

### **9.3 Management System for the Master Plan Projects**

In terms of development of the Study Area, it will be better to treat it as a spatial unit. Administratively, each of one city and nine provinces concerned may be treated as one unit, which is a part of the so-called provincial administration under the Provincial/City People's Committee.

Basically, it seems to be practical to make most of the existing system or to develop the existing "Steering Committee for the Master Plan Study". Therefore, institutional arrangements proposed here are to establish a "Committee" in charge of development of the Dong Nai River and Surrounding Basins (tentatively called as "Dong Nai Water Resources Development Committee: DWRDC"), based on the existing management system.

The DWRDC may consist of chairman of ten (10) Provincial/City People's Communes concerned and representatives from the Ministries/Agencies relevant to the water resources development.

To enable the institutions concerned to assume specific water resources development roles in a region (area), a new institution called a "Project Management Office (PMO)" may be established under the "DWRDC" to facilitate the coordination at every national, ministry/department and regional/provincial levels (refer to Figure 12).

## **10. SELECTION OF PRIORITY PROJECTS**

Taking into account the urgency of project implementation, the maturity of the study level, the effect and quickness of expected benefit, and contribution to the improvement of economic disparity among the regions as well as the fact that master plans are composed of five independent sectors with different development objectives, following six projects including institutional management are selected from each sector related to the water resources development as the priority projects subject to further study (feasibility study) among the master plan projects:

1. Rural Agricultural Development Projects,
2. Rural Water Supply Projects,
3. Combined Development of Dong Nai No. 3 and No. 4,

4. Phan Ri-Phan Thiet Irrigation Project,
5. Water Supply Project along National Highway No. 51, and
6. Action Plan on Institutional Strengthening for Implementation of the Dong Nai Water Resources Development Project.

The Terms of Reference (TOR) to carry out the feasibility study of the above projects is prepared and attached in Appendix X, Formulation of Master Plan, for reference.

**Table 1 Summary of Rural Development Project**

Province	Rural Agricultural Development Project						Rural Water Supply Project	
	Existing		Proposed		Total		Number of communes	Number of proposed projects
	Number of schemes	Irrigation area, ha	Number of schemes	Irrigation area, ha	Number of schemes	Irrigation area, ha		
Tay Ninh	3	3,260	12	21,870	15	25,130	9	119
Song Be	16	4,581	20	11,094	36	15,675	11	78
Dac Lac	1	120	0	0	1	120	19	46
Lam Dong	25	10,809	3	3,050	28	13,859	29	93
Ninh Thuan	15	3,932	3	6,400	18	10,332	9	47
Binh Thuan	56	20,033	2	608	58	20,641	25	193
Ba Ria-Vung Tau	15	8,080	18	8,450	33	16,530	20	239
Dong Nai	33	16,930	7	9,770	40	26,700	18	190
Long An	0	0	0	0	0	0	30	202
<b>Total</b>	<b>164</b>	<b>67,745</b>	<b>65</b>	<b>61,242</b>	<b>229</b>	<b>128,987</b>	<b>170</b>	<b>1,207</b>

**Table 2 Principal Feature of Hydropower Master Plan Projects**

Description	Unit	Dong Nai No.3	Dong Nai No.4	Combined Total	Fu Mieng (Multipurpose)
<b>1. Hydrology</b>					
Catchment Area	km <sup>2</sup>	2,428 *1)	2,597 *1)	-	4,110
Mean Inflow	m <sup>3</sup> /s	56.8 *1)	62.7 *1)	-	168.8
Maximum Flood	m <sup>3</sup> /s	9,400	9,550	-	6,200
<b>2. Reservoir</b>					
Surface Area at FSL	km <sup>2</sup>	40	6	46	70
FSL	m	570	440	-	77
MOL	m	540	430 *2)	-	69
Active Capacity	mil.m <sup>3</sup>	899	47 *2)	946	462
Firm Discharge	m <sup>3</sup> /s	47.5	50.3 *2)	-	55.0
<b>3. Major Structures</b>					
<b>3-1 Dam</b>					
Type	-	Rockfill	Rockfill	-	Earthfill
Crest Length	m	690	290	-	2,820
Height	m	84	102	-	35
Volume	1,000m <sup>3</sup>	4,280	2,700	6,980	3,430
<b>3-2 Waterway</b>					
Number of Tunnel	-	2	2	-	-
Tunnel Length	m	5,030	5,650	10,680	-
<b>3-3 Diversion Canal</b>					
Canal Capacity	m <sup>3</sup> /s	-	-	-	60
Canal Length	m	-	-	-	7,200
<b>3-4 Power Plant</b>					
Tail Water Level	m	440	287	-	45
Plant Discharge	m <sup>3</sup> /s	190	201 *2)	-	220
Effective Head	m	112	141	254	28
Installed Capacity	MW	180	240 *2)	420	55
Number of Unit	-	2	2	-	2
<b>4. Energy Generation</b>					
Annual Firm Energy	GWh	377	506 *2)	883	111
Annual Secondary Energy	GWh	80	121 *2)	201	85
Annual Total Energy	GWh	457	627 *2)	1084	196
<b>5. Project Cost</b>					
Preparatory Works	mil.US\$	11	10 *2)	21	6
Civil Work	mil.US\$	308	238 *2)	546	151
Hydro-Mechanical Work	mil.US\$	24	28 *2)	52	15
Electro-Mechanical Work	mil.US\$	41	47 *2)	88	28
Indirect Cost including Contingency	mil.US\$	106	75 *2)	181	85
Total Project Cost	mil.US\$	490	398	888	285

\*1) excluding catchment of Da Nhim and Dai Ninh Projects

\*2) under the condition of "with Dong Nai No.3 Project"

**Table 3 Principal Feature of Irrigation Master Plan Projects (1/2)**

Master Plan Projects	Beneficiary Area (Province)	Proposed Irrigation Area (ha)	Impact of Master Plan		Project Cost (million US\$)
			Increment of paddy product (ton)	Increment of cash crops area (ha)	
- Rural Agricultural Development Project	Lam Dong, Dac Lac, Ninh Thuan, Binh Thuan, Song Be, Dong Nai, BaRia-VungTau and Tay Ninh	102,680	337,860	.	231
- Phan Ri-Phan Thiet					209
Phan Ri	Binh Thuan	29,700	152,160	22,920	
Phan Thiet	Binh Thuan	10,000	39,270	7,710	
- Lower La Nga					160
Ta Pao	Binh Thuan and Dong Nai	19,000	92,150	8,000	
Vo Dat	Binh Thuan and Dong Nai	12,620	78,200	6,720	
- Phuoc Hoa	Song Be	45,680	99,730	36,920	220
- Dau Tieng and HCMC-Long An Delta					243
Dau Tieng II	Song Be, Tay Ninh and HCMC	48,390	54,200	59,030	
HCMC Delta	HCMC	46,000	165,830	20,460	
Long An Delta	Long An	31,170	138,870	3,300	
	<b>Total</b>	<b>345,240</b>	<b>1,158,270</b>	<b>165,060</b>	<b>1,063</b>

**Table 3 Principal Feature of Luy Dam for Phan Ri-Phan Thiet Irrigation Projects (2/2)**

Type of dam		Centre core rockfill
Full supply level	(EL.m)	129.0
Flood water level	(EL.m)	132.0
Minimum operation level	(EL.m)	120.0
Gross storage volume	(Mil. m <sup>3</sup> )	137.0
Net storage volume	(Mil. m <sup>3</sup> )	11.0
Dam height and crest length	(m)	Main dam 33.0 and 1,870 Sub dam-1 4.0 and 430 Sub dam-2 5.0 and 580
Type of spillway		Side overflow
Design flood discharge	(m <sup>3</sup> /sec)	1,000
Maximum outlet discharge	(m <sup>3</sup> /sec)	48
Total embankment volume	(m <sup>3</sup> )	2,751,000
Construction cost		
Direct cost	(Million US\$)	59
Indirect cost	(Million US\$)	22
Total	(Million US\$)	81

**Table 4 Principal Feature of Water Supply Project (1/2)**

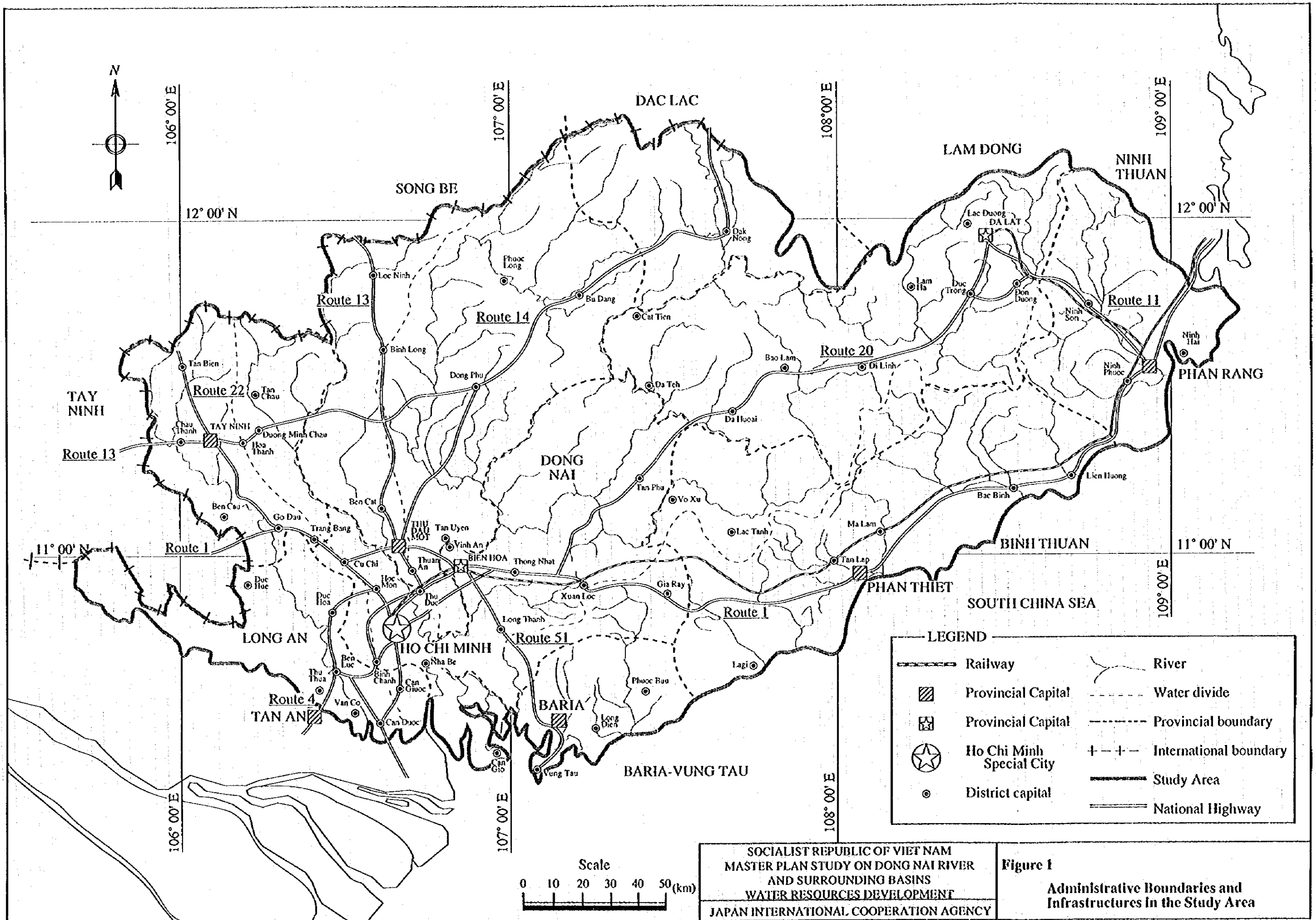
Description	Demand Centre					Total
	Bien Hoa	Tam Phuoc	Nhon Trach	Phu My	Vung Tau	
<b>Water Supply Capacity (m<sup>3</sup>/day)</b>						
Groundwater	0	30,000	50,000	25,000	15,000	120,000
Da Den reservoir	0	0	0	125,000	125,000	250,000
Song Ray reservoir	0	0	0	200,000	250,000	450,000
Dong Nai river (Thien Tan)	300,000	250,000	350,000	0	0	900,000
<b>Total</b>	<b>300,000</b>	<b>280,000</b>	<b>400,000</b>	<b>350,000</b>	<b>390,000</b>	<b>1,720,000</b>
<b>Length of the Pipeline (km)</b>						
Da Den reservoir	0	0	0	6	13	19
Song Ray reservoir	0	0	0	32	27	59
Dong Nai river (Thien Tan)	8	21	30	0	0	59
<b>Total</b>	<b>8</b>	<b>21</b>	<b>30</b>	<b>38</b>	<b>40</b>	<b>137</b>
<b>Construction Cost (Million US\$)</b>						
Groundwater	0	8	13	6	4	30
Treatment plant	60	50	70	65	75	320
Pipeline	5	10	21	7	23	66
Dam	0	0	0	23	25	48
<b>Total</b>	<b>65</b>	<b>68</b>	<b>103</b>	<b>101</b>	<b>127</b>	<b>464</b>

Note : Construction costs are sheared based on water supply capacity of each demand centres.

**Table 4 Principal Feature of Reservoir Projects for Water Supply Project (2/2)**

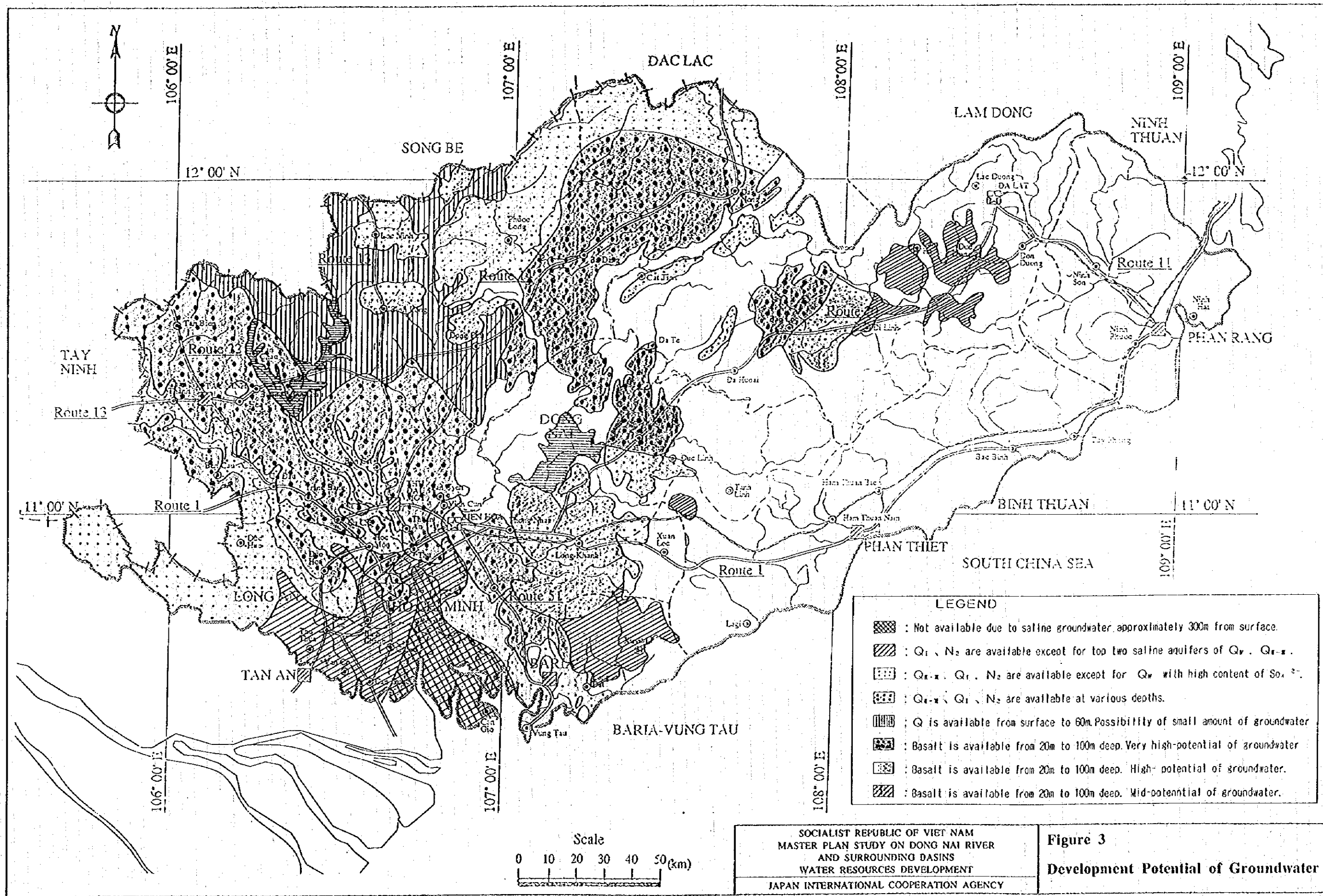
Description	Reservoir Projects	
	Da Den	Song Ray
Catchment area (km <sup>2</sup> )	127	750
Basin average rainfall (mm/year)	1,950	2,100
Type of dam	Rockfill	Rockfill
Full supply level (EL.m)	40.0	70.0
Flood water level (EL.m)	43.0	73.0
Minimum operation level (EL.m)	27.0	48.0
Gross storage volume (Mil. m <sup>3</sup> )	63.1	276.7
Net storage volume (Mil. m <sup>3</sup> )	56.7	239.2
Dam height and crest length (m)	25.0 and 950	45.0 and 1,040
Type of spillway	Side overflow	Side overflow
Design flood discharge (m <sup>3</sup> /sec)	622	1,830
Total embankment volume (m <sup>3</sup> )	751,200	1,663,400
<b>Construction cost</b>		
Direct cost (Million US\$)	19	48
Indirect cost (Million US\$)	8	18
<b>Total (Million US\$)</b>	<b>27</b>	<b>66</b>

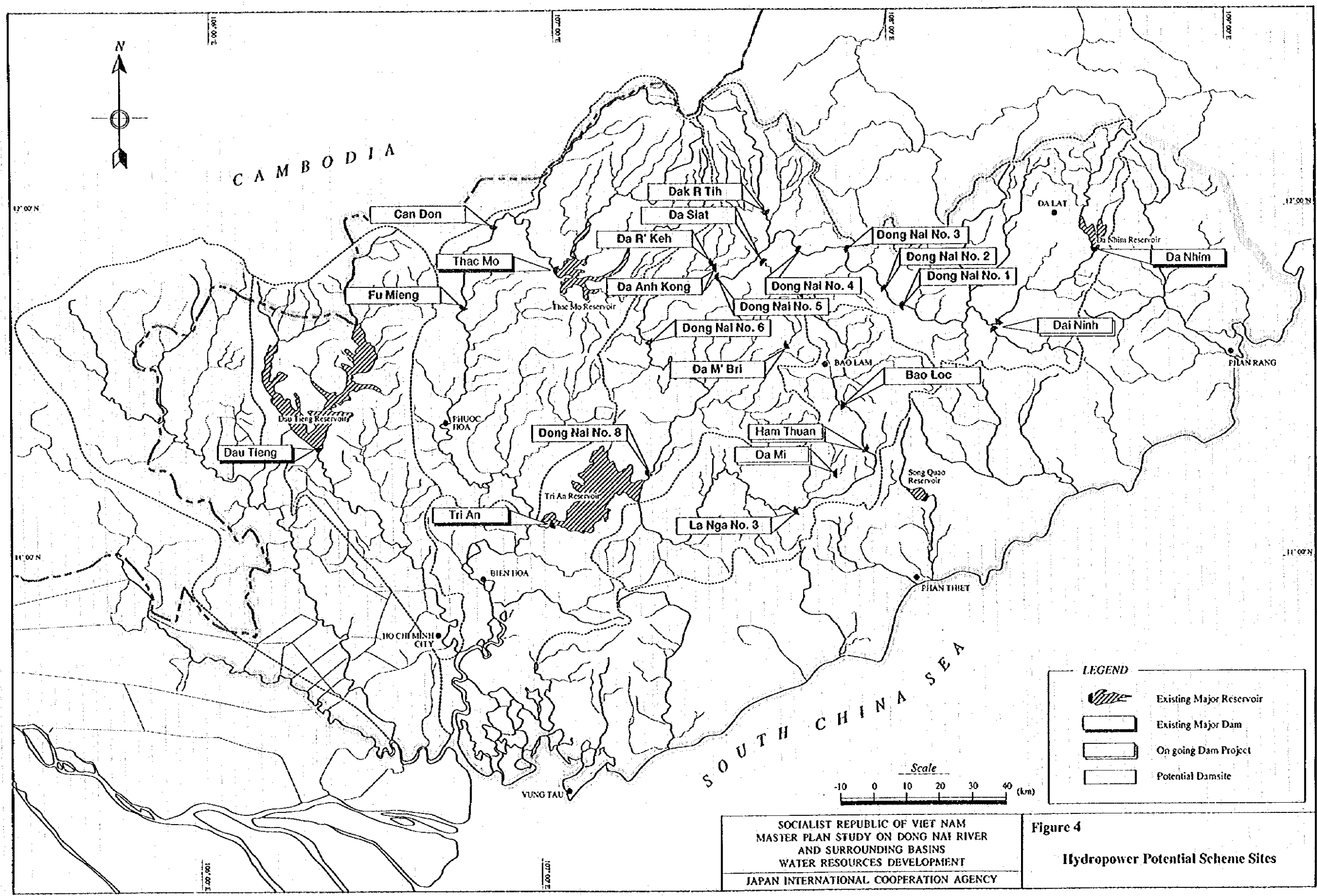






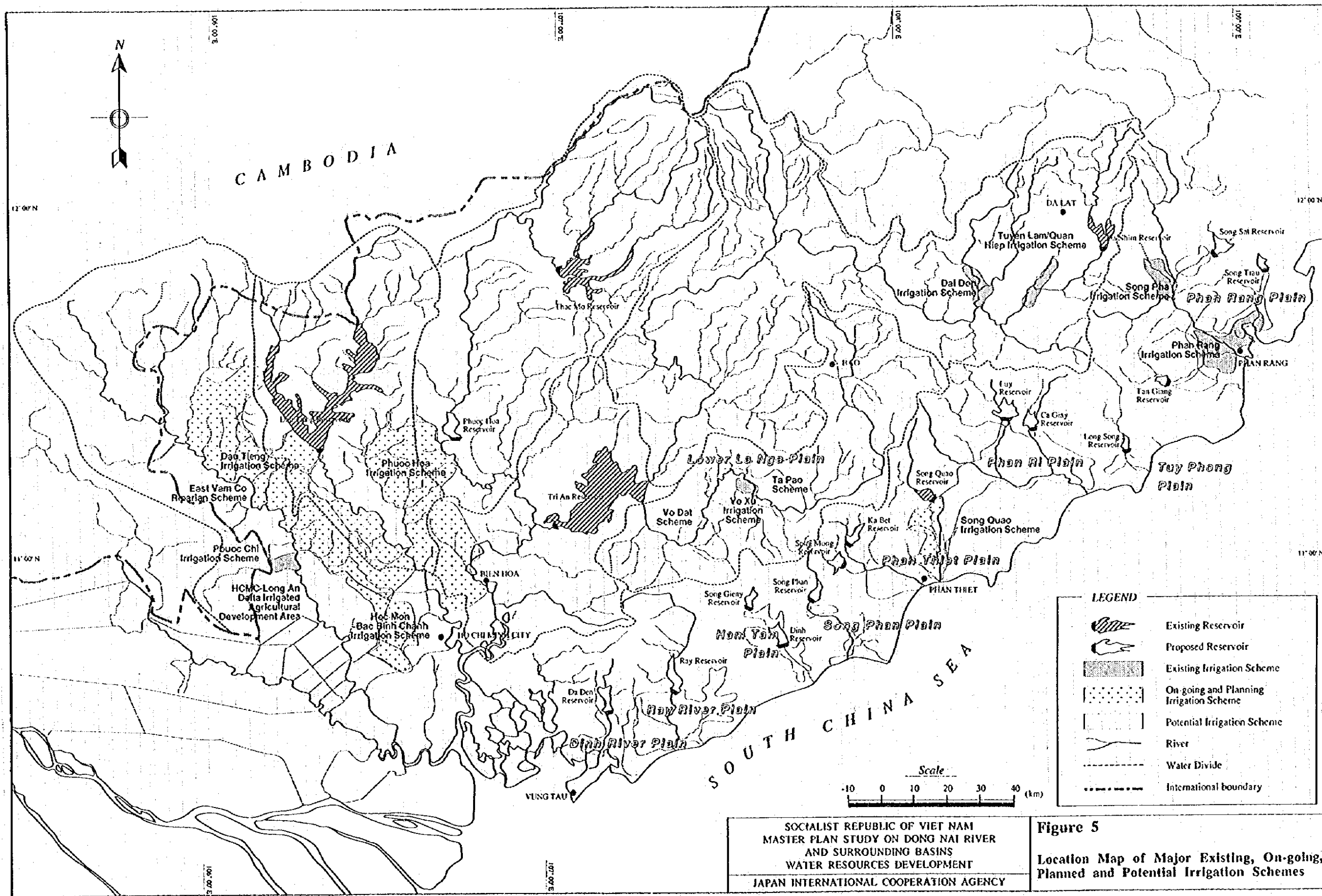


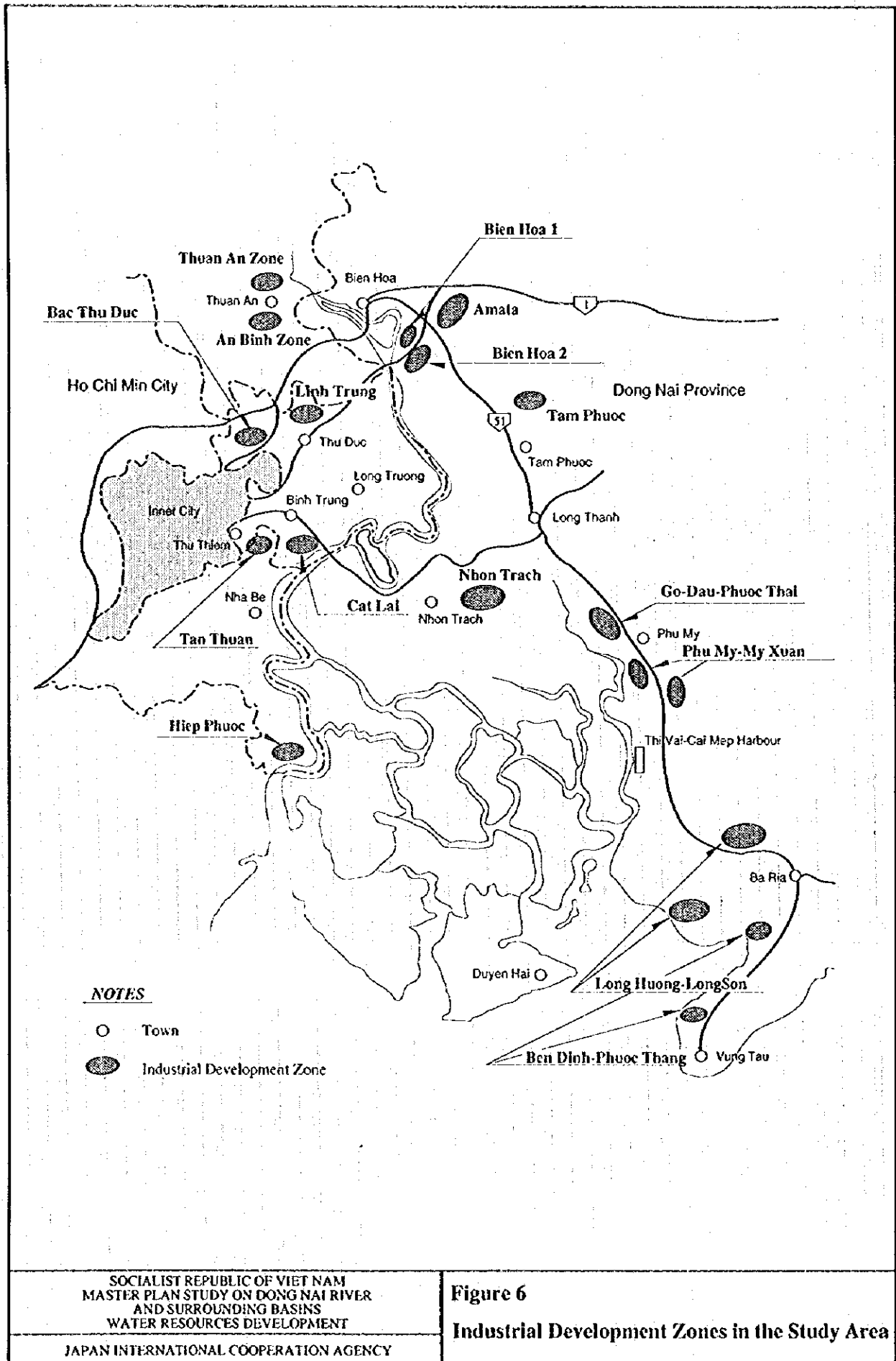




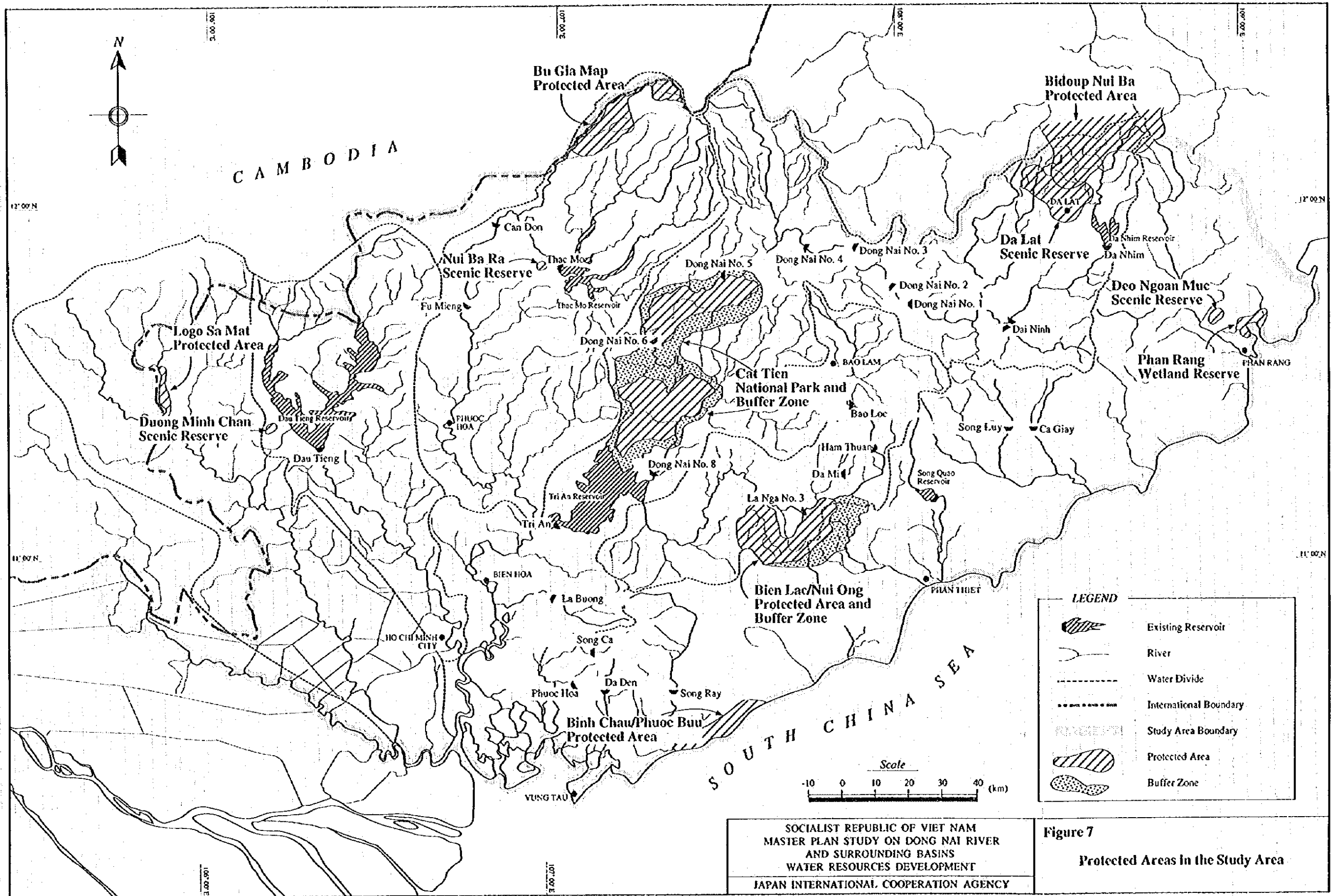
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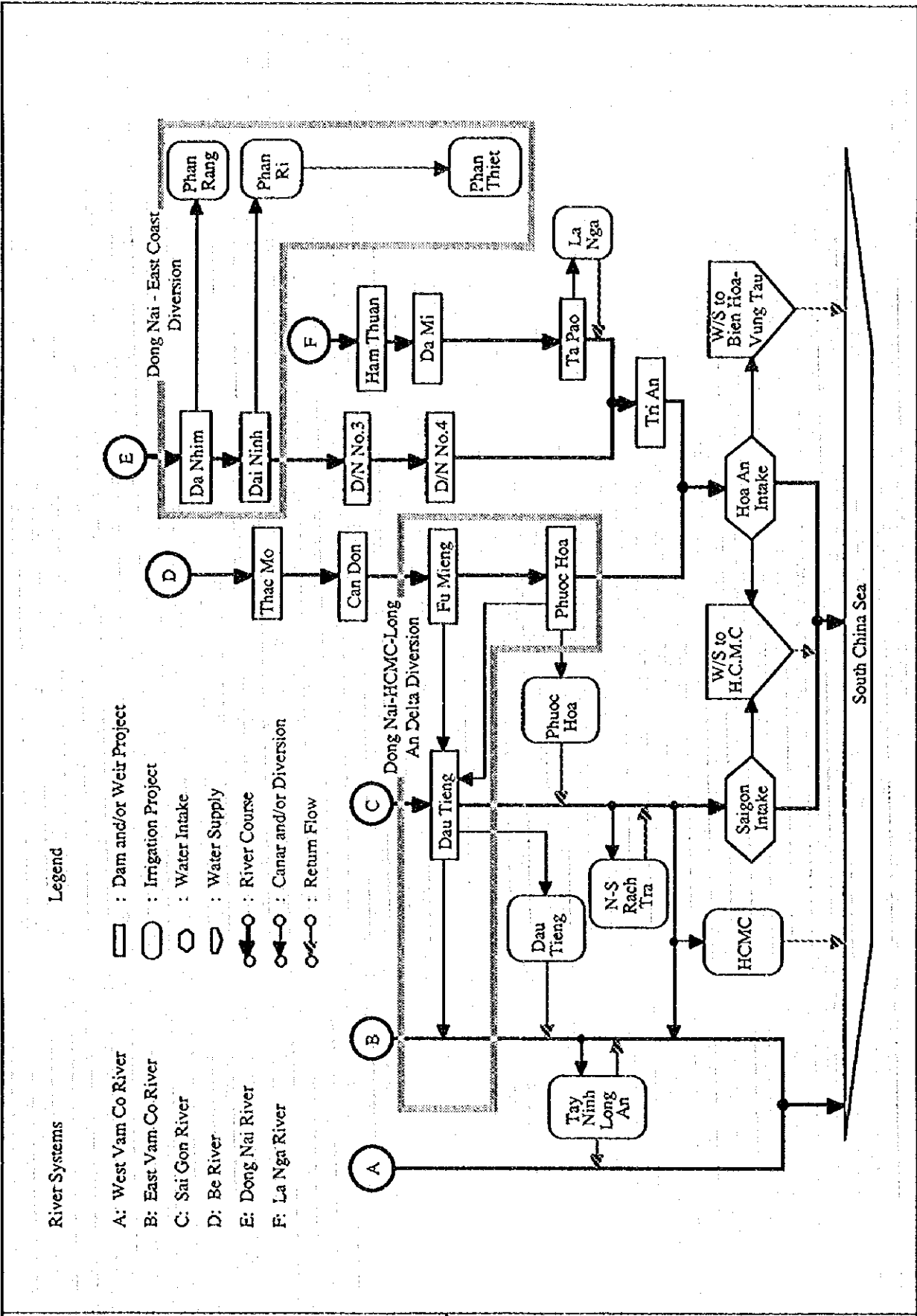
Figure 4  
 Hydropower Potential Scheme Sites











**Legend**

- : Dam and/or Weir Project
- : Irrigation Project
- ◻ : Water Intake
- ◻ : Water Supply
- ◻ : River Course
- ◻ : Canal and/or Diversion
- ◻ : Return Flow

**River Systems**

- A: West Vam Co River
- B: East Vam Co River
- C: Sai Gon River
- D: Be River
- E: Dong Nai River
- F: La Nga River

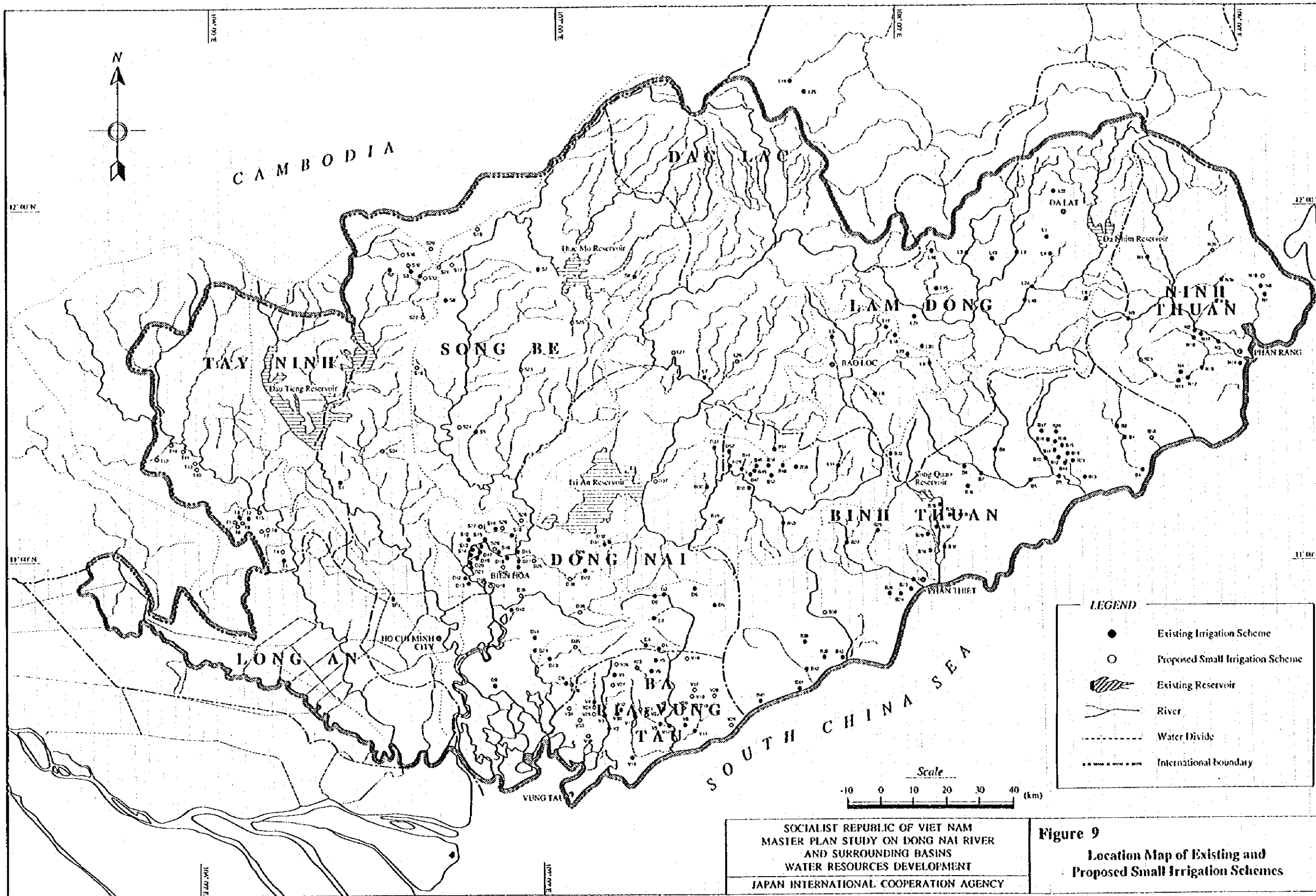
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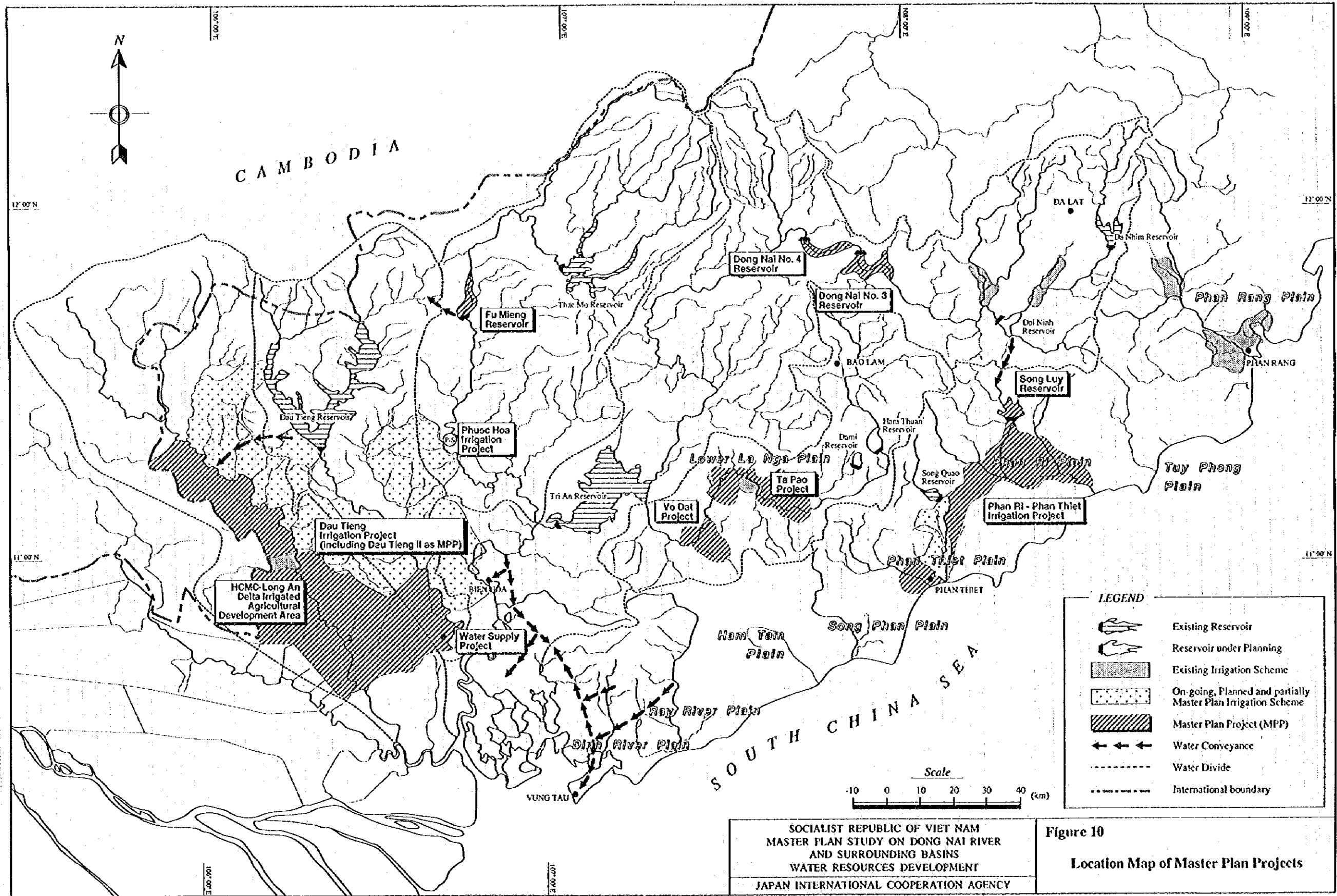
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**Figure 8**  
**Schematic Diagram of Basin Model**







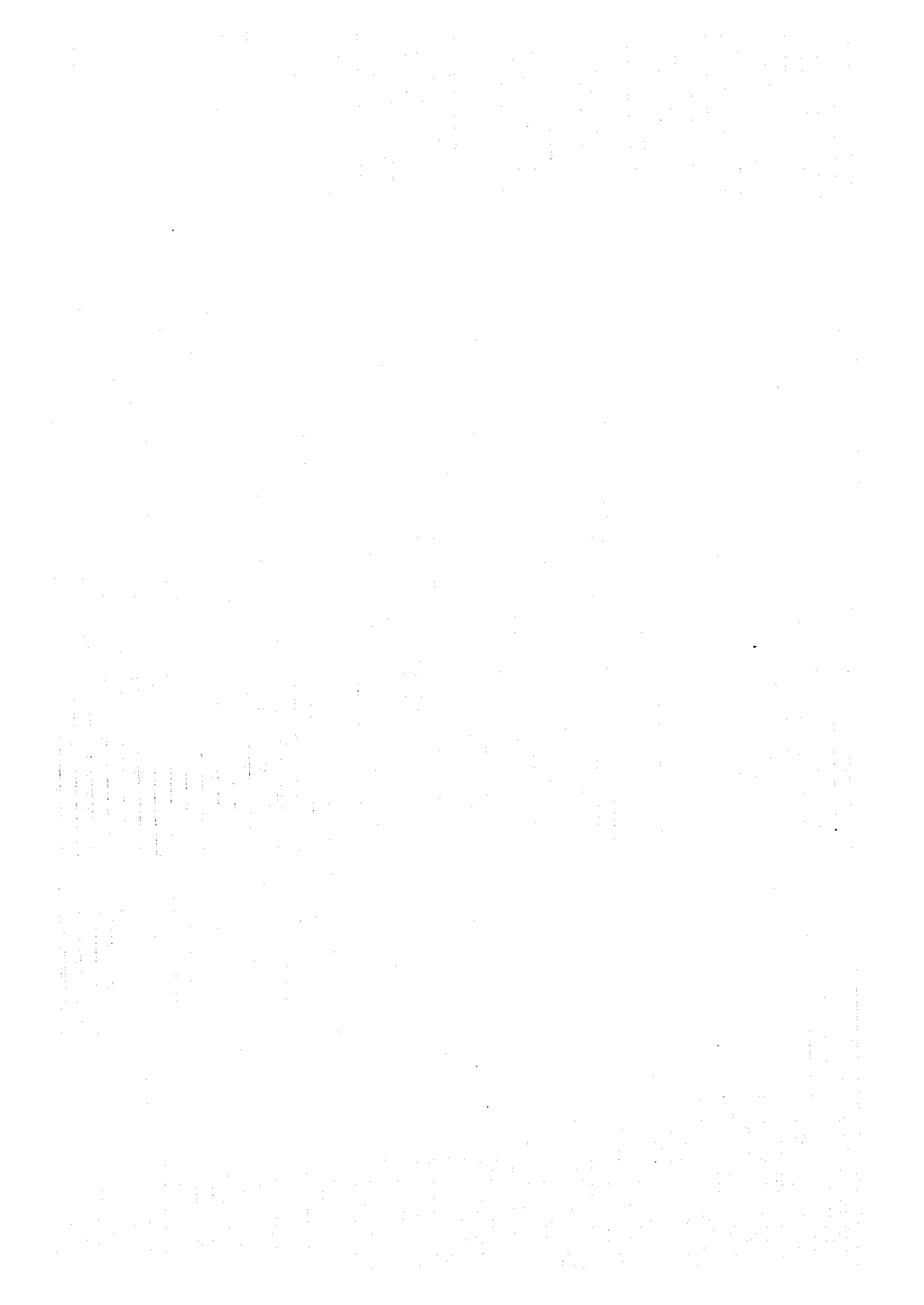


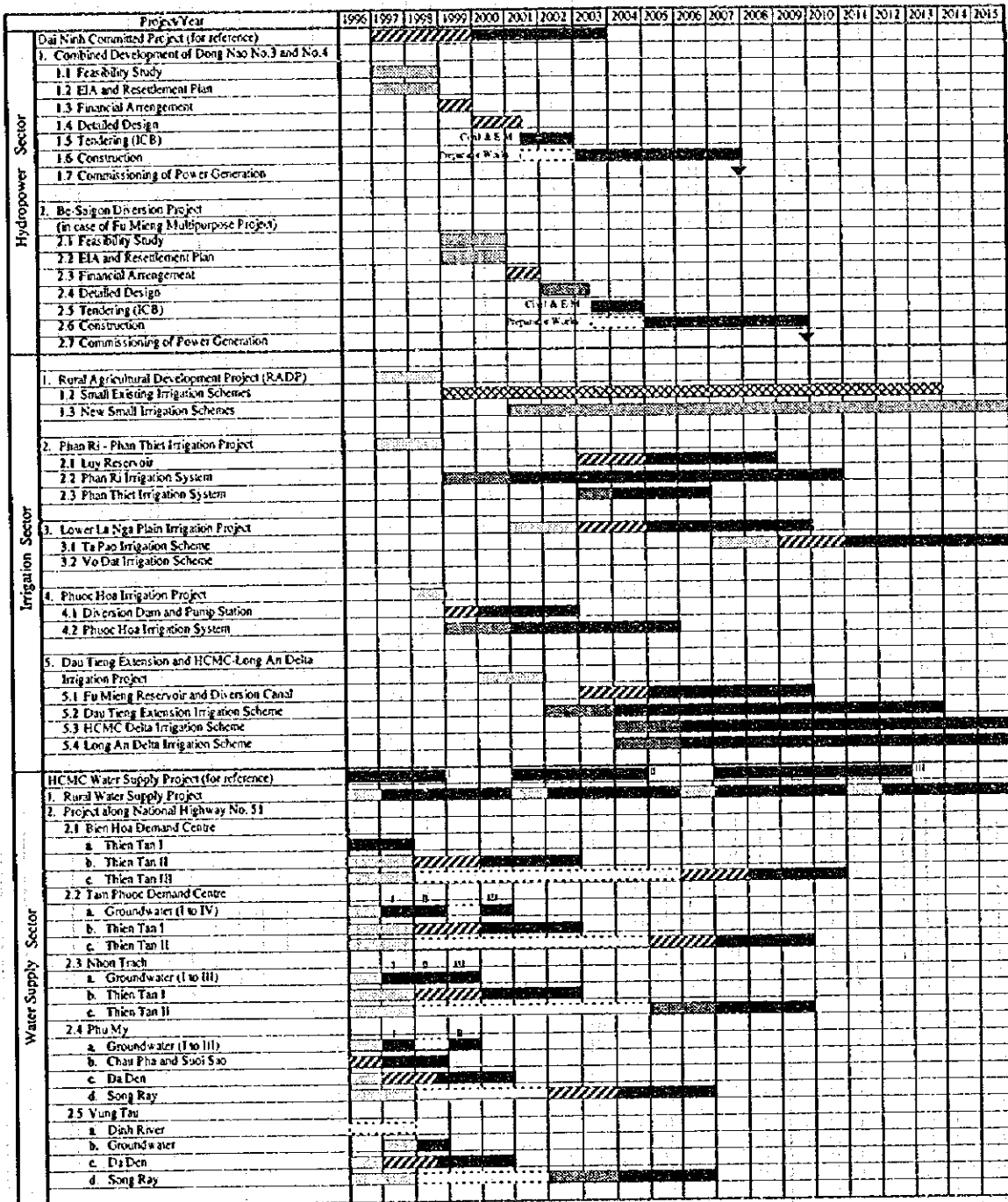
**LEGEND**

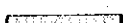


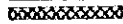
- Existing Reservoir
- Reservoir under Planning
- Existing Irrigation Scheme
- On-going, Planned and partially Master Plan Irrigation Scheme
- Master Plan Project (MPP)
- Water Conveyance
- Water Divide
- International boundary

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Figure 10  
 Location Map of Master Plan Projects





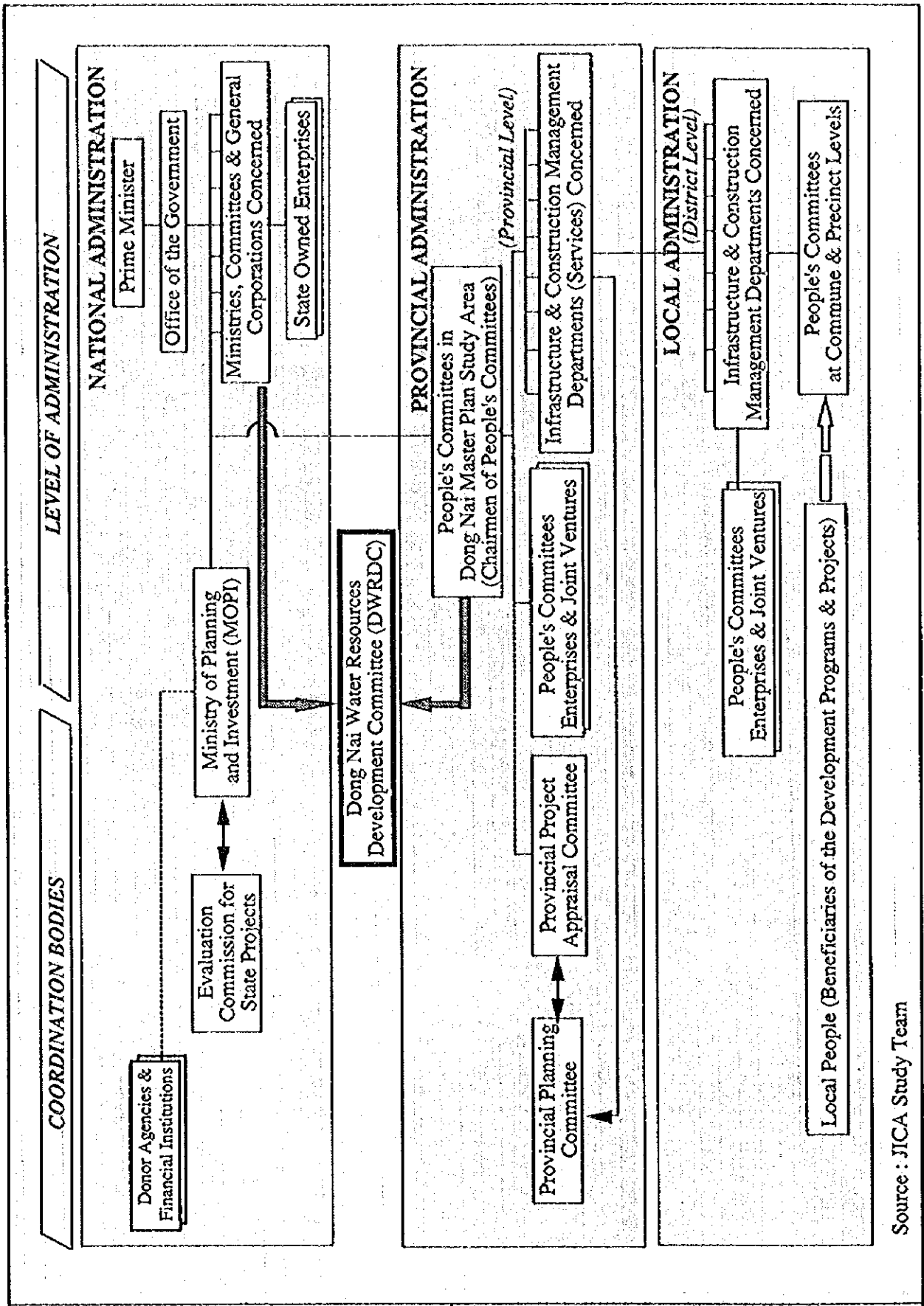
 : Master Plan Study Feasibility Study Investigation  
 : Detailed Design  
 : Construction  
 : Construction in Parallel with Design

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Figure 11

Implementation Sequence of Master Plan Projects



Source : JICA Study Team

Figure 12  
 Proposed Structure for Implementing the Dong Nai  
 Water Resources Development Projects

