

表 2-1 インドネシアの州別人口、人口増加率、人口密度

Provinces	Population (thousand)			Annual growth rate of population	Population density per km ²
	1990	1995	2000	1990-2000	2000
Sumatra	36,506	40,381	42,655	1.69	88
D.I Aceh	3,416	3,847	4,011	1.67	72
North Sumatra	10,256	11,115	11,476	1.17	160
West Sumatra	4,000	4,323	4,228	0.57	99
Riau	3,304	3,900	4,734	3.79	50
Jambi	2,020	2,370	2,401	1.80	45
South Sumatra	6,313	7,208	7,756	2.15	71
Bengkulu	1,179	1,409	1,405	1.83	71
Lampung	6,018	6,658	6,654	1.05	188
Java	107,581	114,733	120,430	1.19	945
DKI Jakarta	8,259	9,113	8,385	0.16	12,628
West Java	35,384	39,207	43,553	2.17	1,009
Central Java	28,521	29,653	30,857	0.82	948
DI Yogyakarta	2,913	2,917	3,109	0.68	976
East Java	32,504	33,844	34,526	0.63	720
Bali	2,778	2,896	3,125	1.22	555
Nusa Tenggara	6,639	7,223	7,751	1.67	115
West Nusa Tenggara	3,370	3,646	3,822	1.31	190
East Nusa Tenggara	3,269	3,577	3,929	1.92	83
Kalimantan	9,099	10,470	10,911	1.99	20
West Kalimantan	3,229	3,636	3,704	1.53	26
Central Kalimantan	1,396	1,627	1,801	2.67	12
South Kalimantan	2,597	2,893	2,970	1.40	81
East Kalimantan	1,877	2,314	2,436	2.74	12
Sulawesi	12,521	13,732	14,446	1.54	75
North Sulawesi	2,478	2,649	2,821	1.35	103
Central Sulawesi	1,711	1,938	2,066	1.97	32
South Sulawesi	6,982	7,558	7,787	1.14	125
Southeast Sulawesi	1,350	1,587	1,772	2.86	46
Maluku	1,858	2,087	1,978	0.65	25
Irian Jaya	1,649	1,943	2,113	2.60	5
Indonesia	179,379	194,755	203,456	1.35	106

Source: Statistic Indonesia, 2000, Badan Pusat Statistik

表 2-2 北スマトラ州の人口、人口増加率、人口密度

Regency / Municipality	Population		Annual growth rate
	1990	1999	
1. Nias	589,184	701,858	1.94
2. Tapanuli Selatan	954,332	768,969	-2.40
3. Tapanuli Tengah	214,467	262,312	2.24
4. North Tapanuli	695,777	426,540	-5.54
5. Labuhan Batu	733,521	930,275	2.64
6. Asahan	884,594	967,200	0.99
7. Simahngun	805,365	877,048	0.95
8. Dairi	276,980	305,265	1.08
9. Karo	257,981	290,035	1.30
10. Deli Serdang	1,602,749	1,963,156	2.25
11. Langkat	812,229	899,708	1.14
12. Mandaling Natal	-	380,160	-
13. Toba Samosir	-	304,659	-
14. Sibolga	71,895	82,320	1.50
15. Tanjung Balai	108,202	118,639	1.02
16. Pematang Siantar	219,328	240,353	1.02
17. Tebing Tinggi	116,767	141,284	2.12
18. Medan	1,730,752	2,068,377	1.98
19. Binjai	181,904	227,712	2.50
North Sumatra	10,256,021	11,955,870	1.72

Source: Statistic North Sumatra, 1999

表 2-3(1)北スマトラ州における排水水質調査結果 (2000 年)

Factories	Type of Factory	pH	BOD (mg/l)	COD (mg/l)	NH ₃ -N (mg/l)	PO ₄ (mg/l)	SS(mg/l)	Oil & Fat (mg/l)	Survey Periods
DELI River									
PT.Triumumi	textile	5.19-5.34 (6-9)	118-162 (150)	0.019-1310 (1.0)	0.18-117 (60)	-	211-762 (50)	3-21 (3)	Mar, Aug, Sep
PT.Sumatex	textile	5.15-6.97 (6-9)	170-466 (150)	383-954 (1.0)	0.35-1.63 (60)	-	102-536 (50)	5-22(3)	Mar, Aug
PT.CocaCola Amatil	beverage	7.24-7.94 (6-9)	23.1-64.3 (50)	-	-	-	53-128 (30)	11-12 (6)	Mar, Sep
PT.Musim Mas	oil	6.02-8.35 (6-9)	428-482 (75)	21-826 (180)	212 (-)	2.36 (2)	126-434 (60)	0.4-8 (15)	Mar, Aug
PT.Kim Sari	cigarette paper	6.89-7.57 (6-9)	15.9-26.7 (90)	30.3-50.3 (175)	-	-	35-43 (80)	-	Mar, Oct
PT.Superin	glue	8.68-8.94 (6-9)	24-54.8 (150)	47.8-117 (300)	0.06-7.009 (2)	-	47-56 (400)	18 (-)	Mar, Aug, Oct
PT.Intan Natinal Iron	steel	6.86-9.27 (6-9)	-	-	-	-	45-82 (20)	-	Mar, Aug, Sep
PT.Growth Sumatra	steel	4.27-6.28 (6-9)	-	-	-	-	191-355 (20)	-	Mar, Aug, Sep
PT.Intan Suar Kartika	steel	2.47-7.36 (6-9)	-	-	-	-	40-233 (20)	-	Mar, Aug, Sep
BELAWAN River									
PT.Rubber Hocklie	rubber	6.14-6.75 (6-9)	39.4-111 (100)	77.6-262 (250)	0.79-20.460 (15)	-	114-271 (100)	-	Mar, Jul, Sep
PT.Hadi Baru	rubber	5.98-6.68 (6-9)	108-130 (100)	258-265 (250)	0.84-20.814 (15)	-	85-330 (100)	-	Mar, Jul, Sep
PTPN. II S.Semayang	sugar	5.71 (-)	100 (-)	14 (-)	42.8 (-)	-	63 (-)	-	Mar
PT.ABC	battery	7.13-7.55 (6-9)	26-56 (10)	0.0004-0.049 (0.3)	0.01-0.68 (-)	-	26-56 (10)	10-97.5 (4)	Mar, Jul, Sep
PT.Damai Abadi	steel	3.79-10.51 (6-9)	-	47.8 (-)	-	-	19-130 (20)	-	Mar, Jul, Sep
HELUMAI River									
PT.Medisafe Technologies.	rubber	6.68-7.64 (6-9)	50.8-160 (100)	92.9-344 (250)	1.04-9.65 (15)	-	78-147 (100)	-	Mar, Jul, Sep
PT.Sari Morawa	incense stick	6.04-6.44 (6-9)	218-248 (100)	498-500 (200)	-	-	186-329 (100)	-	Mar, Sep
PT.Olaga Food	food	4.87-6.70 (6-9)	32.4-376 (150)	30.6-763 (300)	7.67 (-)	-	62-173 (400)	10 (-)	Apr, Jul, Sep
PT.Sari Morawa	incense stick	6.32-6.92 (6-9)	115-500 (200)	-	57.3-243 (100)	-	103-247 (100)	-	Jul, Sep
ASAHAN River									
PT.Kisaran Raya	rubber	5.96-6.9 (6-9)	34.4-58.5 (60)	66.2-124 (200)	0.61-15.895 (5)	-	32-280 (100)	-	Feb, Jun, Sep
PT.Sari Tani Jaya	tapioca	4.51-7.01 (6-9)	78.9-2170 (150)	100-4792 (300)	-	-	123-207 (100)	-	Jun, Sep
Aek Loba Sucfindo	palm oil	7.17-7.9 (6-9)	150-426 (100)	291-832 (350)	0.19-28.883 (50)	-	242-425 (250)	40-54 (25)	Feb, May, Sep
Sfi Silau	palm oil	7.8-8.48 (6-9)	76.8-204 (100)	180-424 (350)	0.06-28.883 (50)	-	217-321 (250)	19-22 (25)	Feb, Jun, Sep
PT.Padasa Enam Utama	palm oil	7.58-8.5 (6-9)	431-480 (100)	874-1139 (350)	0.06-21.737(50)	-	362-468 (250)	28-61(25)	Feb, Jun, Sep
Air Batu	palm oil	7.17-8.5 (6-9)	480-500 (100)	1069-1679 (350)	0.25-28.882 (50)	-	202-754 (250)	45-52 (25)	Feb, May, Sep
PT.Aslan Agro TJ.Balai	oil	5.36-8.5 (6-9)	24.4-51.2 (75)	24-51.1 (180)	21.5 (-)	0.026-0.6 (2)	53-69 (60)	0.8-18 (15)	Feb, Jun, Sep
MERBAU River									
PT.Kapuas Besar	rubber	6.27-6.85 (6-9)	28.3-48.5 (60)	66.9-79.5 (200)	1.16-15.12 (5)	-	54-243 (100)	-	Feb, May, Sep
PT.Merbau Jaya	palm oil	6.97-7.6 (6-9)	256-408 (100)	764-787 (350)	0.31-28.883 (50)	-	236-479 (250)	37-46 (25)	Feb, May, Sep
Sinart	palm oil	7.77-8.8 (6-9)	878-930 (100)	1845-5561 (350)	0.22-28.883 (50)	-	295-825 (250)	32-46 (25)	Feb, May, Sep
PTPN. IV (Berangir)	palm oil	7.16-7.18 (6-9)	136-230 (100)	389-470 (350)	0.21-28.883 (50)	-	283-403 (250)	38-57 (25)	Feb, May, Sep
PT.Umada	palm oil	6.03-7.59 (6-9)	76.5-442 (100)	148-913 (350)	0.24-0.32 (50)	-	108-257 (250)	20-56 (25)	Feb, May, Sep

Note : Figures in parentheses show the Effluent Quality Standards of each type of factories, "-" means Not Available

Source : North Sumatra BAPEDALDA

表 2-3(2)北スマトラ州における排水水質調査結果 (2000 年)

Factories	Type of Factory	Fe (mg/l)	Cr (mg/l)	Cd (mg/l)	Cl (mg/l)	Mn (mg/l)	Zn (mg/l)	SO ₄ (mg/l)	Cu (mg/l)	Ni (mg/l)	Pb (mg/l)	Survey Periods
DELI River												
PT. Trimurni	textile	-	<0.0004 (-)	-	-	-	-	-	-	-	-	Mar, Aug, Sep
PT. Sumatex	textile	-	-	-	-	-	-	-	-	-	-	Mar, Aug
PT. CocaCola Amatil	beverage	-	-	-	-	-	-	-	-	-	-	Mar, Sep
PT. Musim Mas	oil	-	-	-	-	-	-	-	-	-	-	Mar, Aug
PT. Kim Sari	cigarette paper	-	-	-	-	-	-	-	-	-	-	Mar, Oct
PT. Superin	glue	1.109 (-)	-	<0.0004 (-)	16.9 (-)	<0.0004 (-)	0.802 (-)	3 (-)	<0.0004 (-)	-	1.795 (-)	Mar, Aug, Oct
PT. Intan Natinal Iron	steel	-	<0.0004 (0.5)	0.0004-0.043 (0.05)	-	-	0.0004-0.454 (1.0)	-	0.037-0.164 (0.6)	0.0004-0.321 (0.1)	0.045-1.132 (1.0)	Mar, Aug, Sep
PT. Growth Sumatra	steel	-	<0.0004 (0.5)	0.0004-0.025 (0.05)	-	-	0.081-5.590 (1.0)	-	0.0004-0.412 (0.6)	0.0004-0.226 (0.1)	0.031-1.684 (1.0)	Mar, Aug, Sep
PT. Intan Sugar Kartika	steel	-	0.063-7.458 (0.5)	0.0004-0.08 (0.05)	-	-	2.025-12.351 (1.0)	-	0.251-0.441 (0.6)	0.0004-0.686 (0.1)	0.242-0.764 (0.1)	Mar, Aug, Sep
BELAWAN River												
PT. Rubber Hocklie	rubber	-	-	-	-	-	-	-	-	-	-	Mar, Jul, Sep
PT. Hadi Baru	rubber	-	-	-	-	-	-	-	-	-	-	Mar, Jul, Sep
PTPN. II S. Semayang	sugar	-	-	-	-	-	-	-	-	-	-	Mar
PT. ABC	battery	-	<0.0004 (0.09)	-	-	0.0004-0.049 (0.3)	0.0004-1.566 (0.4)	-	-	<0.0004 (0.4)	-	Mar, Jul, Sep
PT. Damai Abadi	steel	-	0.0004-0.064 (0.5)	0.0004-0.058 (0.05)	-	-	0.0004-0.3316 (1.0)	-	0.0004-0.089 (0.6)	0.0004-0.605 (0.1)	0.0004-1.570 (1.0)	Mar, Jul, Sep
BELUMAI River												
PT. Medisafe Technologies.	rubber	-	-	-	-	-	-	-	-	-	-	Mar, Jul, Sep
PT. Sari Morawa	incense stick	-	-	-	-	-	-	-	-	-	-	Mar, Sep
PT. Olaga Food	food	-	-	-	-	-	-	-	-	-	-	Apr, Jul, Sep
PT. Sari Morawa	incense stick	-	-	-	-	-	-	-	-	-	-	Jul, Sep
ASAHAN River												
PT. Kisanan Raya	rubber	-	-	-	-	-	-	-	-	-	-	Feb, Jun, Sep
PT. Sari Tani Jaya	tapioca	-	-	-	-	-	-	-	-	-	-	Jun, Sep
Aek Loba Sucfindo	palm oil	-	-	-	-	-	-	-	-	-	-	Feb, May, Sep
Sifi Silau	palm oil	-	-	-	-	-	-	-	-	-	-	Feb, Jun, Sep
PT. Padasa Enam Utama	palm oil	-	-	-	-	-	-	-	-	-	-	Feb, Jun, Sep
Air Batu	palm oil	-	-	-	-	-	-	-	-	-	-	Feb, May, Sep
PT. Aslan Agro TJ. Balai	oil	-	-	-	-	-	-	-	-	-	-	Feb, Jun, Sep
MERBAU River												
PT. Kapuas Besar	rubber	-	-	-	-	-	-	-	-	-	-	Feb, May, Sep
PT. Merbau Jaya	palm oil	-	-	-	-	-	-	-	-	-	-	Feb, May, Sep
Smart	palm oil	-	-	-	-	-	-	-	-	-	-	Feb, May, Sep
PTPN. IV (Berangir)	palm oil	-	-	-	-	-	-	-	-	-	-	Feb, May, Sep
PT. Umada	palm oil	-	-	-	-	-	-	-	-	-	-	Feb, May, Sep

Note : Figures in parentheses show the Effluent Quality Standards of each type of factories, "-" means Not Available

Source : North Sumatra BAPEDALDA

表 2-3(3)北スマトラ州における排水水質調査結果 (2000 年)

Sampling Point	Item	Temperature (°C)	pH	DO (mg/l)	NH ₃ -N (mg/l)	SS(mg/l)	Cl (mg/l)	SO ₄ (mg/l)	Fe (mg/l)	Cd (mg/l)	Mn (mg/l)	Zn (mg/l)	Cu (mg/l)	Pb (mg/l)	Survey Periods
Standard	Normal Water Temperature	5-9	>6	>6	0.5	1000	600	400	1.5	0.01	0.5	5	1	0.1	-
DELI River															
TITI Gang Sejarah		25.3-25.8	5.84-7.44	6.22-6.66	0.12-0.508	63.9-79.6	12.1-15.6	3-29	0.0004-2.279	0.0004-0.003	0.097-0.114	<0.0004	0.0004-0.102	<0.0004	Mar, Oct
TITI Pangkalan Mansyur		25.3-25.8	6.48-7.09	5.65-6.86	0.17-7.09	83.5-174	10.9-27.1	1-15	0.0004-3.548	<0.0004	0.069-0.180	0.0004-0.018	0.0004-0.124	<0.0004	Mar, Oct
TITI Suka Mulla		25.3-25.8	5.84-7.01	5.9-5.97	0.306-0.51	96.1-5,960	22.9-358	1-24	0.0004-2.134	0.0004-0.022	0.063-0.359	<0.0004	0.0004-0.095	<0.0004	Mar, Oct
TITI Petisah		25.3-25.8	5.80-7.22	2.29-5.43	0.52-1.18	84.6-5,150	21.9-342	1-9	0.0004-3.64	<0.0004	0.052-0.54	<0.0004	0.0004-0.05	<0.0004	Mar, Oct
TITI Pulo Brayon / Helvetia		25.3-25.8	5.96-7.02	3.08-5.49	0.61-1.11	96-5,870	25-322	3-22	0.0004-2.994	<0.0004	0.049-0.186	<0.0004	0.0004-0.019	<0.0004	Mar, Oct
TITI Labuhan Deli		25.3-25.8	5.94-6.9	1.78-4.28	0.62-1.042	102-6,290	30.2-342	2-24	0.037-2.708	<0.0004	0.027-0.254	0.0004-0.006	<0.0004	<0.0004	Mar, Oct
TITI Belawan		25.3-25.8	6.01-6.93	3.02-5.65	0.575-0.59	94.9-5,630	28.1-250	3-24	0.128-1.759	<0.0004	0.048-0.086	<0.0004	<0.0004	<0.0004	Mar, Oct
BELAWAN & SEMAYANG River															
Down Stream Pdam (T.Pasir)		25.8-29.3	6.46-7.37	5.67-6.94	0.13-1.39	51.2-76.7	9.71-15.1	2-9	0.6458-2.557	<0.0004	0.0439-0.6782	0.0789-0.112	0.0004-0.0896	0.0004-0.023	Mar, Jly, Oct
Up Stream Damai Abadi		25.8-28.1	6.31-7.02	5.49-6.0	0.11-1.11	52.2-96	10.9-25	1-22	0.0004-2.270	<0.0004	0.0392-0.052	0.0004-0.0778	0.0004-0.19	<0.0004	Mar, Jly, Oct
TITI Kamung Lalang		25.8-28.5	6.32-7.08	4.06-5.94	0.06-2.37	50.6-101.0	7.28-14.3	2-15.2	0.66-1.658	<0.0004	0.0367-0.092	0.0004-0.0772	0.0004-0.0883	0.0004-0.0126	Mar, Jly, Oct
TITI Sei Semayang		25.8	6.02	3.40	0.64	6,240	272	2	2.602	<0.0004	0.170	<0.0004	<0.0004	<0.0004	Mar
D. Stream P.Gula Semayang		25.8	6.42	3.97	0.04	60.6	6.07	1	1.010	<0.0004	0.061	<0.0004	<0.0004	<0.0004	Mar
TITI Payung Desa Kelanbir		25.8-28.1	6.33-6.99	5.07-6.22	0.10-1.96	48.9-72.6	8.49-20.6	3-14.4	0.6162-2.920	<0.0004	0.0379-0.080	0.0004-0.0857	0.0004-0.0816	0.0004-0.017	Mar, Jly, Oct
BELUMAI River															
Desa Dalu X-B		25.8-28.5	6.18-7.52	4.41-5.58	0.03-1.28	50.1-68.3	10.9-14.5	1-9	0.6537-0.924	<0.0004	0.0004-0.0677	0.0004-0.0743	0.0004-0.0947	<0.0004	Mar, Jly, Oct
Percampuran Sei Serdang		25.8-28.5	6.32-7.42	4.19-5.68	0.01-1.28	63.7-69.3	9.71-16.2	2-10	0.6585-0.892	<0.0004	0.0004-0.0548	0.0004-0.0858	0.0004-0.731	0.0004-0.0108	Mar, Jly, Oct
Up Stream Pdam (Belimai)		25.8-28.5	6.12-7.4	4.03-5.67	0.02-1.31	60.6-71.2	7.28-15.1	3-9	0.480-0.6827	<0.0004	0.0004-0.6782	0.0004-0.0789	0.0004-0.0896	<0.0004	Mar, Jly, Oct
ASAHAN River															
S-3 Tanjung Balai (H.Sawit)		25.1-26.6	6.01-7.15	5.39-5.94	0.00-0.29	46.9-48.9	3.13-14.5	0-5	0.115-4.794	0.0004-0.049	0.0004-0.052	0.0004-0.243	0.0004-0.424	0.0004-3.630	Mar, Jly, Sep
S-2 Pulo Raja		25.9-26.6	6.04-6.80	5.72-6.51	0-0.02	46.9-60.7	4.85-6.07	1-3	0.104-0.3605	<0.0004	0.0004-0.062	0.0004-0.013	0.0004-0.058	0.0004-1.071	Mar, Sep
S-a Pulo Mandi		25.9-26.2	6.0-6.23	5.66-7.29	0.005-0.01	27.3-51.5	2.08-3.64	2	0.161-0.4765	0.0004-0.023	0.0004-0.026	<0.0004	0.0004-0.05	0.0004-0.648	Mar, Oct
MERBAU River															
Aek Pandan		25.9-26.6	5.88-6.7	5.87-6.04	0-0.01	29.2-50.9	4.17-4.85	1-2	0.0004-0.198	0.0004-0.036	0.0004-0.062	0.0004-0.006	0.0004-0.164	0.0004-1.753	Mar, Sep
Aek Kota Batu		25.1-26.6	5.8-7.19	5.64-6.17	0.01-0.39	21.8-52.2	3.13-6.07	0-7	0.099-2.648	0.0004-0.054	0.0004-0.081	0.0004-0.031	0.0004-0.141	0.0004-1.967	Mar, Jly, Sep
Simpang Empat (GB.Merbau)		25.1-26.6	5.91-7.36	5.6-5.91	0-0.24	35.2-77.8	5.21-9.1	1-8	0.138-2.912	0.0004-0.026	0.0004-0.018	<0.0004	0.0004-0.096	0.0004-1.665	Mar, Jly, Sep

Source : North Sumatra BAPEDALDA

表 2-4 メダン市による Deli 川の水質モニタリング結果

Sampling Station	Temperature (°C)			pH		
	1998/1999	1999/2000	2000	1998/1999	1999/2000	2000
1	28	27	27.5	6.9	7.0	7.0
2	25	28	26	6.9	7.0	7.0
3	24	25	24.5	7.0	6.9	6.7
4	27	24	26.5	6.9	7.0	6.7
5	26	26	26	6.9	6.9	6.9
6	26	26	27	6.6	6.9	6.9
7	28	26	26.5	7.0	6.9	7.1
8	27	27	27.5	6.4	6.3	6.8
9	26	27	26	6.5	6.6	6.9
10	25	26	27	6.3	6.5	7.0
Sampling Station	TSS (mg/l)			Turbidity (NTU)		
	1998/1999	1999/2000	2000	1998/1999	1999/2000	2000
1	78	81	105	13.5	14.5	16.5
2	52	50	65	12.1	11.9	23.1
3	60	45	82	23.1	9.8	14.5
4	58	69	70	22	26.3	20.4
5	51	60	158	11.9	23.1	24.2
6	130	148	162	20.5	22.8	50.5
7	150	169	180	21.4	20	56
8	905	916	935	542	568	635
9	335	340	368	202	200	305
10	120	135	152	16.2	17.5	30.8
Sampling Station	Total Coliform (MPN)			Fecal Coliform (MPN)		
	1998/1999	1999/2000	2000	1998/1999	1999/2000	2000
1	16,500	17,000	16,200	15,000	17,000	16,000
2	230,000	>240,000	235,000	24,000	24,000	23,000
3	18,500	19,000	20,500	30,500	31,000	28,500
4	40,500	45,000	42,000	32,100	37,000	29,000
5	29,400	29,000	31,500	18,500	19,000	30,500
6	27,000	27,000	27,000	5,200	5,100	26,200
7	34,100	35,000	38,000	2,800	3,400	21,000
8	90,500	92,000	85,500	2,650	2,700	80,700
9	40,000	54,000	43,200	3,400	3,300	33,500
10	5,500	4,400	10,750	710	700	9,850

Sampling Station:

1. Belakang Pesantren TA'DIB AL SYAKIRIN Kel. Kedai Durian Deli Tua
2. Belakang Landasan Pacu Polonia Medan
3. Jembatan Palang Merah
4. Jembatan Glugur, Jl. H. Adam Malik
5. Jembatan dekat RM. Kuda Mas
6. Jl. Kuningan, Kel. Kota Bangun, Kec. Medan Deli
7. Jl. Titi Papan, Marelan
8. Jl. Yos Sudarso Km. 15.5
9. Jembatan Jl. Yos Sudarso/Jl. Stasiun Km.20
10. Muara Deli, Bagan Deli.

表 2-5 Deli 川流域の主な汚染源リスト

No.	Name	Type	Adress
1.	PT. UNIJAYA	Beverage	B. Katamso Km 9
2.	PT. BINTA	Palm oil	B. Katamso Km 8,5
3.	PT. TAMERA	Palm oil	B. Katamso Km 8,3
4.	PT. KIMSARI PAPER INDONESIA	Cigarette paper	B. Katamso Km 6,8
5.	RUMAH BERSALIN WINA	Hospital	B. Katamso (Blk K. Lurah kp. Baru)
6.	RM. LEMFUR KURING	Restaurant	Jl. Padang Golf Polonia
7.	RS GLEANEAGLES	Hospital	Jl. Listrik
8.	QUALITY HOTEL SUITE	Hotel	Jl. Listrik
9.	RM OKE SUKI	-	Jl. Palang Merah
10.	DHARMA DELI HOTEL	-	Jl. Balai Kota
11.	DELI PLAZA	-	Jl. Balai Kota
12.	SINAR PLAZA	-	Jl. Guru Patimpus
13.	RS TEMBAKAU DELI	-	Jl. Putri Hijau
14.	RS KESDAM I BB.	-	Jl. Putri Hijau
15.	LAB. KESEHATAN	-	Jl. Putri Hijau
16.	RM GARUDA	-	Jl. H Adam Malik
17.	RM GARUDA	-	Jl. H. Adam Milik
18.	EMERALD GARDEN	-	Jl. Putri Hijau
19.	RS Dr. RUSDI	-	Jl. H. Adam Malik
20.	KUDA MAS	Restaurant	Jl. Pertempuran
21.	KLINK SUMBER ASIH	Clinic/Lab.	Jl. Yos Sudarso Km 5,3
22.	PT. BERLIAN EKATAMA RAYA	Palm oil	Jl. Yos Sudarso Km 6
23.	PT. PERINDONI IND. MEDAN	Mosquito coil	Jl. Yos Sudarso Km 6,1
24.	PT. PROPAN RAYA	Paint	Jl. Yos Sudarso Km 6,2
25.	RS. MARTHA FRISKA	Hospital	Jl. Yos Sudarso Km 6,8
26.	PT. TEXTIL WASH	-	Jl. Yos Sudarso Km 7,2
27.	PT. ATRISCO ASBESTO SEMENT	Asbestos	Jl. Yos Sudarso Km 7,3
28.	PT. SUMATRA OIL CHEMICAL IND.	Palm oil	Jl. Yos Sudarso Km 7,3
29.	PT. SUMATRA INDUSTRI CAT	Industrial paint	Jl. Yos Sudarso Km 7,4
30.	PT. UNIVERSAL INDOFOOD PROD	Food	Jl. Yos Sudarso Km 7,4
31.	PT. MUSIM MAS	Palm oil	Jl. Yos Sudarso Km 7,4
32.	PT. CIPTA RIMBA CEMENT	Playwood	Jl. Yos Sudarso Km 7,5
33.	PT. SUPERIN	-	Jl. Yos Sudarso Km 7,8
34.	PT. VICTOR INDO RAYA	-	Jl. Yos Sudarso Km 8
35.	PT. INDUSTRI KARET DELI	Tire	Jl. Yos Sudarso Km 8,2
36.	PT. NIPSEA PAINT & CHEM	Paint	Jl. Yos Sudarso Km 8,3
37.	PT. TIMUR JAVA COLD STORAGE	Ice manufacture & processed marine products	Jl. Yos Sudarso Km 8,8

No.	Name	Type	Adress
38.	PT. SUPER ANDALAS STEEL	Steel	Jl. Yos Sudarso Km 9
39.	PT. INTAN NASIONAL GROET IND.	Rubber	Jl. Yos Sudarso Km 9,6
40.	PT. GUNUNG GAHAPI SAKTI	Plate & steel	Jl. Yos Sudarso Km 9,7
41.	PABRIK ES MABAR	Ice manufacture	Jl. Yos Sudarso Km 9,7
42.	PT. INDUSTRI TALI & BENANG PLASTIK	Rope & Pipe	Jl. Yos Sudarso Km 9,8
43.	CV. COBER	Plastic goods	Jl. Yos Sudarso Km 9,8
44.	PT. GROWTH SUMATRA IND.	Plate & steel	Jl. Yos Sudarso Km 10
45.	PT. ABDI RAKYAT BAKTI	Glass	Jl. Yos Sudarso Km 10,3
46.	PT. IKA INDO	Carbon	Jl. Yos Sudarso Km 11,7
47.	PT. COCA COLA AMATIL IND.	Beverage	Jl. Yos Sudarso Km 14
48.	PT. AGRO JAYA PERDANA	Fried food oil	Jl. Yos Sudarso Km 15,5
49.	RSU ARI CIPTA	Hospital	Jl. Yos Sudarso Km 16,2
50.	DANAU TOBA	Hotel / Restaurant	Jl. Gabion Belawan
51.	PT. IVOMAS TUNGGAL	Palm oil	Jl. Gabion Belawan

Source: Medan municipality

Note : “-“ mean no information available

表 2-6 JBIC 及び Aus-AID に援助を受けた地方ラボラトリー

No.	Province	RMCD by JBIC			RELD by Aus-AID			Total
		BLK/BTKL	BPPI/BBS	BPP PU	BLK/BTKL	BPPI	BPP PU	
1	D.I. Aceh	BLK	BPPI	PU	-	-	-	3
2	North Sumatra	BLK	BPPI	PU	-	-	-	3
3	West Sumatra	-	-	-	BLK	BPPI	-	2
4	Riau	BLK	-	PU	-	-	-	2
5	Jambi	-	-	-	BLK	-	PU	2
6	South Snatra	BLK	BPPI	PU	-	-	-	3
7	Bengkulu	-	-	-	BLK	-	-	1
8	Lampung	BLK	BPPI	PU	-	-	-	3
9	DKI Jakarta	-	-	-	BTKL	-	PU	2
10	West Java	BLK	BBS	PU	-	-	-	3
11	Central Java	BLK	BPPI	PU	-	-	-	3
12	D.I. Yogyakarta	BTKL	-	PU	-	-	-	2
13	East Java	BTKL	BPPI	PU	-	-	-	3
14	Bali	BLK	-	PU	-	-	-	2
15	West Nusa Tenggara	-	-	-	BLK	-	PU	2
16	East Nusa Tenggara	-	-	-	BLK	-	-	1
17	West Kalimantan	BLK	BPPI	PU	-	-	-	3
18	Central Kakimantan	-	-	-	BLK	-	PU	2
19	South Kalimantan	BLK	BPPI	PU	-	-	-	3
20	East Kalimantan	BLK	BPPI	PU	-	-	-	3
21	North Sulawesi	-	-	-	BLK	BPPI	-	2
22	Central Sulawesi	-	-	-	BLK	-	-	1
23	South Sulawesi	BLK	BPPI	PU	-	-	-	3
24	Southeast Sulawesi	-	-	-	BLK	-	-	1
25	Maluku	-	-	-	BLK	BPPI	-	2
26	Irian Jaya	-	-	-	BLK	-	PU	2
Total		14	11	14	12	3	5	59
		39			20			

Note) BLK : Laboratory of Health (Dept. of Health)

BTKL : Laboratory of Health & Environment (Dept. of Health)

BPPI : Laboratory of Industrial Research and Development (Dept. of Industry)

BBS : Laboratory of Cellulose (Dept. of Industry)

BPP PU : Laboratory of Testing and Instrument (Dept. of Public Works, now Dept. of Settlements and Regional Facilities)

表 2-7 RMCD プロジェクトで地方ラボラトリーに導入された機器

Item	Main Equipment	BLK/BTKL	BPPI/BBS	BPP PU
Common Analytical Instrument	UV-VIS Spectrophotometer (UV-VIS)			
	Atomic Absorption Spectrophotometer (AAS)			
	Total Organic Carbon Analyzer (TOC)			
	pH/Ion Selective Meter			
	Dissolved Oxygen Meter (DO)			
	Conductivity Meter			
	Turbidity Meter	○	○	○
	COD Apparatus			
	Oil Analyzer			
	Pure Water Supply System			
	Colony Counter			
	CN Ion Distillation Unit			
	F Ion Distillation Unit			
Filter System For Suspended Solid (SS)				
GAS Chromatograph	Gas Chromatograph (GC)	○	○	-
Sound Level Meter	Precision Integrating Sound Level Meter	○	-	-
Environmental Gas Analyzer	Carbon Monoxide (CO) Gas Analyzer			
	Nitrogen Oxide (NO, NO ₂ , and NO _x) Gas Analyzer			
	Ozone (O ₃) Gas Analyzer			
	Sulfur Dioxide (SO ₂) Gas Analyzer			
	Total Hydrocarbon (THC) Gas Analyzer	○	-	-
	Ambient Suspended Particle (PM10) Monitor			
	High Volume Air Sampler			
	Impinger Gas Sampling System			
	Particle Counter			
Meteorological Meter	Wind Speed Meter			
	Wind Direction Meter	○	-	-
	Thermometer-Hygrothermometer			
	Barometer			
Gas Analyser For Pollution Sources	Dust Measuring Unit			
	Orsat-Fisher Gas Analyzer	-	○	-
	Portable Multi Gas Analyzer			
Personal Computer For Data Analysis	Computer Set	○	○	○

Note: "○" means equipment is installed.

表 3-1 BAPEDALDA 及び地方ラボラトリーのスタッフ数

No.	Province	BAPEDALDA	Laboratory			
			BLK/BTKL	BPPI	BPP PU	Total
1	D.I Aceh	45	4	9	9	22
2	North Sumatra	90	7	9	7	23
3	West Sumatra	41	5	9	12	26
4	Riau	53	5	NL	5	10
5	Jambi	41	11	NL	5	16
6	South Smatra	50	8	15	6	29
7	Bengkulu	-	5	NL	NL	5
8	Lampung	-	4	6	7	17
9	DKI Jakarta	-	9	-	-	9
10	West Java	-	12	10	5	27
11	Central Java	23	7	12	4	23
12	D.I. Yogyakarta	-	9	NL	7	16
13	East Java	132	61	10	9	80
14	Bali	61	4	NL	9	13
15	West Nusa Tenggara	25	10	NL	5	15
16	East Nusa Tenggara	47	4	NL	-	4
17	West Kalimantan	-	4	5	6	15
18	Central Kalimantan	-	3	NL	NL	3
19	South Kalimantan	-	3	6	3	12
20	East Kalimantan	34	8	6	3	17
21	North Sulawesi	55	7	10	NL	17
22	Central Sulawesi	-	6	NL	NL	6
23	South Sulawesi	58	-	10	3	13
24	Southeast Sulawesi	-	6	NL	NL	6
25	Maluku	-	4	15	NL	19
25	Irian Jaya	-	4	NL	3	7
Average		29	8	5	4	17
Total		755	210	132	108	450

Source: 1) A Study on Actual Condition of related Institutions in Environmental Monitoring in Indonesia 2000, Overseas Environmental Cooperation Center (OECC), Japan
2) PUSARPEDAL

Note: 1) “-” means not available.
2) “NL” means no laboratory exist.

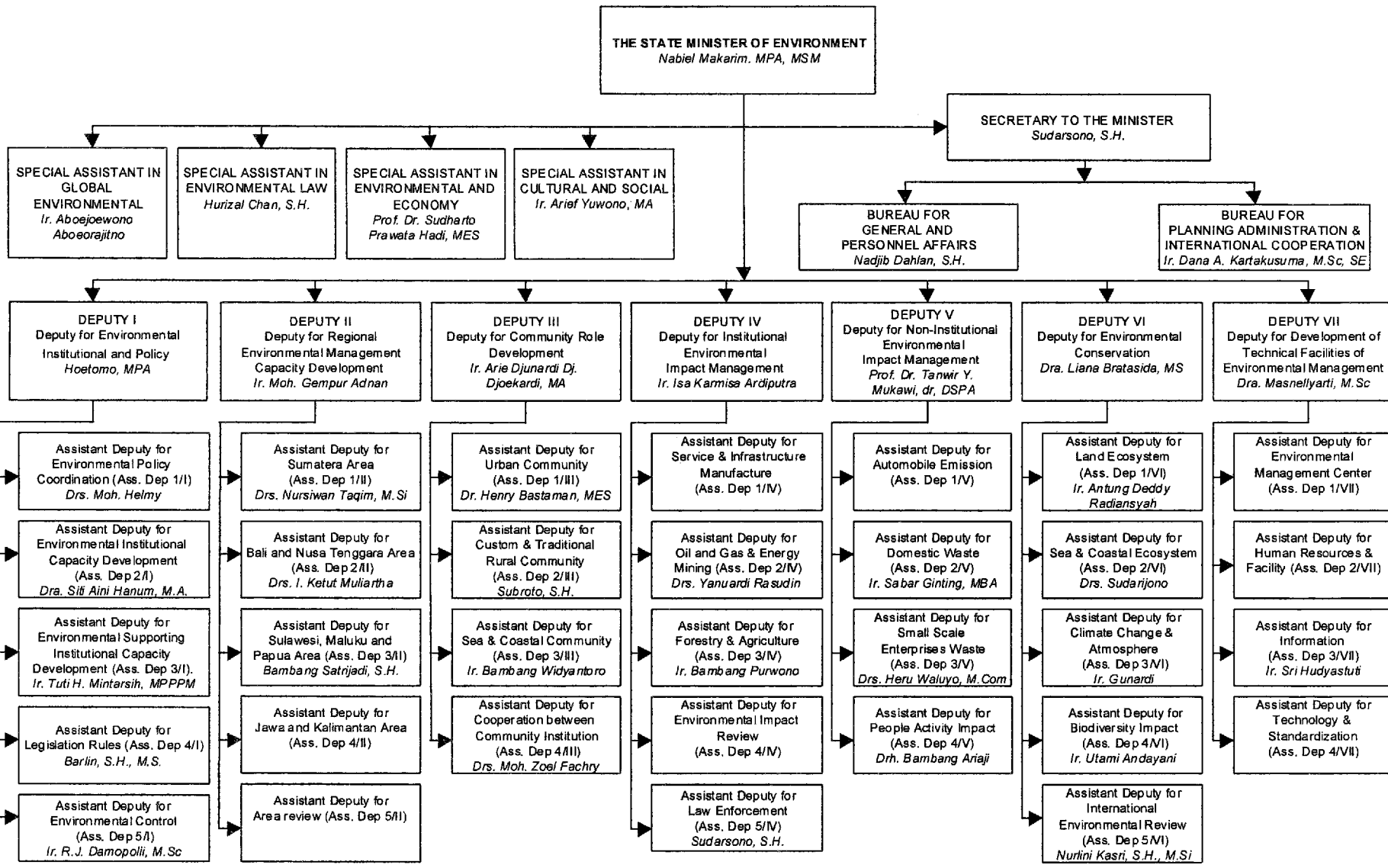


図 3-1 新環境省の組織 (仮訳)

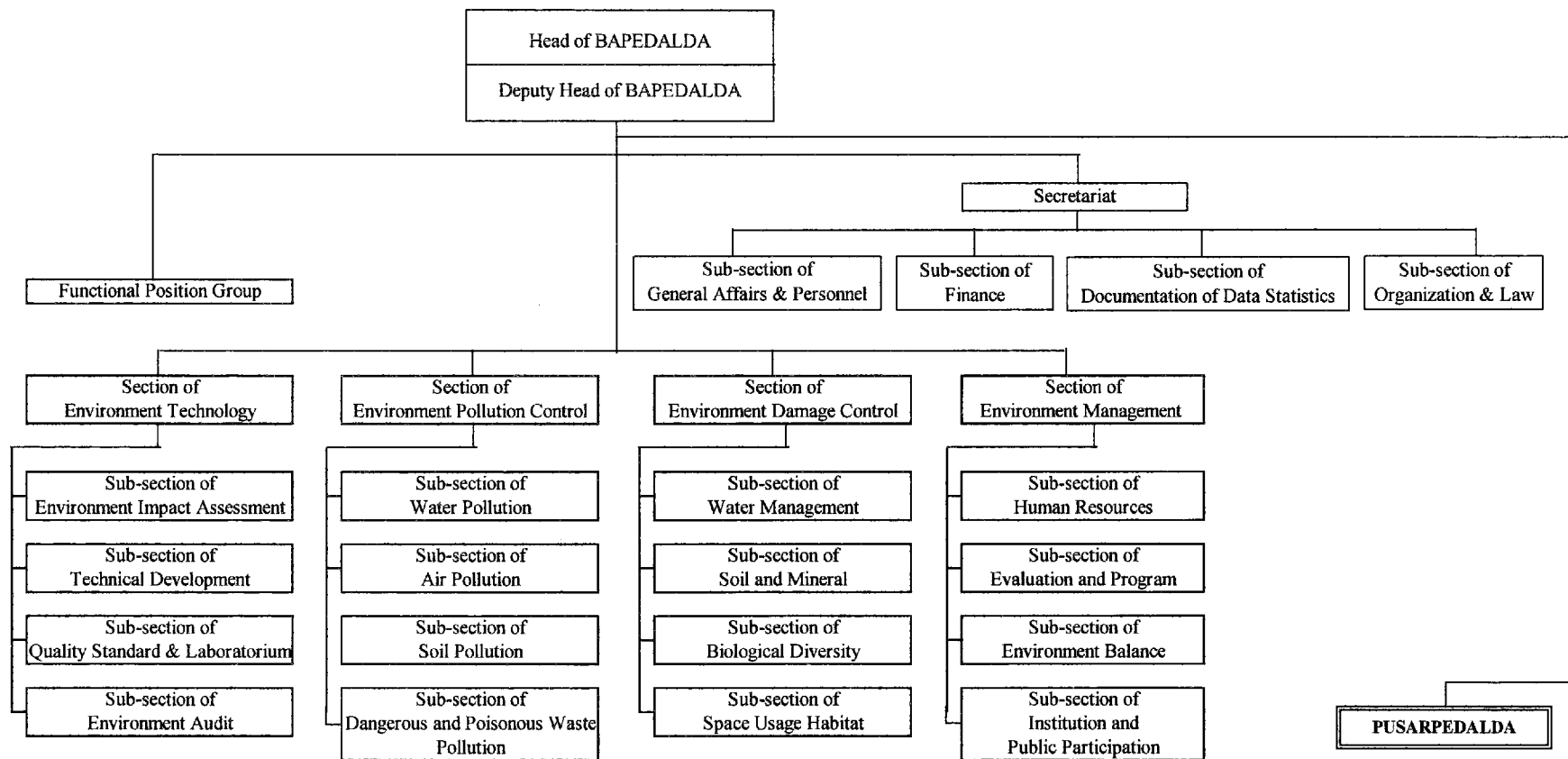


図 3-2 北スマトラ州 BAPEDALDA (州環境管理局) の組織 (計画)

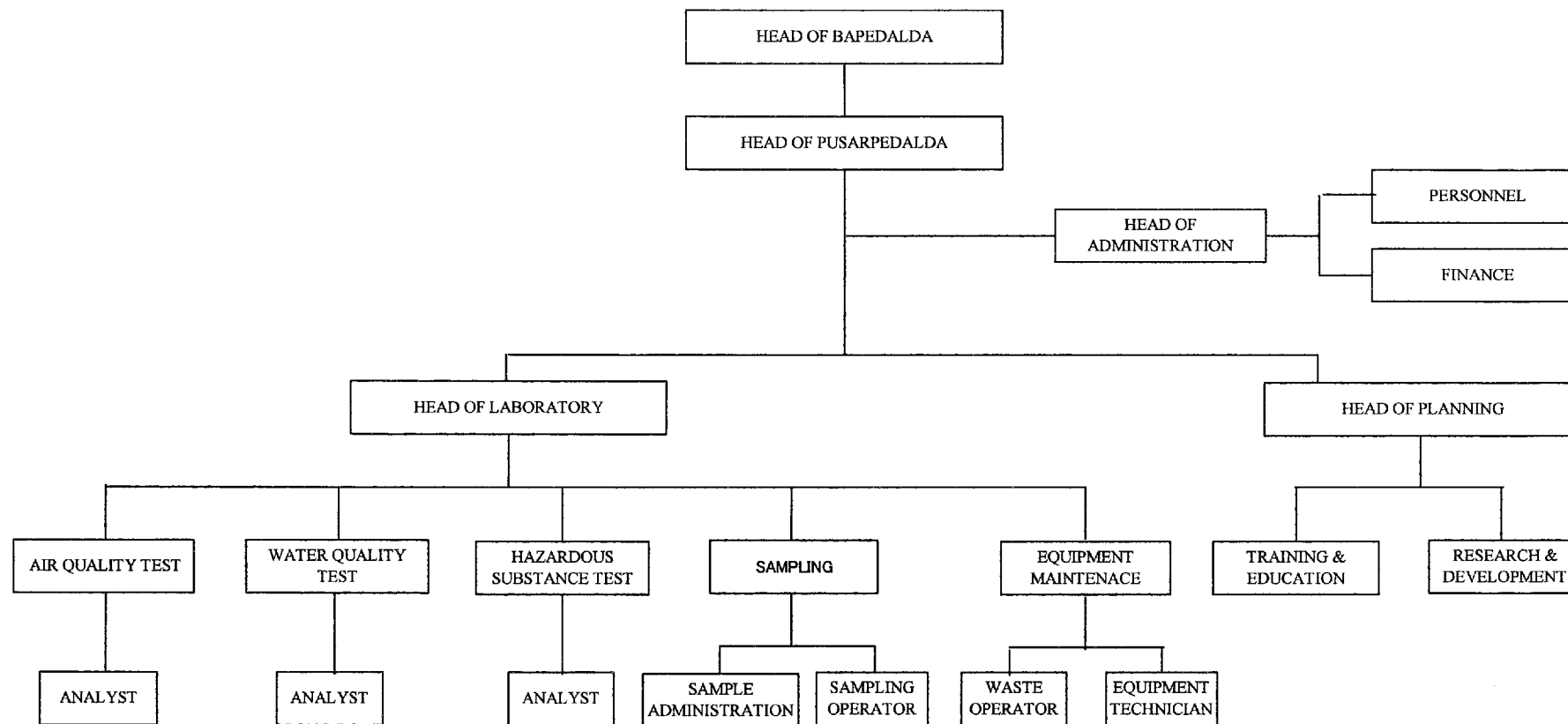


図 3-3 北スマトラ州 PUSARPEDALDA (州環境管理局ラボラトリー) の組織 (短期)

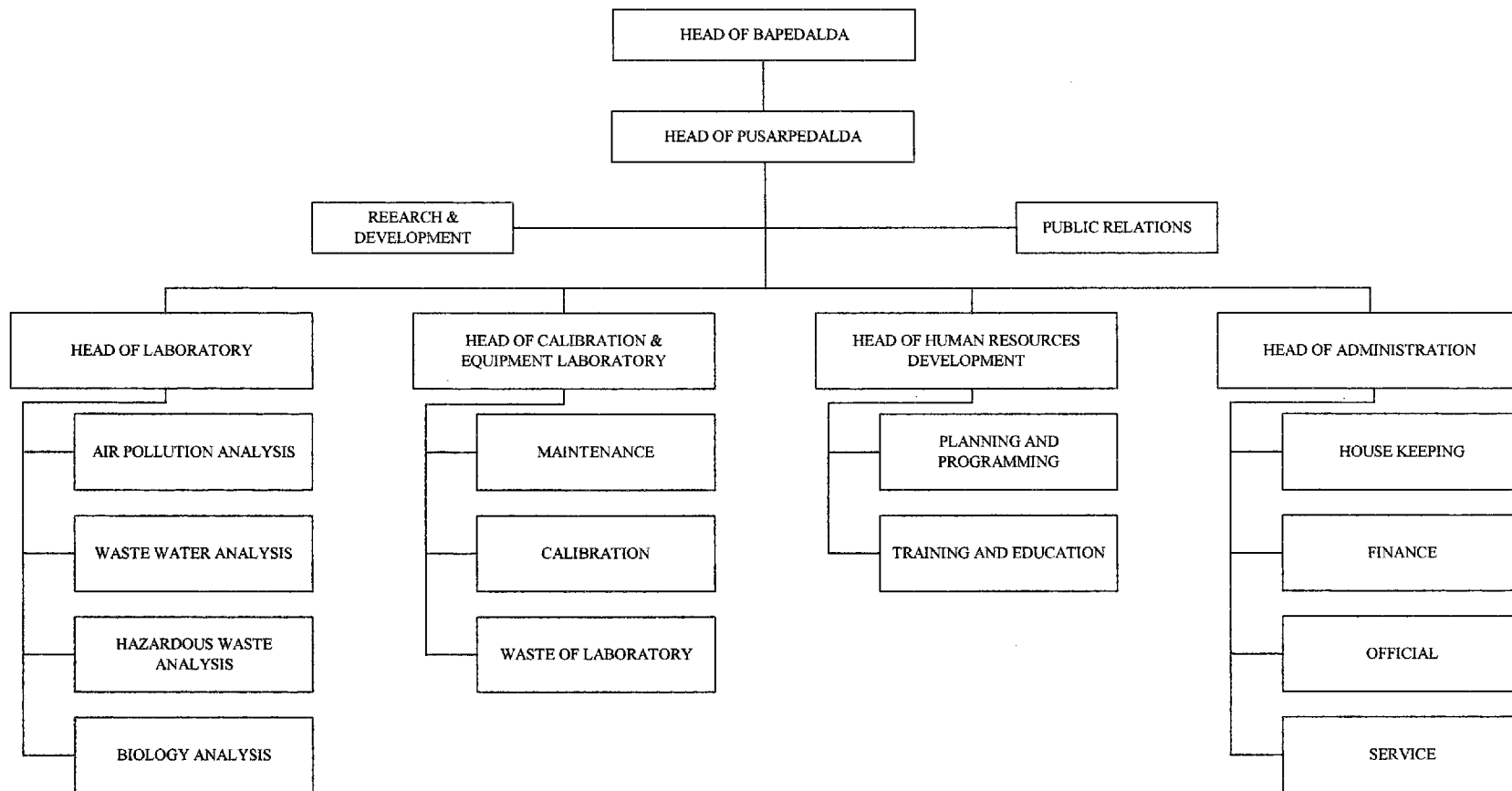


図 3-4 北スマトラ州 PUSARPEDALDA (州環境管理局ラボラトリー) の組織 (長期)

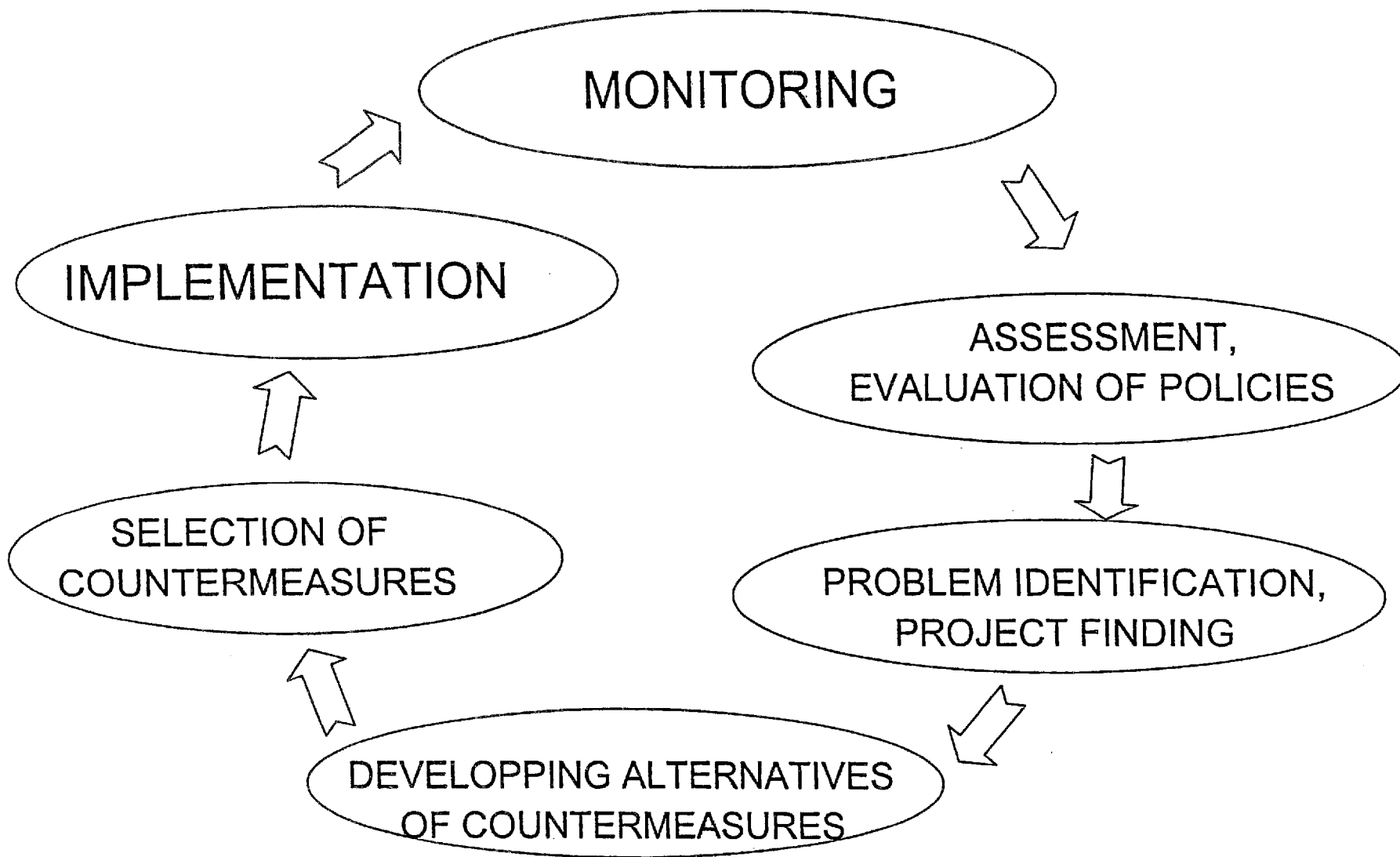
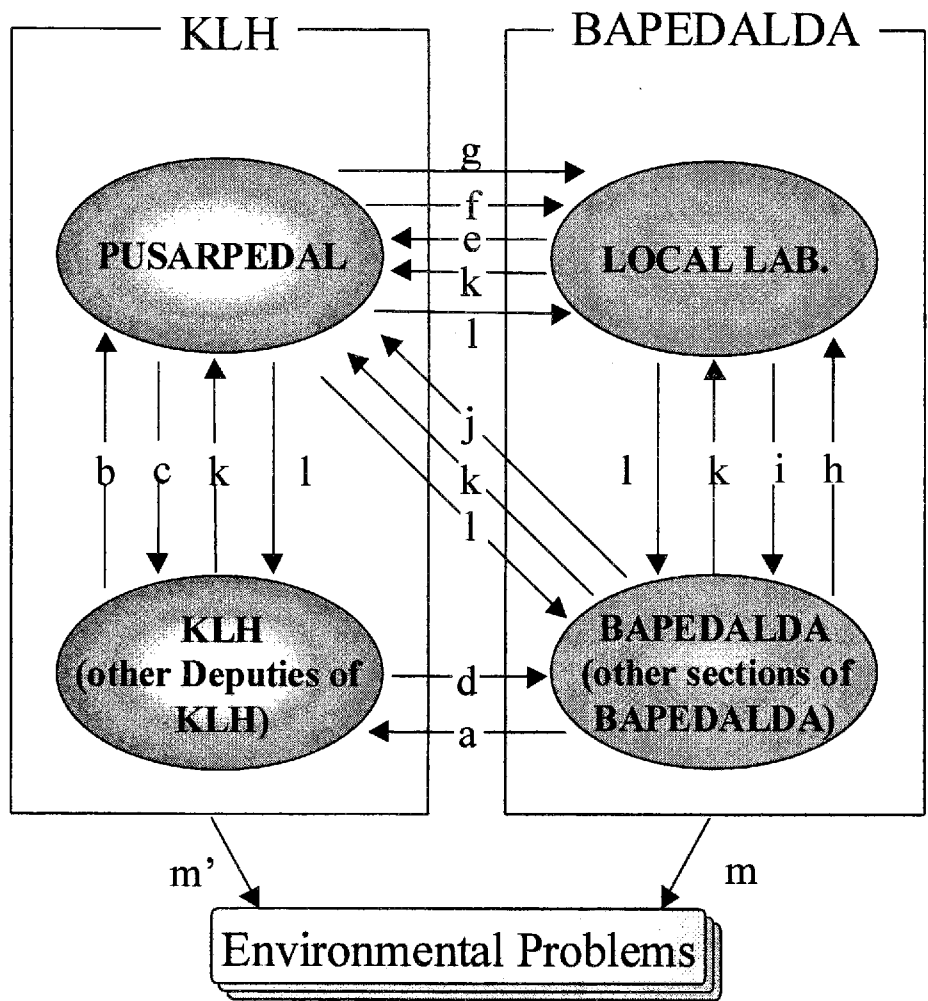


図 4-1 環境管理の典型的なサイクル



Functions:

- a) Request to analyze pollution mechanisms (local site)
- b) Request to analyze environmental parameters (nationwide)
- c) Outcome of analyses of b)
- d) Outcome of analyses of a)
- e) Request technical assistance for further expertise
- f) Outcome of e)
- g) Training for environmental laboratory management system
- h) Request to local environmental monitoring
- i) Outcome of environmental monitoring data
- j) Environmental monitoring data
- k) Request for technical guidance and scientific knowledge
- l) Outcome of k)
- m) To take countermeasures for environmental protection on the local site

図 4-2 モデル地域における環境施策立案のフローチャート

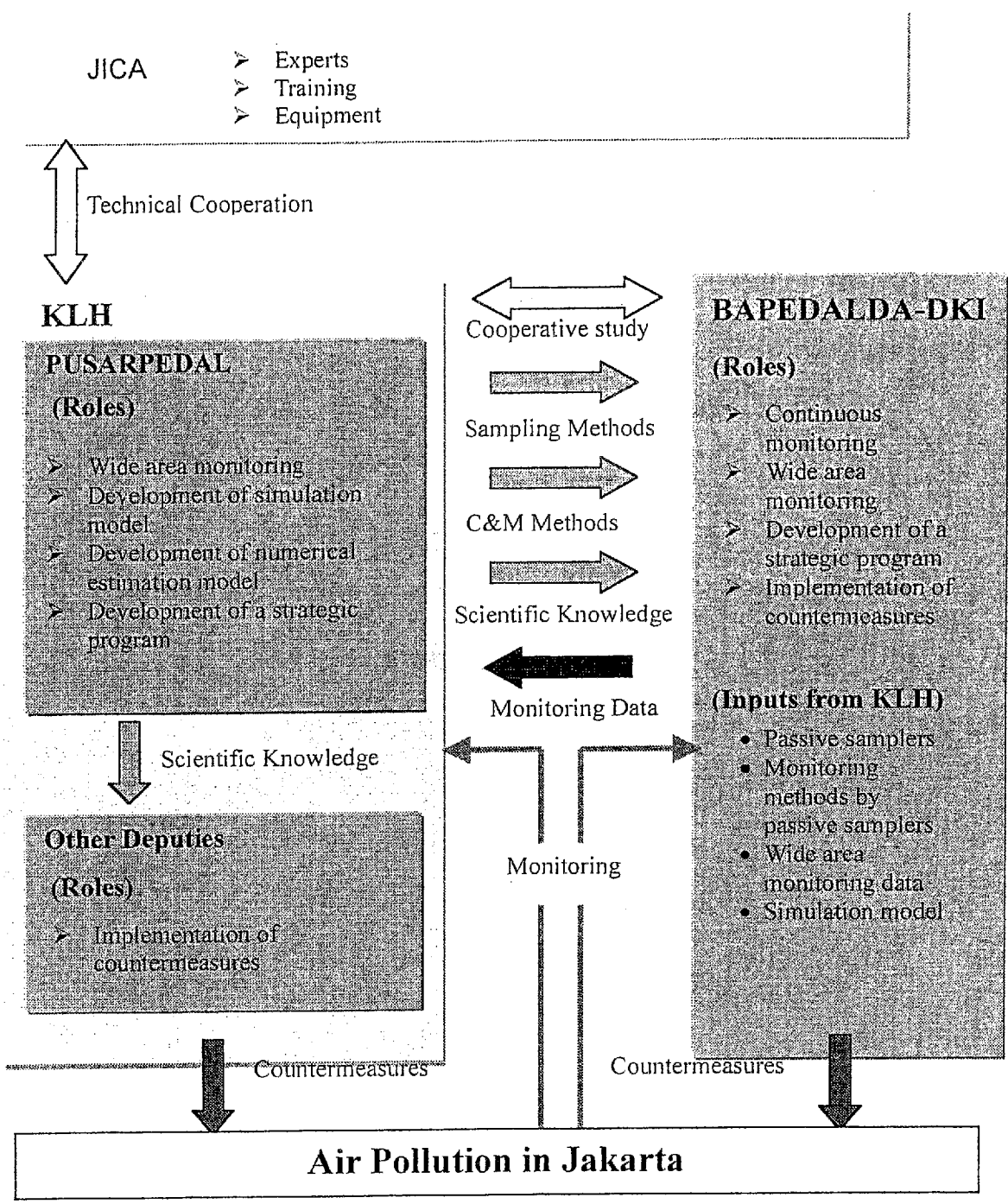


図 4-3 ジャカルタ市大気汚染に係る調査の枠組み

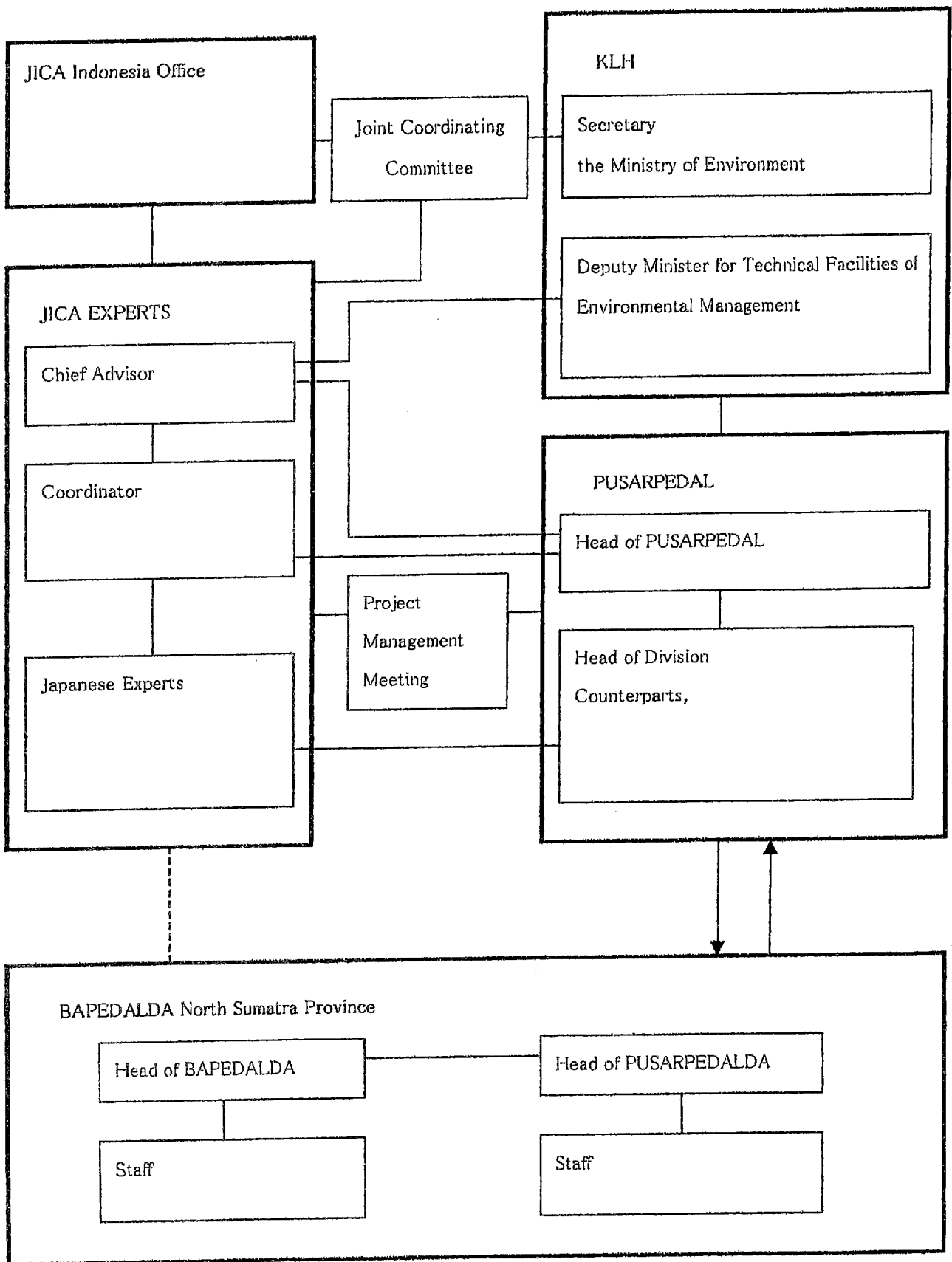


図 5-1 プロジェクトの実施組織

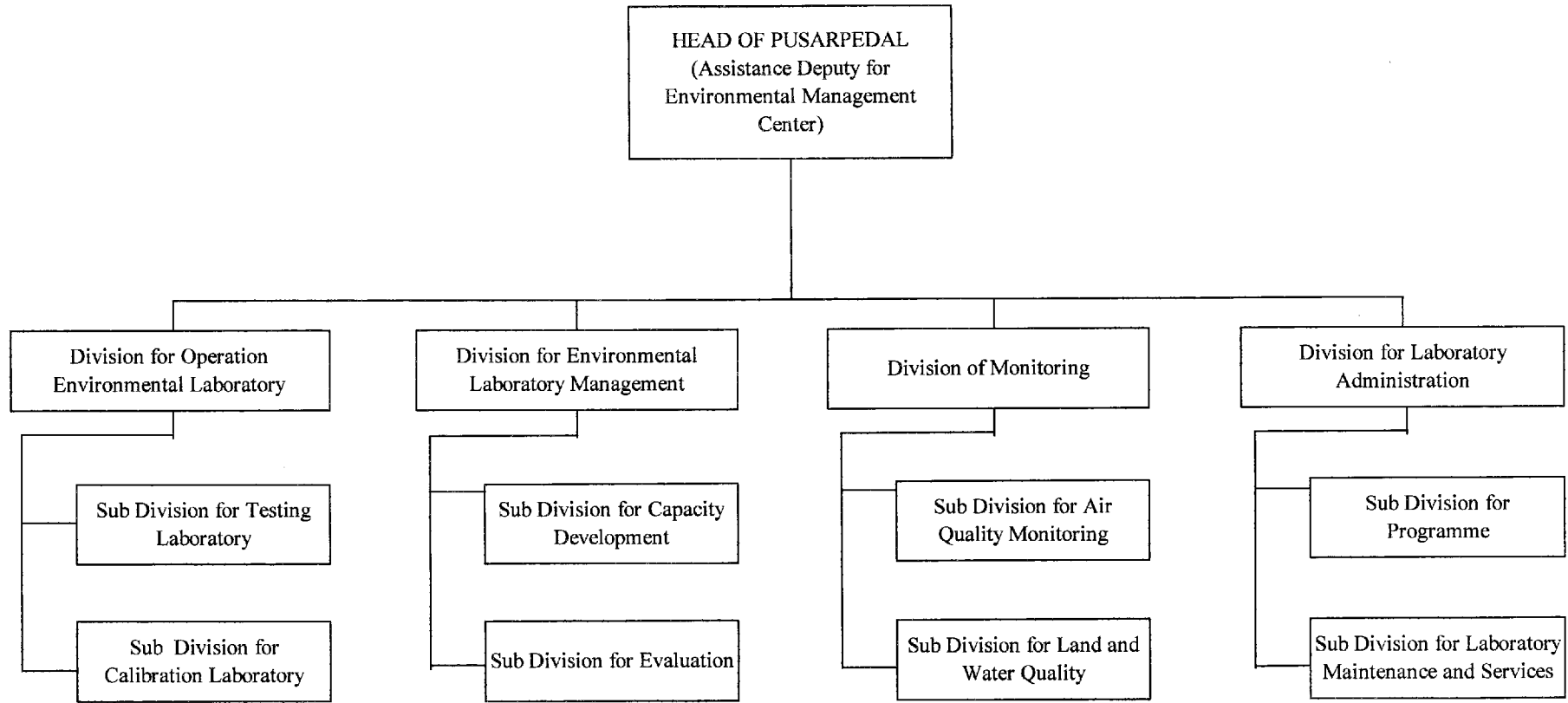


図 5-2 計画中の EMC (環境管理センター) の組織