
10				0.14	0.75	0.89	0.25	1.14		17.44	7.89	25.33	24.19
11				0.14	0.75	0.89	0.25	1.14		20.81	9.04	29.86	28.72
12				0.14	0.75	0.89	0.25	1.14		23.95	9.62	33.57	32.43
13				0.14	0.75	0.89	0.25	1.14		26.85	9.62	36.47	35.33
14				0.14	0.75	0.89	0.25	1.14		28.78	9.62	38.40	37.26
15				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
16				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
17				0.14	7.75	7.89	0.25	8.14		29.74	9.62	39.36	31.22
18				4.90	0.75	5.65	1.65	7.30		29.74	9.62	39.36	32.06
19				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
20				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
21				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
22				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
23				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
24				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
25				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
26				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
27				0.14	7.75	7.89	0.25	8.14		29.74	9.62	39.36	31.22
28				4.90	0.75	5.65	1.65	7.30		29.74	9.62	39.36	32.06
29				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
30				0.14	0.75	0.89	0.25	1.14		29.74	9.62	39.36	38.22
Net Present Value (10%) Cost								102.59	EIRR :			14.75%	
Benefit								186.22					

Table 2.60 Estimate of Construction Costs of Ta Pao and Vo Dat Irrigation Schemes in Lower La Nga Plain

		Unit: US\$000					
No.	Description	Unit	Unit Price (US\$)	Ta Pao Scheme (19,000 ha)		Vo Dat Scheme (12,600 ha)	
				Work Q'ty	Amount	Work Q'ty	Amount
1.	Preparatory Works	LS			1,091		836
2.	Care of River	LS			350		392
3.	Weir				14,020		15,680
	Excavation, common	m3	5.5	303,000	1,667	347,000	1,909
	Excavation, rock	m3	16	1,000	16	9,400	150
	Embankment, common	m3	9.4	202,000	1,899	335,000	3,149
	Embankment, rock	m3	29.5	6,120	181	24,800	732
	Gravel	m3	10.8	5,850	63	6,200	67
	Masonry	m3	10.8	15,880	172	5,480	59
	Structural concrete	m3	142	30,345	4,309	26,400	3,749
	Reinforcement bar	ton	650	1,830	1,190	1,600	1,040
	Intake gate	ton	10,000	325	3,250	340	3,400
	Other miscellaneous	LS			1,275		1,425
4.	Main Canal	Km			15,300		6,561
	Excavation, common	m3	2.7	1,200,000	3,240	720,000	1,944
	Excavation, rock	m3	8	0	0	0	0
	Embankment	m3	4.5	1,273,000	5,729	400,000	1,800
	Stone lining	m3	10.5	2,850	30	7,400	78
	Gravel	m3	28.8	2,280	66	1,500	43
	Masonry	m3	50	30,400	1,520	5,000	250
	Concrete	m3	120	19,000	2,280	11,500	1,380
	Metal work	ton	10,000	105	1,045	47	470
	Other miscellaneous	LS			1,391		596
5.	2nd/3rd canal system				25,212		19,582
	Excavation	m3	2.7	1,320,000	3,564	1,170,000	3,159
	Embankment	m3	4.5	2,540,000	11,430	1,892,000	8,514
	Concrete	m3	120	41,000	4,920	32,400	3,888
	Masonry	m3	50	45,000	2,250	36,000	1,800
	Stone lining	m3	10.5	72,000	756	42,000	441
	Other miscellaneous	LS			2,292		1,780.2
6.	Land Development and On-farm Work				3,800		4,742
	Forest clearing	ha	500	0	0	2,000	1,000
	Bush clearing	ha	225	0	0	3,020	680
	On-farm work (Exist.)	ha	200	19,000	3,800	7,180	1,436
	On-farm work (New)	ha	300	0	0	5,420	1,626
7.	Other Works						16,500
	Pump station	LS					5,000
	Reservoir	LS					11,500
8.	Sub-total (Direct Cost)				59,773		64,293
9.	Compensation cost	LS			1494		1607
10.	Administration cost	LS			1,195		1,286
11.	Engineering fee	LS			4,782		5,143
	Physical contingency	LS			10,087		10,850
	Sub-total (Indirect Cost)				17,558		18,886
	<b>Total</b>				<b>77,331</b>		<b>83,180</b>
	Weir Cost				18,968		21,215
	Canal Cost				58,362		61,965

Data Source : SIWRPM

Table 2.61 Cash Flow of Lower La Nga Irrigation Project

Unit : US\$ Mil.

Year	Ta Pao Irrigation Scheme (19,000 ha)					Vo Dat Irrigation Scheme (12,600 ha)				
	Cost			Benefit	B-C	Cost			Benefit	B-C
	Weir	Canal	Total			Weir	Canal	Total		
0	4.84	4.67	9.51		-9.51	5.40	5.00	10.40		-10.40
1	6.45	9.34	15.79		-15.79	7.20	10.00	17.20		-17.20
2	6.45	9.34	15.79		-15.79	7.20	10.00	17.20		-17.20
3	0.04	14.01	14.05		-14.05	0.04	15.00	15.04		-15.04
4	0.04	9.34	9.38		-9.38	0.04	10.00	10.04		-10.04
5	0.04	0.48	0.52	2.86	2.34	0.04	0.38	0.42	2.46	2.04
6	0.04	0.48	0.52	5.72	5.20	0.04	0.38	0.42	4.91	4.49
7	0.04	0.48	0.52	8.58	8.06	0.04	0.38	0.42	7.37	6.95
8	0.04	0.48	0.52	11.45	10.93	0.04	0.38	0.42	9.83	9.41
9	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
10	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
11	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
12	1.44	0.48	1.92	14.31	12.39	1.37	0.38	1.75	12.29	10.54
13	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
14	0.04	4.02	4.06	14.31	10.25	0.04	5.12	5.16	12.29	7.13
15	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
16	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
17	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
18	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
19	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
20	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
21	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
22	1.44	0.48	1.92	14.31	12.39	1.37	0.38	1.75	12.29	10.54
23	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
24	0.04	4.02	4.06	14.31	10.25	0.04	5.12	5.16	12.29	7.13
25	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
26	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
27	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
28	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
29	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
30	0.04	0.48	0.52	14.31	13.79	0.04	0.38	0.42	12.29	11.87
EIRR : 12.2%					EIRR : 9.9%					
N.P.W. Cost (10%) 53.7					N.P.W. Cost (10%) 57.6					
N.P.W. Benefit (10%) 107.3					N.P.W. Benefit (10%) 92.1					



Table 2.62 Cash Flow of Phuoc Hoa Irrigation Project

Unit : US\$ Mil.

Year	Cost			Benefit			B-C	
	Weir & Pump	Canal	Total	Agriculture	Water Supply	Total	Agriculture Only	Agriculture & Water Supply
0	10.00	16.20	26.20				-26.20	-26.20
1	13.30	32.20	45.50				-45.50	-45.50
2	10.00	32.20	42.20				-42.20	-42.20
3	0.80	49.20	50.00	3.43	3.87	7.30	-46.57	-42.70
4	1.60	33.79	35.39	10.29	7.75	18.04	-25.10	-17.35
5	1.60	1.59	3.19	17.15	11.62	28.77	13.96	25.58
6	1.60	1.59	3.19	24.01	15.50	39.51	20.82	36.32
7	1.60	1.59	3.19	30.88	19.37	50.25	27.69	47.06
8	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
9	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
10	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
11	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
12	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
13	4.90	17.79	22.69	34.31	19.37	53.68	11.62	30.99
14	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
15	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
16	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
17	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
18	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
19	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
20	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
21	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
22	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
23	4.90	17.79	22.69	34.31	19.37	53.68	11.62	30.99
24	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
25	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
26	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
27	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
28	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
29	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
30	1.60	1.59	3.19	34.31	19.37	53.68	31.12	50.49
						EIRR :	10.86%	17.27%
N.P.W. (10%)			174.5	249.3	148.1	397.4		

**Table 2.63 Estimate of Investment Cost of Phuoc Hoa Dam and Diversion Canal to Dau Tieng Reservoir**

No.	Description	Unit	Unit Price (US\$)	Work Quantity	Amount (US\$ mil)
1.	Preparatory Works				3,464
	Access road	km	100,000	5	500
	Power supply	km	14,600	5	73
	Others	LS		1	2891
2.	Care of River	LS		1	681
3.	Main Dam				17,033
	Common excavation	m3	5.5	374,000	2,057
	Rock excavation	m3	16.0	0	0
	Embankment: core	m3	9.4	1,222,000	11,487
	Embankment: filter	m3	29.5	99,000	2,921
	Embankment: rock	m3	10.9	6,600	72
	Rienforce concrete	m3		8,800	0
	Plain concrete	ton		1,400	0
	Reinforcement-bar	ton		350	0
	Grouting & others	LS		1	496
4.	Auxiliary Dam I				6,565
	Common excavation	m3	5.5	105,000	578
	Embankment: core	m3	9.4	362,000	3,403
	Embankment: filter	m3	29.5	39,000	1,151
	Embankment: rock	m3	10.9	470	5
	Rienforce concrete	m3	142	7,450	1,058
	Plain concrete	ton	100	750	75
	Reinforcement-bar	ton	650	160	104
	Grouting & others	LS		1	191
5.	Connection Channel				5,925
	Common excavation	m3	5.5	452,800	2,490
	Embankment	m3	9.4	4,500	42
	Rienforce concrete	m3	142.0	22,100	3,138
	Plain concrete	ton	100.0	14	1
	Reinforcement-bar	ton	650	125	81
	Others	LS		1	173
6.	Spillway				60,053
	Common excavation	m3	5.5	1,717,000	9,444
	Rock excavation	m3	16.0	727,000	11,632
	Embankment	m3	9.4	268,900	2,528
	Filter	m3	29.5	1,800	53
	Rienforce concrete	m3	142	117,000	16,614
	Plain concrete	ton	100	0	0
	Reinforcement-bar	ton	650	7,050	4,583
	Metal work	ton	10,000	1,345	13,450
	Others	LS		1	1,749
7.	Intake				3,417
	Common excavation	m3	5.5	61,500	338
	Embankment	m3	16.0	11,900	190
	Rienforce concrete	m3	142.0	3,950	561
	Plain concrete	m3	100.0	370	37
	Reinforcement-bar	ton	650	370	241
	Intake gate	ton	10,000	195	1,950
	Others	LS		1	100
8.	Diversion Canal to Dau Tieng Reservoir				50,858
8.1	Canal				
	Excavation, common	m3	5.5	4,450,000	24,640
	Excavation, rock	m3	16	1,120,000	17,920
	Embankment	m3	9.4	6,000	56
	Concrete lining	m3	100	57,700	5,770
	Dredging	m3	1	830,000	830
8.2	Intake and Outlet Structure				
	Excavation, common	m3	5.5	4,100	23
	Excavation, rock	m3	16	0	0
	Rienforce concrete	m3	142	850	121
	Reinforcement bar	ton	650	26	17
	Intake gate	ton	20	20	0
	Miscellaneous	LS			1,481
9.	Miscellaneous Works	LS		1	7,227
	Direct Cost Total (1. to 8.)				155,223
10.	Compensation Cost	km2	400,000	38	15,200
11.	Administration Cost	LS			3,104
12.	Engineering Fee	LS			12,418
12.	Physical Contingency	LS			10,227
	Indirect Cost Total (9. to 12.)				40,949
	<b>Total</b>				<b>196,172</b>

Data Source: Ministry of Agriculture and Rural Development (Former Ministry of Water Resources)

Table 2.64 Cash Flow of Dau Tieng Extension and HCMC-Long An Delta Irrigation Project

Unit: US\$ Mil.

Year	Dau Tieng II			HCMC Delta			Long An Delta			Overall				
	Fu Mieng	Canal	Total	Benefit	B-C	Total	Benefit	B-C	Total	Benefit	B-C	Total	Benefit	B-C
0	8.17	0.00	8.17	0.00	-8.17	0.00	0.00	-2.40	0.00	2.13	0.00	0.00	10.57	-10.57
1	16.34	0.00	16.34	0.00	-16.34	0.00	0.00	-4.80	0.00	4.26	0.00	0.00	21.14	-21.14
2	16.34	0.00	16.34	0.00	-16.34	0.00	0.00	-4.80	0.00	4.26	0.00	0.00	21.14	-21.14
3	24.51	0.00	24.51	0.00	-24.51	0.00	0.00	-7.20	0.00	6.39	0.00	0.00	31.71	-31.71
4	16.34	6.29	22.63	0.00	-22.63	0.00	0.00	-12.76	0.00	10.62	0.00	0.00	41.76	-41.76
5	6.57	6.57	13.14	0.71	-5.86	8.12	0.32	-7.80	6.51	6.51	0.29	0.29	21.20	-19.88
6	6.85	6.85	13.70	2.12	-4.73	8.27	0.96	-7.31	6.65	6.65	0.86	0.86	21.78	-17.84
7	7.13	7.13	14.26	4.25	-2.88	8.43	1.92	-6.51	6.80	6.80	1.71	1.71	22.36	-14.48
8	7.41	7.41	14.82	7.08	-0.33	8.59	3.20	-5.38	6.94	6.94	2.85	2.85	22.94	-9.81
9	7.69	7.69	15.38	10.62	2.93	8.75	4.81	-3.94	7.09	7.09	4.28	4.28	23.53	-3.82
10	7.97	7.97	15.94	14.16	6.19	8.90	6.41	-2.49	7.23	7.23	5.70	5.70	24.11	2.17
11	8.25	8.25	16.50	17.70	9.45	9.06	8.01	-1.05	7.38	7.38	7.13	7.13	24.69	8.15
12	8.43	8.43	17.06	21.24	12.81	9.22	9.61	0.40	7.52	7.52	8.56	8.56	25.17	14.24
13	8.54	8.54	17.06	24.79	16.24	9.37	11.22	1.84	7.67	7.67	9.98	9.98	25.58	20.40
14	2.37	2.37	4.74	28.33	25.96	1.57	12.82	11.25	1.45	1.45	11.41	11.41	5.39	47.16
15	2.37	2.37	4.74	31.16	28.79	1.57	14.10	12.53	1.45	1.45	12.55	12.55	5.39	52.41
16	2.37	2.37	4.74	33.28	30.91	1.57	15.06	13.49	1.45	1.45	13.40	13.40	5.39	56.36
17	2.37	2.37	4.74	34.70	32.33	1.57	15.70	14.13	1.45	1.45	13.97	13.97	5.39	58.98
18	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
19	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
20	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
21	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
22	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
23	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
24	8.67	8.67	17.34	35.41	26.74	9.53	16.02	6.49	7.81	7.81	14.26	14.26	26.01	39.68
25	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
26	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
27	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
28	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
29	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
30	2.37	2.37	4.74	35.41	33.04	1.57	16.02	14.45	1.45	1.45	14.26	14.26	5.39	60.30
												EIRR :	10.50%	
												EIRR :	8.60%	
												EIRR :	7.96%	
												EIRR :	10.84%	

Table 2-65 Selection of Priority Master Plan Project

Development Package of Master Plan Projects	Area (ha)	Master Plan Project		Marking to Ranking Factors			Priority Ranking	
		Name of Scheme	Area (ha)	Social Impact Specific	Maturity of Project Preparation	Economic Viability IRR (%) Overall		Mark
1. Phan Ri - Phan Thiet Irrigation Project	39,700	1.1 Phan Ri Irrigation Scheme	29,700	Poverty, Job & Transmigrate	B	12.3	A	
		1.2 Phan Thiet Irrigation Scheme	10,000	Poverty & Job	B	13.4	A	
2. Lower La Nga Plain Irrigation Project	31,620	2.1 Ta Pao Irrigation Scheme	19,000	Poverty & Job	B	12.2	A	
		2.2 Vo Dat Irrigation Scheme	12,620	Poverty & Job	C	9.9	C	
3. Phuoc Hoa Irrigation Project	45,680	Phuoc Hoa Irrigation Project	45,680	Poverty & Job	B	10.9	B	
4. Song Be - Dau Tieng Diversion Project	125,560	4.1 Dau Tieng Extension Irrigation Scheme	48,590	Poverty & Job	B	10.8	B	
		4.2 HCMC Irrigation Scheme	46,000	Poverty & Job	C	8.0	C	
		4.3 Long An Irrigation Scheme	31,170	Poverty & Job	B	8.6	C	
<b>Marking Criteria</b>		<b>Poverty Rank</b>	<b>Province</b>	<b>A: F/S by Ministry</b>				<b>A: High (IRR&gt;10%)</b>
		A: Low Income Area	Ninh Thuan and Binh Thuan	<b>B: Pre-F/S by Ministry</b>				<b>B: Fair (10%&lt;IRR&lt;12%)</b>
		B: Middle Income Area	Tay Ninh, Song Be and Lam Dong	<b>C: Provincial Study</b>				<b>C: Low (IRR&lt;10%)</b>
		C: High Income Area	BR - VT, HCMC, Dong Nai, Long An and Dac Lac					

Table 2.66 Annual Irrigation Development Area and Annual Investment Cost of Master Plan Projects

Year	Annual Irrigation Development Area (ha)												Annual Investment Cost (US\$ Million)							
	Small Exist.	New Small	Phan Ri	Phan Thiet	Ta Pao	Vo Dat	Phuoc Hoa	Dau Tieng Extension	HCMC An	Long An	Total	(Rate)	RADP	Phan Thiet	Phan Ri	Lower La Nga	Phuoc Hoa	Dau Tieng HCMC-Long An	Total	(Rate)
1996											0	(0.0%)							0.0	(0.0%)
1997											0	(0.0%)							0.0	(0.0%)
1998											0	(0.0%)							0.0	(0.0%)
1999	3,340										3,340	(1.0%)	3.9						3.9	(0.4%)
2000	3,340										3,340	(1.0%)	3.9				11.0		14.9	(1.4%)
2001	3,340	3,490	3,500				9,140				19,470	(5.8%)	15.9	12.8			33.0		61.7	(5.9%)
2002	3,340	3,490	3,500				9,140				19,470	(5.8%)	15.4	12.8			46.2		74.4	(7.2%)
2003	3,340	3,490	3,500				9,140				19,470	(5.8%)	15.4	12.8			35.2		63.4	(6.1%)
2004	3,340	3,490	3,630	1,000			9,140	4,840			25,440	(7.6%)	15.4	17.8			55.0	7.4	95.6	(9.2%)
2005	3,340	3,490	1,870	3,000	3,800		9,120	4,840			29,460	(8.8%)	15.4	42.5	11.5		39.6	7.4	116.4	(11.2%)
2006	3,340	3,490	2,000	3,000	3,800			4,840	3,380	3,120	26,970	(8.0%)	15.4	33.5	19.3			24.3	92.5	(8.9%)
2007	3,340	3,490	2,000	3,000	3,800			4,840	3,380	3,120	26,970	(8.0%)	15.4	22.2	19.3			24.3	81.2	(7.8%)
2008	3,340	3,490	4,000	3,800	3,800			4,840	3,380	3,120	25,970	(7.8%)	15.4	20.2	15.4			24.3	75.3	(7.3%)
2009	3,340	3,490	4,000	3,800	3,800			4,840	3,380	3,120	25,970	(7.8%)	15.4	4.2	11.5			24.3	55.4	(5.3%)
2010	3,340	3,490	4,000	3,800	3,800			4,840	3,380	3,120	22,170	(6.6%)	15.4	4.2				24.3	43.9	(4.2%)
2011	3,340	3,490	4,000	3,800	3,800	2,520		4,840	3,380	3,120	20,690	(6.2%)	15.4	4.2				24.3	52.1	(5.0%)
2012	3,340	3,490	4,000	3,800	3,800	2,520		4,840	3,380	3,120	20,690	(6.2%)	15.4	4.2				24.3	60.5	(5.8%)
2013	3,322	3,490	4,000	3,800	3,800	2,520		4,830	3,380	3,120	20,662	(6.2%)	14.9	4.2				24.3	60.0	(5.8%)
2014		3,490				2,520			3,380	3,120	12,510	(3.7%)	11.5	16.6				16.9	45.0	(4.3%)
2015		3,424				2,520			3,380	3,120	12,454	(3.7%)	11.5	12.4				16.9	40.8	(3.9%)
Total	50,082	52,294	32,000	10,000	19,000	12,600	45,680	48,390	33,800	31,200	335,046	(100%)	231.0	183.0	160.0		220.0	243.0	1037.0	(100%)

Table 2.67 Impacts by Master Plan Projects

(1) Increment of Paddy Production

Project	Develop. Area			Product.			Cropping Area		
	(ha)	Present (ton)	Future (ton)	Increment (ton)	Present (ha)	Future (ha)	Increment (ha)		
Phuoc Hoa	45,680	39,630	139,360	99,730	17,750	38,008	20,258		
Dau Tieng Extension	48,390	181,460	235,660	54,200	72,585	61,940	-10,645		
Phan Ri	32,000	44,650	196,810	152,160	15,660	43,900	28,240		
Phan Thiet	10,000	22,230	61,500	39,270	8,700	15,000	6,300		
Ta Pao	19,000	48,580	140,730	92,150	17,020	33,000	15,980		
Vo Dat	12,600	1,300	79,500	78,200	440	18,900	18,460		
HCMC Delta	46,000	55,800	221,630	165,830	24,380	50,280	25,900		
Long An Delta	31,200	53,200	192,070	138,870	41,590	48,310	6,720		
Sub-total	244,870	446,850	1,267,260	820,410	198,125	309,338	111,213		
RADP (Exist.)	50,380	156,730	309,840	173,110	52,400	75,570	23,170		
RADP (New)	52,300	156,900	321,650	164,750	52,300	78,450	26,150		
Sub-total	102,680	293,630	631,490	337,860	104,700	154,020	49,320		
Total	347,550	740,480	1,898,750	1,158,270	302,825	463,358	160,533		

(2) Increment of Cultivating Area of Cash Crops

Province	Develop. Area			Sugar Cane			Cotton			Other Cash Crops/Fruits			Total	
	(ha)	Present (ha)	Future (ha)	Increment (ha)	Present (ha)	Future (ha)	Increment (ha)	Present (ha)	Future (ha)	Increment (ha)	Present (ha)	Future (ha)	Increment (ha)	
Phuoc Hoa	45,680	2,310	4,420	2,110	0	0	0	13,520	48,330	34,810	15,830	52,750	36,920	
Dau Tieng Extension	48,390	0	0	0	0	0	0	24,200	83,230	59,030	24,200	83,230	59,030	
Phan Ri (*)	32,000	550	6,400	5,850	0	6,400	6,400	5,330	16,000	10,670	5,880	28,800	22,920	
Phan Thiet (*)	10,000	170	2,000	1,830	0	2,000	2,000	1,120	5,000	3,880	1,290	9,000	7,710	
Ta Pao (*)	19,000	60	2,040	1,980	0	2,300	2,300	2,040	5,760	3,720	2,100	10,100	8,000	
Vo Dat (*)	12,600	250	2,520	2,270	0	2,520	2,520	4,370	6,300	1,930	4,620	11,340	6,720	
HCMC Delta	46,000	7,850	13,470	5,620	0	0	0	3,430	18,270	14,840	11,280	31,740	20,460	
Long An Delta	31,200	2,980	3,120	140	0	0	0	1,920	5,080	3,160	4,900	8,200	3,300	
Sub-total	244,870	14,170	33,970	19,800	0	13,220	13,220	55,930	187,970	132,040	70,100	235,160	165,060	

Note (\*): Present area of sugar cane is estimated by 1993 Statistics of Binh Thuan and Dong Nai provinces