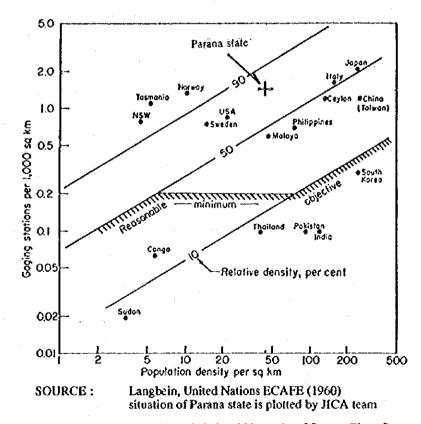
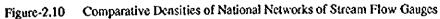
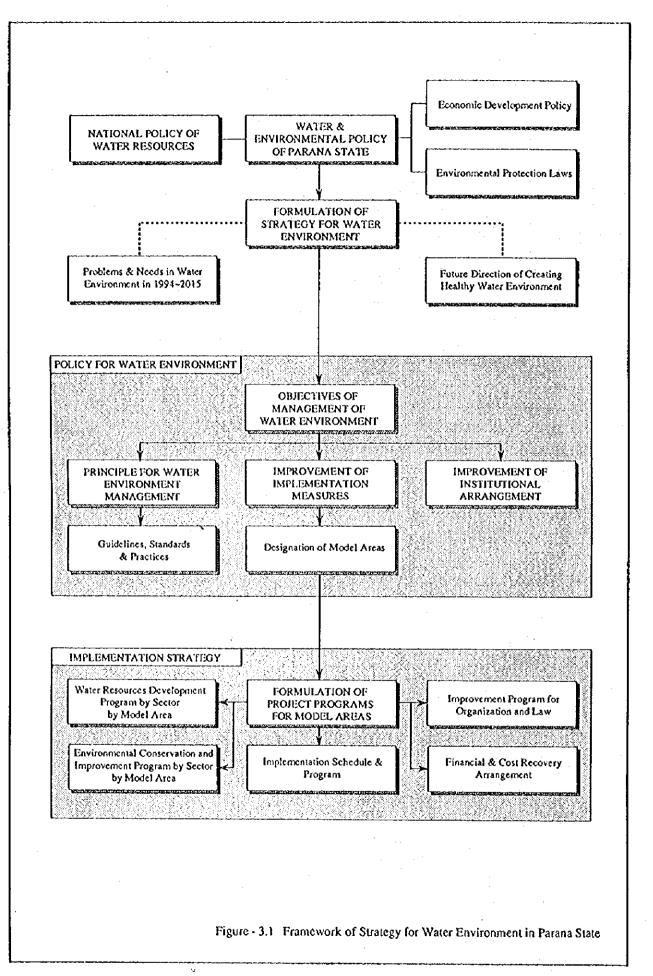


Figure-2.9 Comparative Densities of National Networks of Precipitation Gauges







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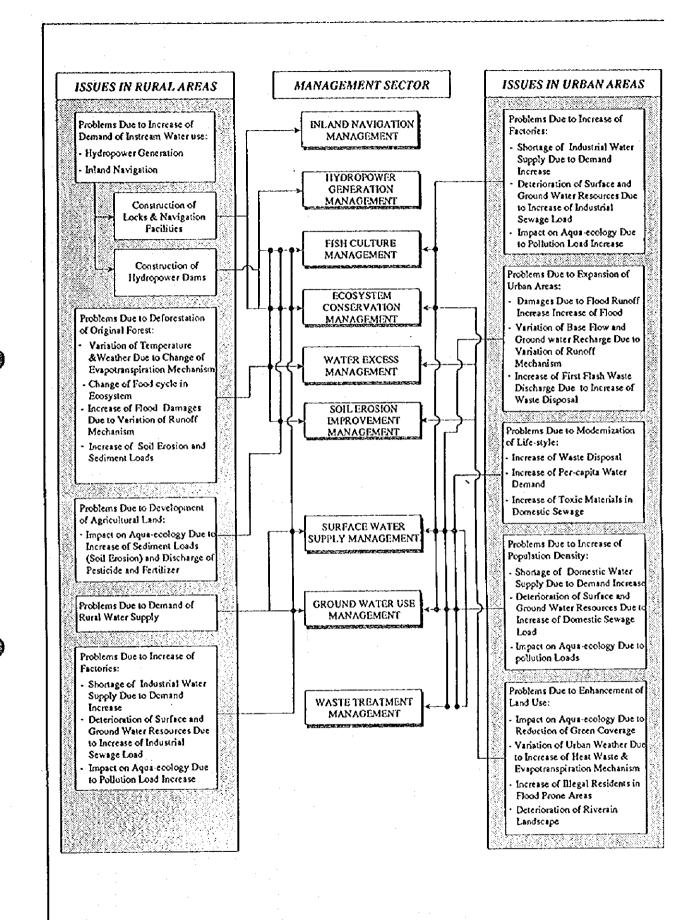
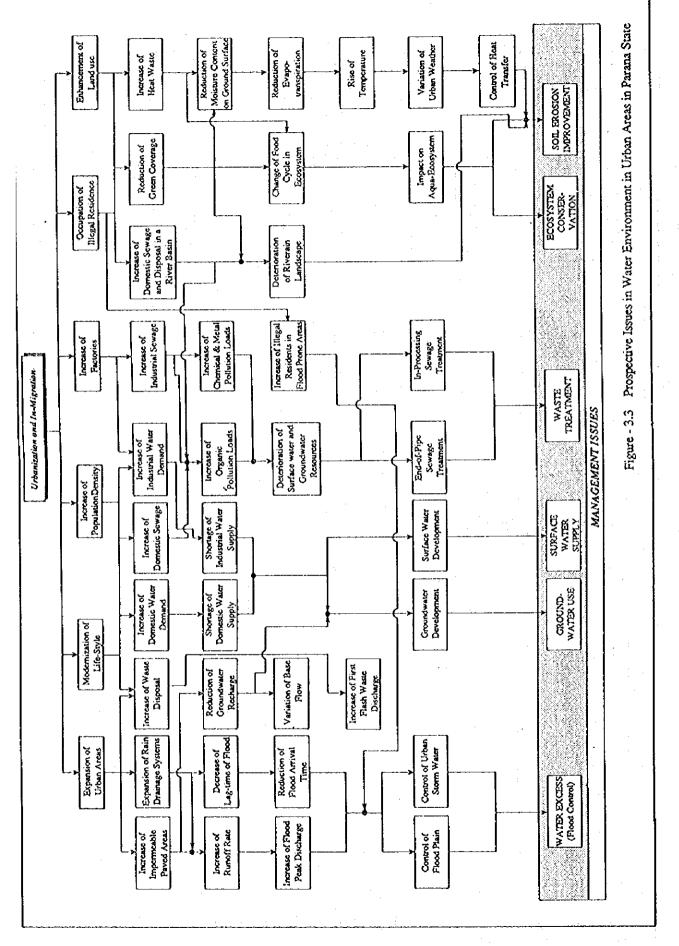
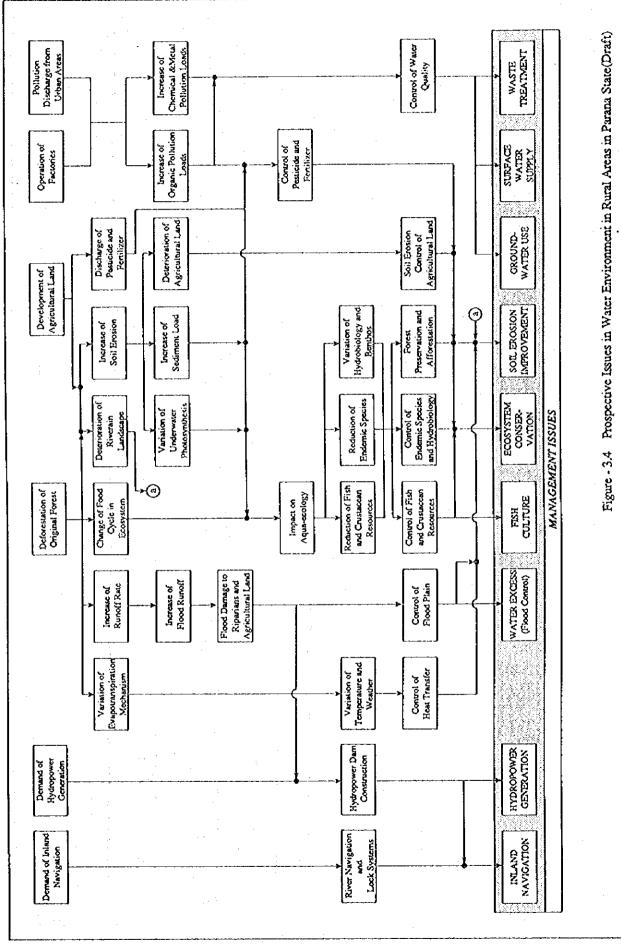
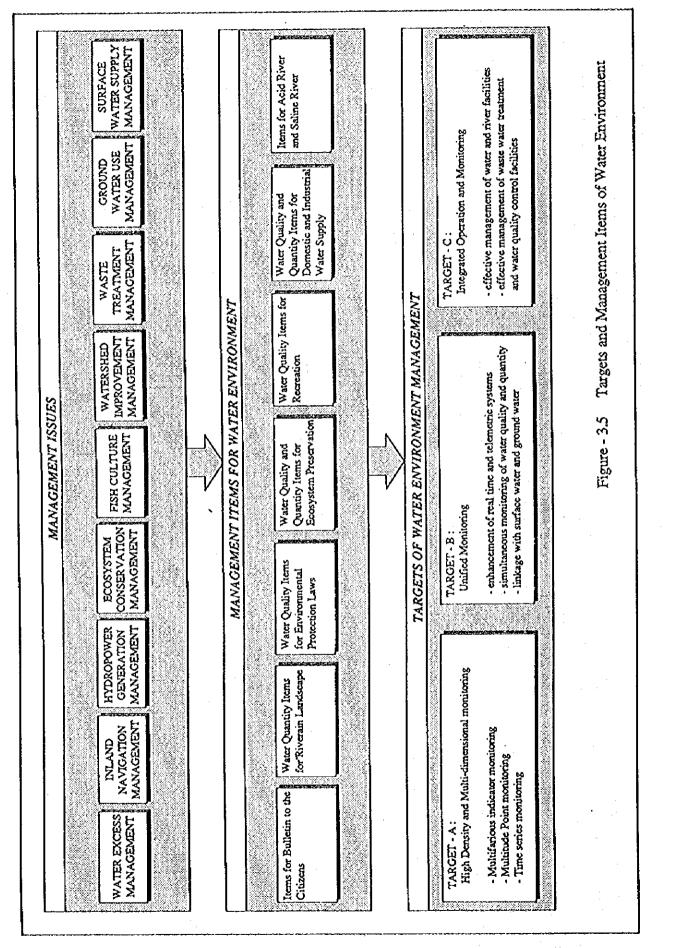


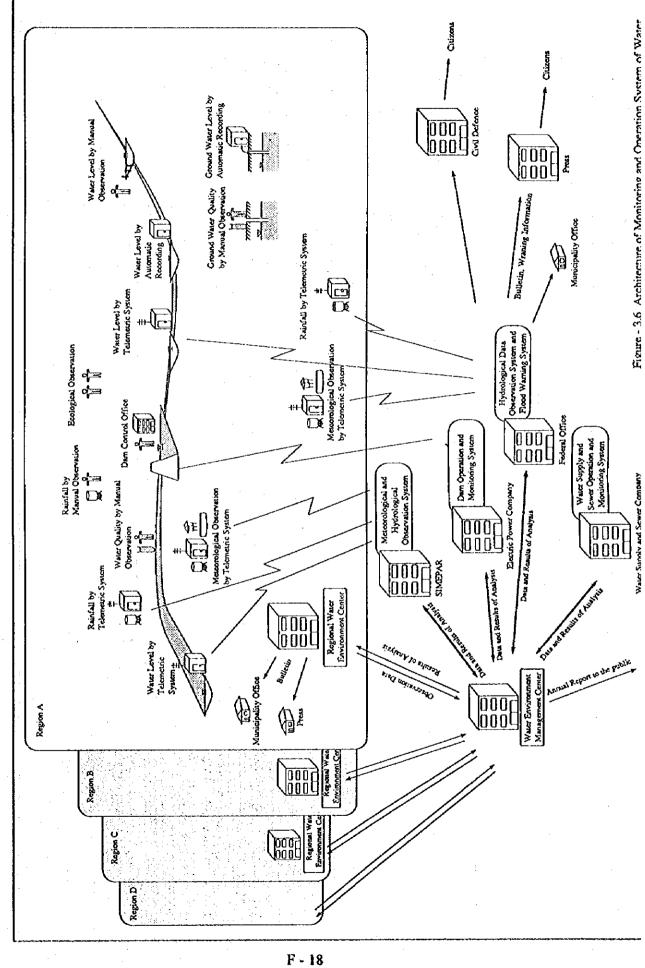
Figure - 3.2 Fundamental Issues in Water Environment in Parana State

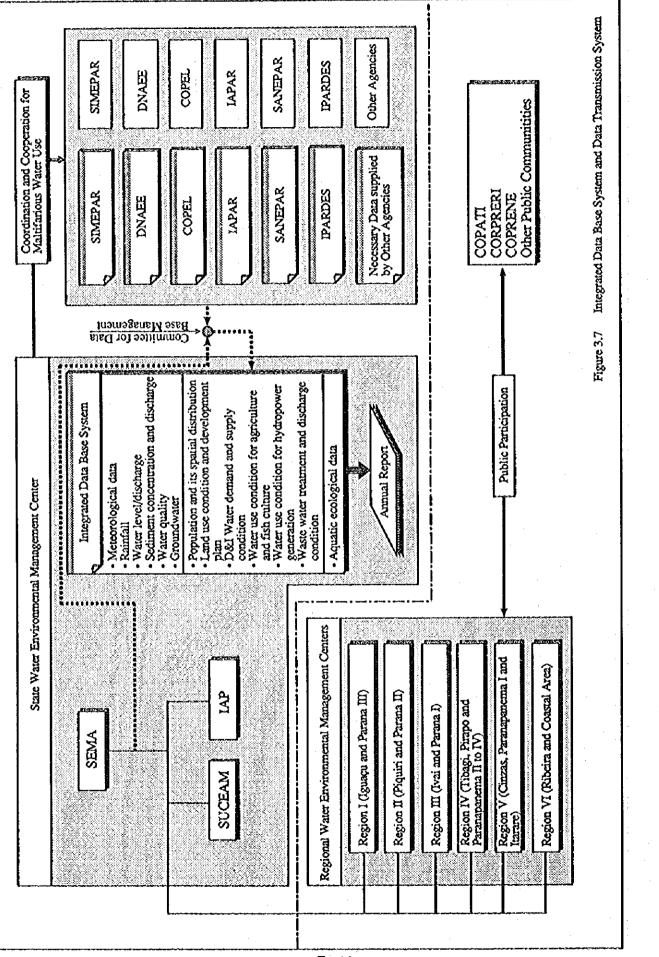


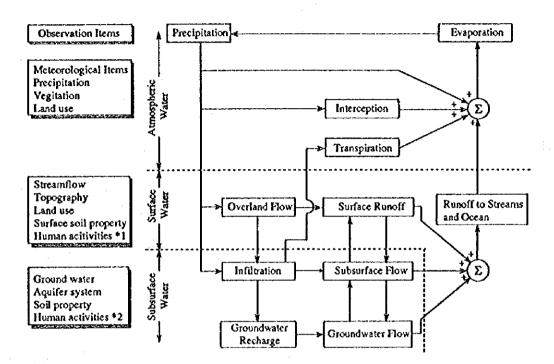
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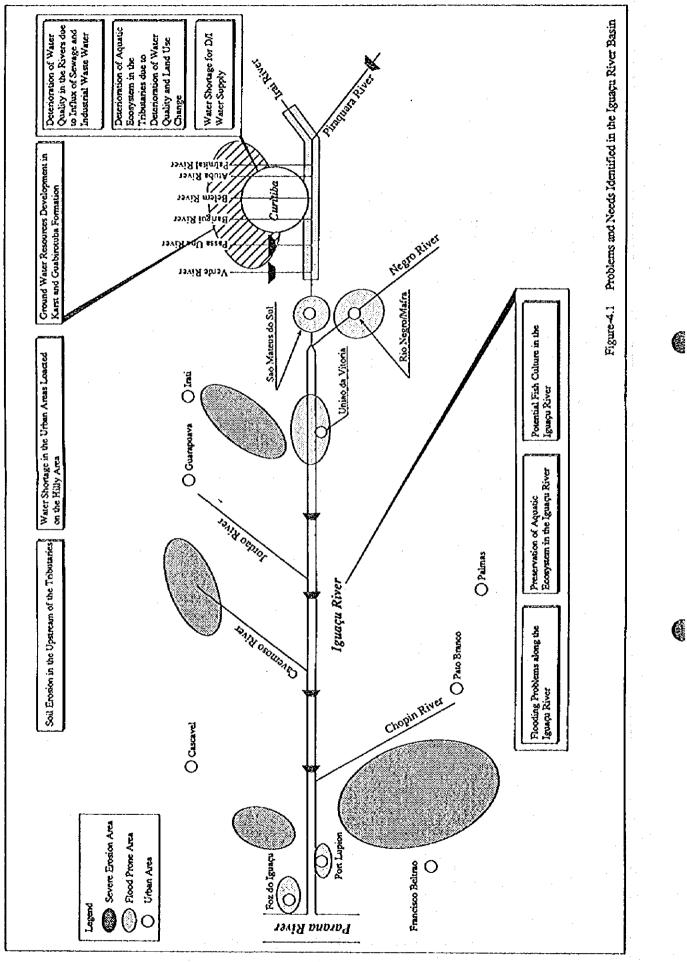
Notation :

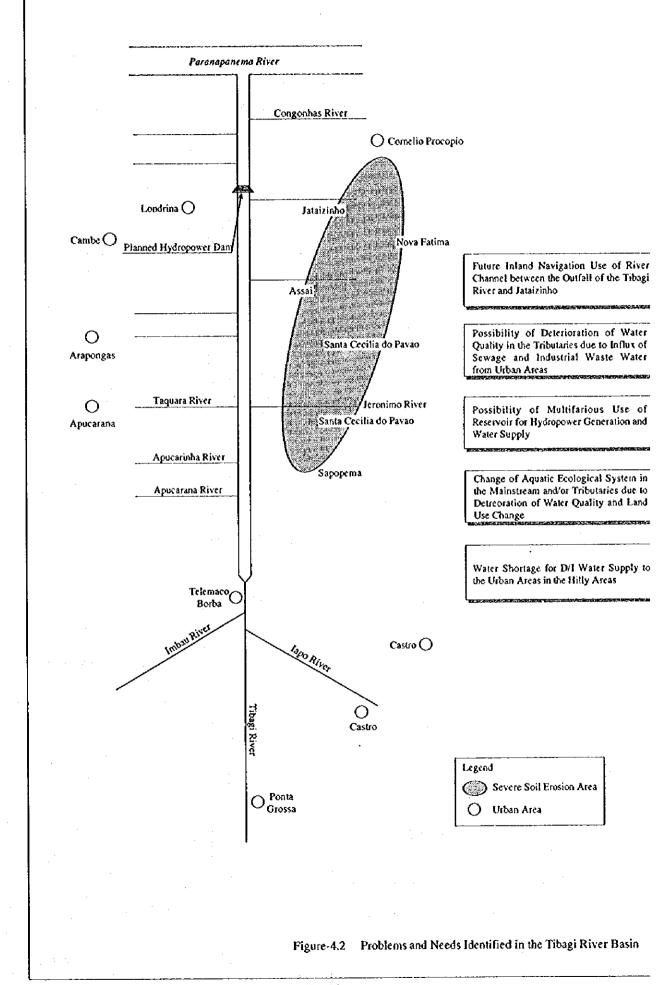
\*1 : Water Intake, Waste Discharge \*2 : Water Supply System Inventry, Sewer System Inventry, River Inventry, Pumping from wells, and Well Inventry

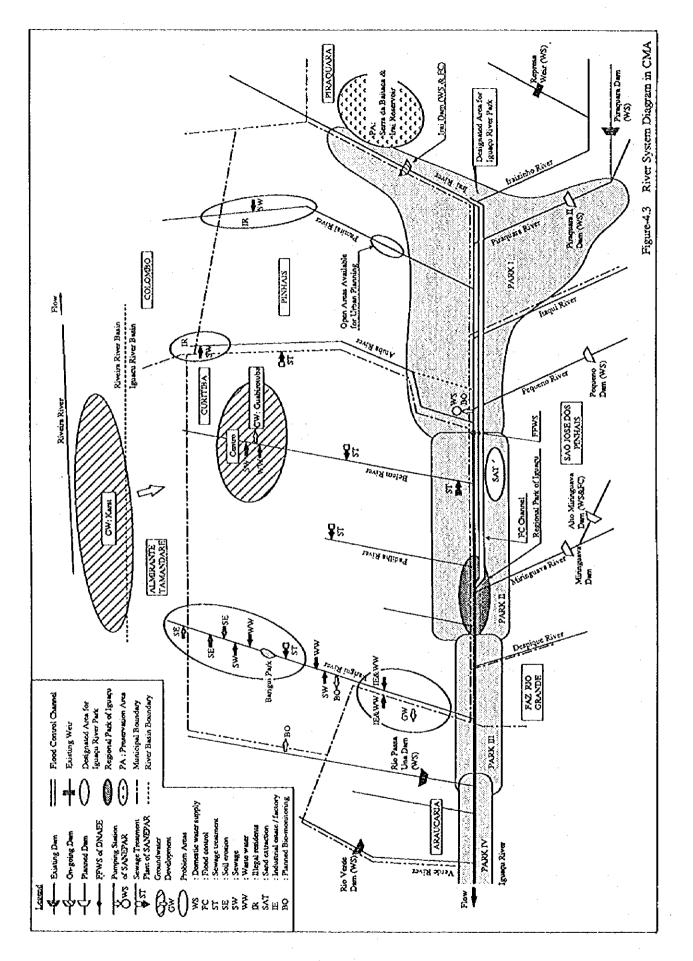
SOURCE: Chow, Madiment and Mays, 1988

Observation items are supplemented by JICA team

Figure - 3.8 Concept of Hydrological Cycle Monitoring and Required Observation Items







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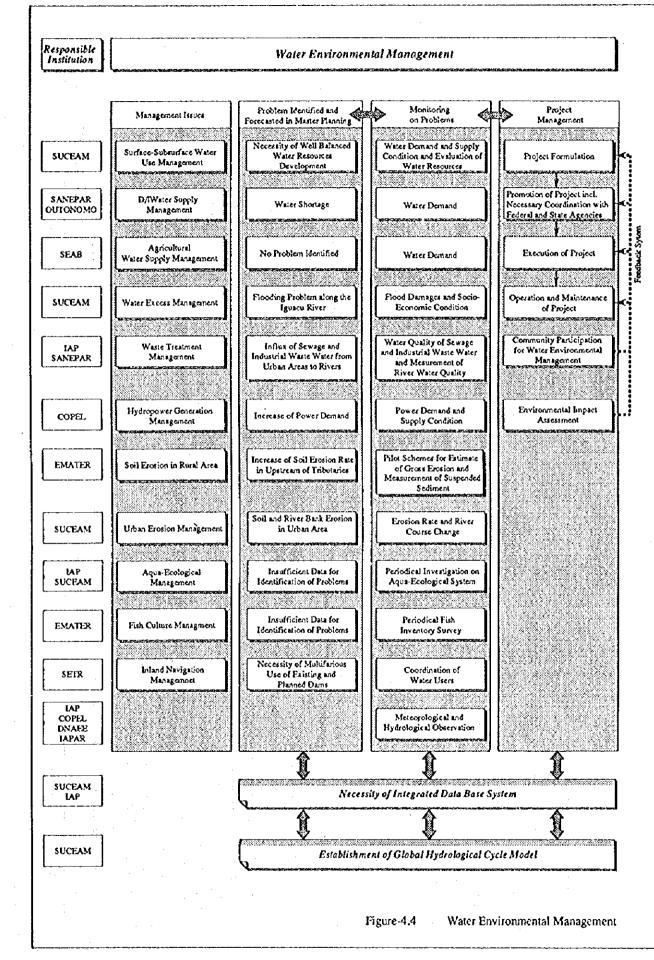


Figure 4.5 Implementation Schedule of Water Environmental Management

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L	Decommendary Activities	10	1990's	[						ส	2000's							
		96 97 9	98 99	0	+4	2 3	4	S	8	7	8	6	10 11	1 12	2 13	34	15	ı,
[	Establishment of Water Environmental Management Centers under SEMA																	
	a) Institutional setting-up of the State and Regional Centers		-	Į.							- <u>-</u>							
	b) Operation of the State and Regional Centers				-	-					-		┨╴		-			<b>-</b> 1717
	c) Integrated data base system at the State Center	Service and a second			•	÷	i 			4 1 4	1							
	d) Data taransmission system between State and Regional Centers and other insbitutions		-		•	1 - +							ġ		÷			<u> </u>
3	Metto-hydrological Observation Network																	
	a) Implementation of SIMEPAR								-	;	•				+			
	b) Strengthning of the existing meteorological and hydrological observation network		1	- 1890 - 1     	-	-						-						·r ·
	c) Strengthening of River Water Quality Monitoring				·													
	<ul> <li>Urbanized areas in CMA, Cascavel, Londrina and Ponta Grossa</li> </ul>				-													
	Other urban areas						<u> </u>								-			-127
	<ul> <li>Water quality test on heavy metals, pesticide and fetilizer</li> </ul>																	
	d) Strengthening of Sediment Monitoring																	
	<ul> <li>Arteas for severe crossion areas</li> </ul>	and the second second				-		-			• •							
	<ul> <li>Other areas, if necessary</li> </ul>								1		-	┨	╢	┨	-			- T-T-
	e) Provision of workshop and improvement of equipment		1	1		-	•			;	;				÷			
	Aquatic Ecosystem Monitoring									:								
	a) Monitoring of bioindicators and assessment of situation	10100000000			00000	200	- 00					-	-		-			- pr
	b) Analysis and assessment of vegetation along the nivers through GIS	N.											1					
	c) Fish investory survey				-			EX.								- 167 -		
	d) Fish population dynamics						-										• • • •	
4	Establishment of Integrated Monitoring System for Surface and Subsurface Water Resources in CMA										<u> </u>		t_m_					
	a) Provision of inspection bore holes and monitoring equipment	37400000													•			
	b) Provision of additional river water level gauges											·						
	c) Accumulation of data		- 20			-	- 44						-			-	-  -	- Fil
	c) Establishment of global hydrological cycle model incorporating surface and subsurface water resources	- 14		22.2445			-+-							;		_ <u>_</u>	· •	
	c) Expansion to other uban areas													-	-8-	-		-69-
]			Activities in 3st Stage		et S	1305			] ¥	- de	Activities in 2nd Stage	245	tace.	-				1
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				0.01												•	Ì	Ċ

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