ANNEX A

RESULTS OF SOIL ANALYSIS

FOR ORIGINAL PROPOSED RESTTLEMENT SITES

(1) Soil Properties of Four Villages for Initial Site Selection

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ

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ສະຖາບັນຄົ້ນຄ້ວາວິທະຍາສາດເຕັກນິກກະສິກຳແລະປ່າໄມ້

ສູນສຳຫລວດແລະແບ່ງເຂດດິນກະສິກຳ

ນະຄອນຫຼວງວຽງຈັນ,ວັນທີ 21 DEC 2007

ຜົນວິໄຈດິນຂອງທ່ານ Dr Somdet MUNSAVENG National consulting company(NCC) ຈຳນວນ 60 ຕົວຢ່າງ

No Lab	No Profile	Soil Unit	pH		%	Nitrogen N			Phosphorus		Potassium		%	%Fine	%	%	Tex-	meq/100g of soil				
			H_2O	KCl	OM	%N Total	NH_4 ppm	NO_3 ppm	$\%P_2O_5$ Tot	P-ppm P-Avail	$\%K_2O$ K_Tot	K-ppm K Avail	Coarse Sand	Sand	Clay	Silt	ture	Ca^{++}	Mg^{++}	K^+	Na^+	CEC
	ບ້ານຫາແອ່ນ																					
76	ຂຸມທີ1	ດິນຮາບພຽງ	4.27	3.80	2.62	0.146	16.10	8.40	0.052	6.08	0.126	106.45	17.68	37.60	20.33	24.39	SCL	0.80	0.52	0.272	0.016	6.82
77	ຂຸມທີ2	ດິນຮາບພຽງ	4.23	3.77	2.89	0.146	14.70	7.00	0.050	5.86	0.124	98.43	18.48	40.91	24.37	16.24	SCL	0.72	0.56	0.252	0.086	4.88
78	ຂຸມທີ3	ດິນຄ້ອຍຊັ້ນ	3.66	3.30	2.56	0.154	12.60	5.60	0.042	9.46	0.074	50.29	24.72	50.86	12.21	12.21	SL	0.28	0.40	0.129	0.007	7.92
79	ຂຸມທີ4	ດິນບ່ອນຕ່ຳສຸດ	4.52	3.98	2.35	0.148	16.80	14.00	0.036	5.20	0.064	331.13	27.23	52.53	8.10	12.15	SL	0.56	0.60	0.847	0.004	4.58
80	ຂຸມທີ5	ດິນຮາບພຽງ	4.16	3.81	1.55	0.120	16.10	7.00	0.049	6.01	0.128	98.43	18.90	44.51	24.39	12.20	SCL	0.84	0.36	0.252	0.103	6.14
81	ຂຸມທີ6	ດິນບ່ອນໂນນສຸດ	4.03	3.85	1.88	0.098	5.60	3.50	0.028	6.30	0.078	42.26	27.37	44.34	16.16	12.12	SL	0.24	0.52	0.108	0.033	2.52

No Lab	No Profile	Soil Unit	pH		%	Nitrogen N			Phosphorus		Potassium		%	%Fine	%	%	Tex-	meq/100g of soil				
			H_2O	KCl	OM	%N Total	NH_4 ppm	NO_3 ppm	$\%P_2O_5$ Tot	P-ppm P-Avail	$\%K_2O$ K_Tot	K-ppm K Avail	Coarse Sand	Sand	Clay	Silt	ture	Ca^{++}	Mg^{++}	K^+	Na^+	CEC
82	ຂຸມທີ7	ດິນຮາບພຽງ	4.16	3.80	2.35	0.154	19.60	7.00	0.048	6.08	0.122	90.41	20.22	47.26	20.33	12.20	SCL	1.96	0.40	0.231	0.086	4.90
83	ຂຸມທີ8	ດິນຮາບພຽງ	4.15	3.81	2.22	0.129	15.40	4.20	0.047	6.30	0.122	94.42	21.81	41.68	16.23	20.28	SL	1.04	0.44	0.241	0.051	4.76
84	ຂຸມທີ9	ດິນຮາບພຽງ	4.13	3.80	2.35	0.134	11.20	5.60	0.049	5.27	0.130	94.42	21.46	41.91	20.35	16.28	SCL	0.84	0.48	0.241	0.051	5.24
85	ຂຸມທີ10	ດິນຮາບພຽງ	4.11	3.76	2.62	0.140	12.60	7.70	0.048	5.78	0.120	90.41	20.43	47.05	20.33	12.20	SCL	0.32	1.32	0.231	0.138	5.34
86	ຂຸມທີ11	ດິນຮາບພຽງ	4.15	3.78	2.56	0.146	15.40	4.20	0.057	5.27	0.138	102.44	20.43	38.92	28.46	12.20	SCL	0.76	0.60	0.262	0.155	5.48
87	ຂຸມທີ12	ດິນຮາບພຽງ	4.17	3.77	2.35	0.137	21.00	4.20	0.052	6.37	0.132	94.42	20.77	38.49	24.44	16.29	SCL	1.08	0.40	0.241	0.190	5.38
88	ຂຸມທີ13	ດິນຮາບພຽງ	4.10	3.74	2.69	0.126	15.40	7.70	0.049	6.15	0.132	94.42	20.63	38.72	28.46	12.20	SCL	0.60	0.56	0.241	0.121	5.84
89	ຂຸມທີ14	ດິນຮາບພຽງ	4.12	3.75	2.56	0.126	16.10	5.60	0.050	5.12	0.126	98.43	21.14	38.21	28.46	12.20	SCL	0.56	0.44	0.252	0.086	7.26
90	ຂຸມທີ15	ດິນຮາບພຽງ	4.15	3.73	2.76	0.132	11.20	7.00	0.050	7.11	0.136	90.41	20.20	43.25	24.37	12.18	SCL	0.76	0.48	0.231	0.103	6.48
	ບ້ານຫາດຍືນ																					
91	ຂຸມທີ1	ດິນນາ	3.90	3.54	2.02	0.112	8.40	4.20	0.046	3.58	0.104	30.23	0.41	34.29	32.65	32.65	CL	1.12	0.40	0.077	0.068	6.32
92	ຂຸມທີ2	ດິນຮາບພຽງ	3.85	3.61	1.82	0.106	5.60	3.50	0.032	2.11	0.084	54.30	1.02	54.22	24.42	20.35	SCL	0.72	0.40	0.139	0.016	5.20
93	ຂຸມທີ3	ດິນຫຼຸບ	3.81	3.68	2.22	0.109	6.30	3.50	0.038	2.11	0.076	70.35	2.55	56.72	28.51	12.22	SCL	0.24	0.52	0.180	0.007	5.48
94	ຂຸມທີ4	ດິນໂນນໜ້ອຍນີ້	3.80	3.67	1.95	0.115	5.60	4.20	0.068	1.67	0.118	50.29	1.93	41.04	36.66	20.37	CL	0.88	0.32	0.129	0.033	5.68
95	ຂຸມທີ5	ດິນໂນນ	3.93	3.75	1.55	0.098	7.00	4.20	0.099	3.58	0.122	66.33	1.63	37.27	36.66	24.44	CL	0.60	0.60	0.170	0.016	5.10

No Lab	No Profile	Soil Unit	pH		%	Nitrogen N			Phosphorus		Potassium		%	%Fine	%	%	Tex-	meq/100g of soil				
			H_2O	KCl	OM	%N Total	NH_4 ppm	NO_3 ppm	$\%P_2O_5$ Tot	P-ppm P-Avail	$\%K_2O$ K_Tot	K-ppm K Avail	Coarse Sand	Sand	Clay	Silt	ture	Ca^{++}	Mg^{++}	K^+	Na^+	CEC
96	ຂຸມທີ6	ດິນຮາບພຽງ	5.18	4.92	3.23	0.165	19.60	8.40	0.069	52.85	0.078	319.09	1.12	53.89	16.36	28.63	SL	3.84	3.60	0.816	0.051	10.32
97	ຂຸມທີ7	ດິນຄ້ອຍຊັນ	3.81	3.70	2.22	0.115	7.00	4.20	0.050	3.22	0.096	42.26	3.58	47.40	28.60	20.43	SCL	1.08	0.40	0.108	0.121	10.26
98	ຂຸມທີ8	ດິນຕ່ຳສຸດ	4.32	4.05	1.21	0.070	7.00	4.20	0.034	15.18	0.058	42.26	3.83	76.01	8.06	12.10	SL	0.56	0.64	0.108	0.068	4.48
99	ຂຸມທີ9	ດິນຮາບພຽງ	4.21	3.93	1.82	0.095	7.00	4.20	0.059	6.06	0.094	122.50	4.49	38.43	24.46	32.62	L	0.88	0.60	0.313	0.086	4.64
100	ຂຸມທີ10	ດິນຮາບພຽງ	4.15	3.98	1.88	0.115	5.60	3.50	0.080	3.58	0.094	70.35	1.94	40.80	28.63	28.63	CL	0.92	0.76	0.180	0.068	5.48
101	ຂຸມທີ11	ດິນຮາບພຽງ	3.88	3.78	2.89	0.148	7.70	4.90	0.063	2.56	0.094	58.31	1.84	40.78	28.69	28.69	CL	0.44	0.40	0.149	0.033	5.16
102	ຂຸມທີ12	ດິນຮາບພຽງ	4.06	3.83	4.24	0.207	5.60	4.20	0.087	5.55	0.108	78.37	0.62	33.54	32.92	32.92	CL	1.20	1.40	0.200	0.051	12.50
103	ຂຸມທີ13	ດິນຮາບພຽງ	4.10	3.85	3.30	0.171	11.20	5.60	0.106	3.88	0.108	130.53	1.85	32.30	28.81	37.04	CL	0.92	1.28	0.334	0.068	12.90
104	ຂຸມທີ14	ດິນໂນນ	3.80	3.72	1.82	0.098	8.40	4.20	0.033	1.91	0.082	54.30	1.63	61.71	20.37	16.29	SCL	0.76	0.68	0.139	0.051	4.78
105	ຂຸມທີ15	ດິນສັນພູ	3.71	3.02	3.83	0.188	11.90	5.60	0.064	2.86	0.152	178.67	4.65	41.63	33.06	20.66	SCL	0.12	1.00	0.457	0.086	12.22
	ບ້ານສາມເຕີຍ																					
106	ຂຸມທີ1	ດິນຮາບພຽງ	4.45	3.63	3.16	0.182	14.70	4.90	0.091	10.36	0.096	84.27	24.21	30.67	32.82	12.31	SCL	2.96	1.52	0.216	0.061	10.12
107	ຂຸມທີ2	ດິນຮາບພຽງ	4.54	3.65	3.70	0.179	11.20	7.00	0.094	12.04	0.094	88.33	26.43	28.48	28.69	16.39	SCL	3.08	1.76	0.226	0.078	9.04
108	ຂຸມທີ3	ດິນຮາບພຽງ	4.50	3.64	3.43	0.174	19.60	14.00	0.094	10.58	0.082	84.27	25.66	29.35	32.72	12.27	SCL	2.68	1.72	0.216	0.061	8.66
109	ຂຸມທີ4	ດິນຮາບພຽງ	4.41	3.58	3.70	0.176	11.90	7.70	0.094	10.15	0.088	88.33	26.41	28.56	32.75	12.28	SCL	2.60	1.48	0.226	0.043	5.44

No Lab	No Profile	Soil Unit	pH		%	Nitrogen N			Phosphorus		Potassium		%	%Fine	%	%	Tex-	meq/100g of soil				
			H_2O	KCl	OM	%N Total	NH_4 ppm	NO_3 ppm	$\%P_2O_5$ Tot	P-ppm P-Avail	$\%K_2O$ K_Tot	K-ppm K Avail	Coarse Sand	Sand	Clay	Silt	ture	Ca^{++}	Mg^{++}	K^+	Na^+	CEC
110	ຂຸມທີ5	ດິນຮາບພຽງ	4.35	3.57	3.36	0.160	20.30	5.60	0.088	10.22	0.090	84.27	28.83	26.18	32.72	12.27	SCL	2.20	1.92	0.216	0.061	10.04
111	ຂຸມທີ6	ດິນຮາບພຽງ	4.34	3.58	4.03	0.188	11.20	7.00	0.096	11.17	0.090	116.69	27.25	31.76	32.79	8.20	SCL	2.48	1.36	0.298	0.061	10.52
112	ຂຸມທີ7	ດິນຮາບພຽງ	4.37	3.63	3.03	0.168	7.70	5.60	0.087	10.36	0.090	92.38	26.41	32.65	28.66	12.28	SCL	2.80	1.16	0.236	0.078	10.68
113	ຂຸມທີ8	ດິນຄ້ອຍຊັນ	3.74	3.12	5.38	0.260	12.60	10.50	0.070	7.96	0.053	72.12	37.60	25.51	32.79	4.10	SCL	1.08	0.96	0.184	0.061	11.12
114	ຂຸມທີ9	ດິນຮາບພຽງ	4.25	3.55	4.03	0.202	8.40	7.00	0.090	9.71	0.092	84.27	26.71	24.16	36.85	12.28	SC	2.40	1.28	0.216	0.078	10.16
115	ຂຸມທີ10	ບ່ອນຕ່ຳສຸດ	4.17	3.33	4.71	0.246	9.80	7.70	0.113	11.09	0.108	141.00	33.88	16.68	41.19	8.24	SC	0.92	1.00	0.361	0.043	12.82
116	ຂຸມທີ11	ດິນຮາບພຽງ	4.24	3.62	3.50	0.171	16.80	4.20	0.093	10.36	0.098	84.27	27.10	27.91	24.54	20.45	SCL	2.80	1.44	0.216	0.043	9.42
117	ຂຸມທີ12	ໂນນໜ້ອຍນຶ່ງ	4.88	4.31	4.71	0.227	9.10	7.00	0.111	8.91	0.124	141.00	30.23	24.69	28.69	16.39	SCL	6.88	1.96	0.361	0.061	12.84
118	ຂຸມທີ13	ດິນຮາບພຽງ	4.38	3.76	3.43	0.171	12.60	7.70	0.097	11.53	0.112	92.38	27.22	27.93	28.54	16.31	SCL	2.92	1.52	0.236	0.078	7.42
119	ຂຸມທີ14	ບ່ອນສູງສຸດ	4.71	4.14	3.03	0.165	11.20	5.60	0.074	14.15	0.100	128.85	27.57	27.67	16.28	28.48	SL	3.12	1.16	0.330	0.095	5.78
120	ຂຸມທີ15	ດິນຮາບພຽງ	4.28	3.74	3.56	0.171	13.30	7.00	0.092	10.73	0.102	88.33	25.36	25.56	28.63	20.45	SCL	3.24	1.48	0.226	0.043	9.22
	ບ້ານນ້ຳປຸ																					
121	ຂຸມທີ1	ດິນຮາບພຽງ	4.07	3.22	3.03	0.146	12.60	7.70	0.066	4.97	0.148	51.86	11.97	55.58	16.23	16.23	SL	0.88	1.12	0.133	0.061	5.36
122	ຂຸມທີ2	ດິນຮາບພຽງ	4.17	3.38	2.82	0.140	8.40	5.60	0.065	3.80	0.150	47.81	9.75	49.64	20.30	20.30	SCL	1.12	1.40	0.122	0.043	8.28
123	ຂຸມທີ3	ດິນຮາບພຽງ	4.08	3.34	3.16	0.160	10.50	4.90	0.065	7.01	0.110	88.33	7.40	60.18	12.16	20.26	SL	0.76	1.04	0.226	0.026	8.70

No Lab	No Profile	Soil Unit	pH		%	Nitrogen N			Phosphorus		Potassium		%	%Fine	%	%	Tex-	meq/100g of soil				
			H_2O	KCl	OM	%N Total	NH_4 ppm	NO_3 ppm	$\%P_2O_5$ Tot	P-ppm P-Avail	$\%K_2O$ K_Tot	K-ppm K Avail	Coarse Sand	Sand	Clay	Silt	ture	Ca^{++}	Mg^{++}	K^+	Na^+	CEC
124	ຊຸມທີ4	ດິນຮາບພຽງ	3.41	3.10	3.36	0.174	8.40	4.20	0.091	2.13	0.183	88.33	9.60	20.23	49.54	20.64	C	0.20	0.76	0.226	0.095	7.20
125	ຊຸມທີ5	ດິນຮາບພຽງ	4.01	3.38	3.23	0.176	22.40	11.20	0.066	7.16	0.112	51.86	16.53	55.07	16.23	12.17	SL	0.84	0.48	0.133	0.043	7.70
126	ຊຸມທີ6	ດິນຮາບພຽງ	4.65	4.01	2.69	0.132	11.90	8.40	0.078	17.36	0.104	181.52	5.79	61.73	20.30	12.18	SCL	1.68	1.96	0.464	0.061	13.42
127	ຊຸມທີ7	ບອນຕ່ຳສຸດ	4.05	3.61	3.50	0.168	7.00	3.50	0.064	4.10	0.106	51.86	6.21	40.90	24.42	28.48	L	1.04	0.80	0.133	0.095	10.78
128	ຊຸມທີ8	ດິນຮາບພຽງ	3.70	3.13	2.35	0.126	11.20	7.00	0.040	8.03	0.041	112.64	22.45	53.29	20.22	4.04	SCL	0.32	0.64	0.288	0.095	8.96
129	ຊຸມທີ9	ດິນຮາບພຽງ	3.95	3.40	3.83	0.190	8.40	7.00	0.047	4.02	0.078	59.96	25.87	49.69	20.37	4.07	SCL	2.88	1.80	0.153	0.061	8.84
130	ຊຸມທີ10	ໂນນສຸດ	3.88	3.23	3.43	0.185	35.00	8.40	0.063	8.18	0.144	88.33	15.94	43.45	28.43	12.18	SCL	0.40	0.48	0.226	0.406	6.96
131	ຊຸມທີ11	ຄ້ອຍຊັ້ນ	3.89	3.32	3.36	0.176	7.70	5.60	0.074	4.82	0.152	157.21	14.88	36.19	36.70	12.23	SC	1.36	1.08	0.402	0.043	6.70
132	ຊຸມທີ12	ບອນໂນນ	3.83	3.32	3.43	0.179	19.60	11.20	0.070	5.84	0.150	149.11	15.70	35.37	32.62	16.31	SCL	1.28	0.64	0.381	0.130	23.80
133	ຊຸມທີ13	ດິນຮາບພຽງ	3.82	3.28	3.03	0.151	18.20	9.80	0.066	5.55	0.154	141.00	15.48	35.64	32.59	16.29	SCL	0.60	1.76	0.361	0.319	5.78
134	ຊຸມທີ14	ດິນຮາบพຽງ	3.76	3.15	3.03	0.171	37.80	14.00	0.054	8.69	0.124	84.27	18.83	44.74	28.34	8.10	SCL	0.44	1.12	0.216	0.440	6.60
135	ຊຸມທີ15	ດິນຮາบพຽງ	3.49	3.27	2.32	0.154	10.50	7.00	0.070	4.82	0.159	145.05	13.65	37.47	32.59	16.29	SCL	0.76	1.04	0.371	0.181	5.30

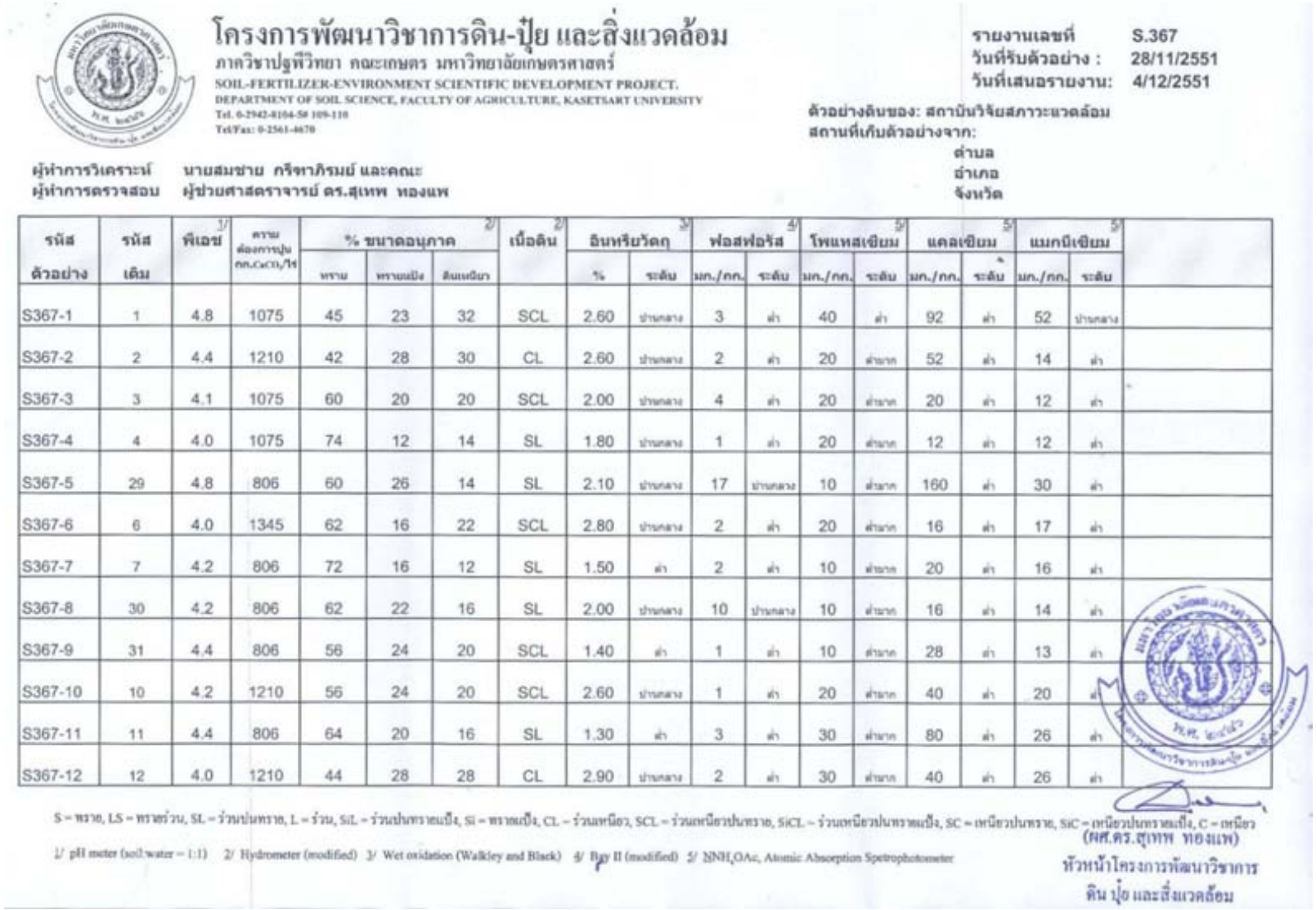
ຫົວໜ້າສູນສຳຫລວດແລະແບ່ງເຂດດິນກະສິກຳ

ໃຄລິດ ແສງດາເຮືອງ

ຫົວໜ້າໜ່ວຍງານວິໄຈດິນ,ພືດແລະຝຸ່ນ

Source: Agriculture and Forestry Scientific Research Institute, Lao PDR, December 2007

(2) Soil fertilities at Phukata and Pha-Aen areas, in November 2008



โครงการพัฒนาวิชาการดิน-ปุ๋ย และสิ่งแวดล้อม
ภาควิชาปฐพีวิทยา คณะเกษตร มหาวิทยาลัยเกษตรศาสตร์
SOIL-FERTILIZER-ENVIRONMENT SCIENTIFIC DEVELOPMENT PROJECT.
DEPARTMENT OF SOIL SCIENCE, FACULTY OF AGRICULTURE, KASETSART UNIVERSITY
Tel. 0-2942-8104-5# 109-110
Tel/Fax: 0-2561-4670

รายงานเลขที่ S.367
วันที่รับตัวอย่าง : 28/11/2551
วันที่เสนอรายงาน: 4/12/2551

ตัวอย่างดินของ: สถาบันวิจัยสภาวะแวดล้อม
สถานที่เก็บตัวอย่างจาก:
ตำบล
อำเภอ
จังหวัด

ผู้ทำการวิเคราะห์ นายสมชาย กริชาภิรมย์ และคณะ
ผู้ทำการตรวจสอบ ผู้ช่วยศาสตราจารย์ ดร.สุเทพ ทองแพ

รหัสตัวอย่าง	รหัสเดิม	พีเอช 1/	ความต้องการปูน กก.CaCO3/ไร่	% ขนาดอนุภาค 2/ ทราย	ทรายแป้ง	ดินเหนียว	เนื้อดิน 2/	อินทรียวัตถุ 3/ %	ระดับ	ฟอสฟอรัส 4/ มก./กก.	ระดับ	โพแทสเซียม 5/ มก./กก.	ระดับ	แคลเซียม 5/ มก./กก.	ระดับ	แมกนีเซียม 5/ มก./กก.	ระดับ	
S367-1	1	4.8	1075	45	23	32	SCL	2.60	ปานกลาง	3	ต่ำ	40	ต่ำ	92	ต่ำ	52	ปานกลาง	
S367-2	2	4.4	1210	42	28	30	CL	2.60	ปานกลาง	2	ต่ำ	20	ต่ำมาก	52	ต่ำ	14	ต่ำ	
S367-3	3	4.1	1075	60	20	20	SCL	2.00	ปานกลาง	4	ต่ำ	20	ต่ำมาก	20	ต่ำ	12	ต่ำ	
S367-4	4	4.0	1075	74	12	14	SL	1.80	ปานกลาง	1	ต่ำ	20	ต่ำมาก	12	ต่ำ	12	ต่ำ	
S367-5	29	4.8	806	60	26	14	SL	2.10	ปานกลาง	17	ปานกลาง	10	ต่ำมาก	160	ต่ำ	30	ต่ำ	
S367-6	6	4.0	1345	62	16	22	SCL	2.80	ปานกลาง	2	ต่ำ	20	ต่ำมาก	16	ต่ำ	17	ต่ำ	
S367-7	7	4.2	806	72	16	12	SL	1.50	ต่ำ	2	ต่ำ	10	ต่ำมาก	20	ต่ำ	16	ต่ำ	
S367-8	30	4.2	806	62	22	16	SL	2.00	ปานกลาง	10	ปานกลาง	10	ต่ำมาก	16	ต่ำ	14	ต่ำ	
S367-9	31	4.4	806	56	24	20	SCL	1.40	ต่ำ	1	ต่ำ	10	ต่ำมาก	28	ต่ำ	13	ต่ำ	
S367-10	10	4.2	1210	56	24	20	SCL	2.60	ปานกลาง	1	ต่ำ	20	ต่ำมาก	40	ต่ำ	20	ต่ำ	
S367-11	11	4.4	806	64	20	16	SL	1.30	ต่ำ	3	ต่ำ	30	ต่ำมาก	80	ต่ำ	26	ต่ำ	
S367-12	12	4.0	1210	44	28	28	CL	2.90	ปานกลาง	2	ต่ำ	30	ต่ำมาก	40	ต่ำ	26	ต่ำ	

S = ทราย, LS = ทรายร่วน, SL = ร่วนปนทราย, L = ร่วน, SiL = ร่วนปนทรายแป้ง, Si = ทรายแป้ง, CL = ร่วนเหนียว, SCL = ร่วนเหนียวปนทราย, SiCL = ร่วนเหนียวปนทรายแป้ง, SC = เหนียวปนทราย, SiC = เหนียวปนทรายแป้ง, C = เหนียว

1/ pH meter (soil:water = 1:1) 2/ Hydrometer (modified) 3/ Wet oxidation (Walkley and Black) 4/ Bray II (modified) 5/ NH_4OAc, Atomic Absorption Spetrophotometer

(ผศ.ดร.สุเทพ ทองแพ)
หัวหน้าโครงการพัฒนาวิชาการ
ดิน ปุ๋ย และสิ่งแวดล้อม

โครงการพัฒนาวิชาการดิน-ปุ๋ย และสิ่งแวดล้อม

ภาควิชาปฐพีวิทยา คณะเกษตร มหาวิทยาลัยเกษตรศาสตร์
SOIL-FERTILIZER-ENVIRONMENT SCIENTIFIC DEVELOPMENT PROJECT.
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Tel. 0-2942-8104-5# 109-110
Tel/Fax: 0-2561-4678

รายงานเลขที่ S.367
วันที่รับตัวอย่าง : 28/11/2551
วันที่เสนอรายงาน: 4/12/2551

ตัวอย่างดินของ: สถาบันวิจัยสภาวะแวดล้อม
สถานที่เก็บตัวอย่างจาก:
ตำบล
อำเภอ
จังหวัด

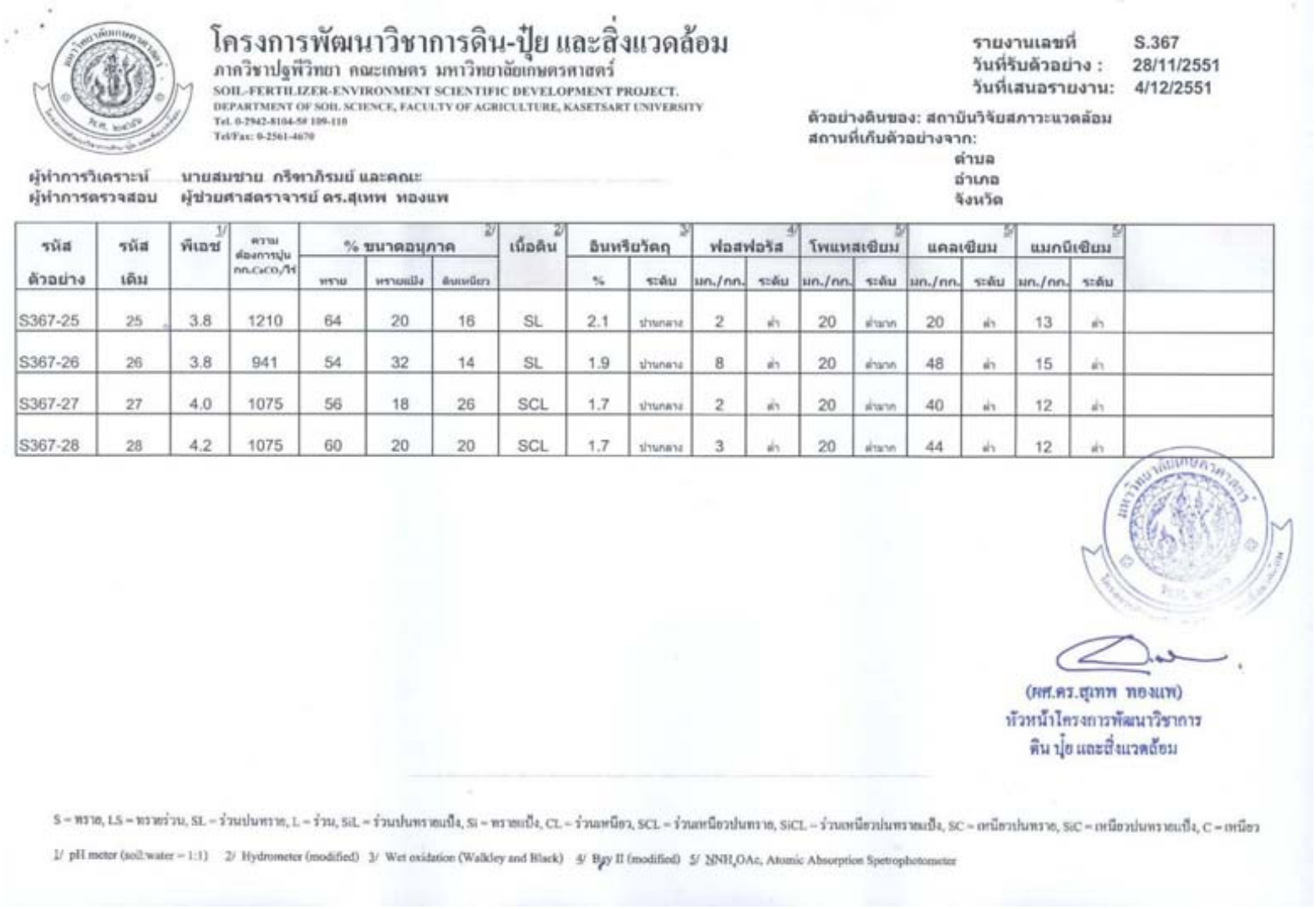
ผู้ทำการวิเคราะห์ นายสมชาย กริชาภิรมย์ และคณะ
ผู้ทำการตรวจสอบ ผู้ช่วยศาสตราจารย์ ดร.สุเทพ ทองแพ

รหัสตัวอย่าง	รหัสเดิม	พีเอช 1/	ความต้องการปูน กก.$CaCO_3$/ไร่	% ขนาดอนุภาค 2/			เนื้อดิน 2/	อินทรียวัตถุ 3/		ฟอสฟอรัส 4/		โพแทสเซียม 5/		แคลเซียม 5/		แมกนีเซียม 5/	
				ทราย	ทรายแป้ง	ดินเหนียว		%	ระดับ	มก./กก.	ระดับ	มก./กก.	ระดับ	มก./กก.	ระดับ	มก./กก.	ระดับ
S367-13	13	4.4	538	78	14	8	SL	0.7	ต่ำมาก	4	ต่ำ	10	ต่ำมาก	40	ต่ำ	14	ต่ำ
S367-14	14	4.0	1478	60	26	14	SL	3.0	ปานกลาง	31	สูง	20	ต่ำมาก	64	ต่ำ	22	ต่ำ
S367-15	15	4.6	941	56	24	20	SCL	1.1	ต่ำ	10	ต่ำ	20	ต่ำมาก	112	ต่ำ	25	ต่ำ
S367-16	16	4.6	1613	50	28	22	L	3.2	ปานกลาง	2	ต่ำ	60	ต่ำ	32	ต่ำ	20	ต่ำ
S367-17	17	4.6	1075	56	26	18	SL	2.1	ปานกลาง	15	ปานกลาง	80	ปานกลาง	48	ต่ำ	45	ปานกลาง
S367-18	18	4.2	1345	32	22	46	C	2.6	ปานกลาง	1	ต่ำ	40	ต่ำ	32	ต่ำ	25	ต่ำ
S367-19	19	4.4	941	52	34	14	SL	2.0	ปานกลาง	6	ต่ำ	20	ต่ำมาก	120	ต่ำ	70	ปานกลาง
S367-20	20	5.0	806	64	26	10	SL	2.5	ปานกลาง	5	ต่ำ	30	ต่ำมาก	400	ต่ำ	70	ปานกลาง
S367-21	21	4.0	1345	70	18	12	SL	3.1	ปานกลาง	3	ต่ำ	20	ต่ำมาก	40	ต่ำ	11	ต่ำ
S367-22	22	4.4	1075	66	22	12	SL	1.6	ปานกลาง	8	ต่ำ	10	ต่ำมาก	120	ต่ำ	18	ต่ำ
S367-23	23	4.3	673	68	20	12	SL	1.2	ต่ำ	12	ปานกลาง	10	ต่ำมาก	96	ต่ำ	20	ต่ำ
S367-24	24	3.9	806	62	20	18	SL	2.6	ปานกลาง	0	ต่ำ	20	ต่ำมาก	36	ต่ำ	15	ต่ำ

S = ทราย, LS = ทรายร่วน, SL = ร่วนปนทราย, L = ร่วน, SiL = ร่วนปนทรายแป้ง, Si = ทรายแป้ง, CL = ร่วนเหนียว, SCL = ร่วนเหนียวปนทราย, SiCL = ร่วนเหนียวปนทรายแป้ง, SC = เหนียวปนทราย, SiC = เหนียวปนทรายแป้ง, C = เหนียว

1/ pH meter (soil:water = 1:1) 2/ Hydrometer (modified) 3/ Wet oxidation (Walkley and Black) 4/ Bray II (modified) 5/ NH_4OAc, Atomic Absorption Spetrophotometer

(ผศ.ดร.สุเทพ ทองแพ)
หัวหน้าโครงการพัฒนาวิชาการ
ดิน ปุ๋ย และสิ่งแวดล้อม



โครงการพัฒนาวิชาการดิน-ปุ๋ย และสิ่งแวดล้อม
ภาควิชาปฐพีวิทยา คณะเกษตร มหาวิทยาลัยเกษตรศาสตร์
SOIL-FERTILIZER-ENVIRONMENT SCIENTIFIC DEVELOPMENT PROJECT.
DEPARTMENT OF SOIL SCIENCE, FACULTY OF AGRICULTURE, KASETSART UNIVERSITY
Tel. 0-2942-8104-59 109-110
Tel/Fax: 0-2561-4670

รายงานเลขที่ S.367
วันที่รับตัวอย่าง : 28/11/2551
วันที่เสนอรายงาน: 4/12/2551

ตัวอย่างดินของ: สถาบันวิจัยสภาวะแวดล้อม
สถานที่เก็บตัวอย่างจาก:
ตำบล
อำเภอ
จังหวัด

ผู้ทำการวิเคราะห์ นายสมชาย กรีฑาภิรมย์ และคณะ
ผู้ทำการตรวจสอบ ผู้ช่วยศาสตราจารย์ ดร.สุเทพ ทองแพ

รหัสตัวอย่าง	รหัสเดิม	พีเอช 1/	ความต้องการปูน กก.$CaCO_3$/ไร่	% ขนาดอนุภาค 2/ ทราย	ทรายแป้ง	ดินเหนียว	เนื้อดิน 2/	อินทรียวัตถุ 3/ %	ระดับ	ฟอสฟอรัส 4/ มก./กก.	ระดับ	โพแทสเซียม 5/ มก./กก.	ระดับ	แคลเซียม 5/ มก./กก.	ระดับ	แมกนีเซียม 5/ มก./กก.	ระดับ
S367-25	25	3.8	1210	64	20	16	SL	2.1	ปานกลาง	2	ต่ำ	20	ต่ำมาก	20	ต่ำ	13	ต่ำ
S367-26	26	3.8	941	54	32	14	SL	1.9	ปานกลาง	8	ต่ำ	20	ต่ำมาก	48	ต่ำ	15	ต่ำ
S367-27	27	4.0	1075	56	18	26	SCL	1.7	ปานกลาง	2	ต่ำ	20	ต่ำมาก	40	ต่ำ	12	ต่ำ
S367-28	28	4.2	1075	60	20	20	SCL	1.7	ปานกลาง	3	ต่ำ	20	ต่ำมาก	44	ต่ำ	12	ต่ำ

(รศ.ดร.สุเทพ ทองแพ)
หัวหน้าโครงการพัฒนาวิชาการ
ดิน ปุ๋ย และสิ่งแวดล้อม

S = ทราย, LS = ทรายร่วน, SL = ร่วนปนทราย, L = ร่วน, SiL = ร่วนปนทรายแป้ง, Si = ทรายแป้ง, CL = ร่วนเหนียว, SCL = ร่วนเหนียวปนทราย, SiCL = ร่วนเหนียวปนทรายแป้ง, SC = เหนียวปนทราย, SiC = เหนียวปนทรายแป้ง, C = เหนียว

1/ pH meter (soil:water = 1:1) 2/ Hydrometer (modified) 3/ Wet oxidation (Walkley and Black) 4/ Bray II (modified) 5/ NH_4OAc, Atomic Absorption Spetrophotometer

Source: Soil-Fertilizer-Environment Scientific Development Project, Kasetsart University, 2008

โครงการพัฒนาวิชาการดิน-ปุ๋ย และสิ่งแวดล้อม

ภาควิชาปฐพีวิทยา คณะเกษตร มหาวิทยาลัยเกษตรศาสตร์

SOIL-FERTILIZER-ENVIRONMENT SCIENTIFIC DEVELOPMENT PROJECT.
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Tel. 0-2942-8104-5, 0-2561-4670 Fax: 0-2942-8106

ตัวอย่างของ สถาบันวิจัยสภาวะแวดล้อม จุฬาฯ

ตัวอย่างจาก ตำบล
อำเภอ
จังหวัด

วันที่เสนอรายงาน 5/1/52
Date of report:

วันที่ส่งตัวอย่างเพื่อวิเคราะห์ 11/12/51
Date of sample submitted:

ผู้ทำการวิเคราะห์ นายสมชาย กรีฑาทิรมย์ และคณะ

ผู้ทำการตรวจสอบ ผศ.ดร.สุเทพ ทองแพ

รายงานผลวิเคราะห์เลขที่ S.398

ชนิดตัวอย่าง : ดิน

ตัวอย่าง	Total N %	NH^{+}_{4}-N mg N kg^{-1}	NO^{-}_{3}-N mg N kg^{-1}	CEC cmol kg^{-1}
No.1	0.15	5.6	33.6	9.0
No.2	0.14	2.8	16.8	11.0
No.3	0.11	<0.1	14.0	9.0
No.4	0.09	<0.1	19.6	6.0
No.29	0.10	2.8	22.4	6.0
No.6	0.15	2.8	25.2	11.4
No.7	0.07	<0.1	16.8	5.0
No.30	0.10	<0.1	19.6	5.8
No.31	0.07	<0.1	14.0	0.6
No.10	0.11	<0.1	19.6	9.6
No.11	0.09	<0.1	22.4	7.0
No.12	0.15	2.8	22.4	11.0
No.13	0.03	<0.1	11.2	2.8
No.14	0.29	2.8	36.4	16.8
No.15	0.11	<0.1	14.0	10.2
No.16	0.16	5.6	22.4	14.4
No.17	0.10	<0.1	11.2	8.8

(ผศ. ดร.สุเทพ ทองแพ)
หัวหน้าโครงการพัฒนาวิชาการ
ดิน ปุ๋ย และสิ่งแวดล้อม

โครงการพัฒนาวิชาการดิน-ปุ๋ย และสิ่งแวดล้อม

ภาควิชาปฐพีวิทยา คณะเกษตร มหาวิทยาลัยเกษตรศาสตร์

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DEPARTMENT OF SOIL SCIENCE, FACULTY OF AGRICULTURE, KASETSART UNIVERSITY
Tel. 0-2942-8104-5, 0-2561-4670 Fax: 0-2942-8106

แผ่นที่ 2
Sheet NO.

ตัวอย่างของ สถาบันวิจัยสภาวะแวดล้อม จุฬาฯ
ตัวอย่างจาก ตำบล
อำเภอ
จังหวัด

วันที่เสนอรายงาน 5/1/52
Date of report:
วันที่ส่งตัวอย่างเพื่อวิเคราะห์ 11/12/51
Date of sample submitted:
ผู้ทำการวิเคราะห์ นายสมชาย กรีฑาภิรมย์ และคณะ
ผู้ทำการตรวจสอบ ผศ.ดร.สุเทพ ทองแพ

รายงานผลวิเคราะห์เลขที่ S.398 ชนิดตัวอย่าง : ดิน

ตัวอย่าง	Total N %	NH^{+}_{4}-N mg N kg^{-1}	NO^{-}_{3}-N mg N kg^{-1}	CEC cmol kg^{-1}
No.18	0.13	8.4	14.0	13.8
No.19	0.09	5.6	14.0	6.0
No.20	0.12	5.6	19.6	7.8
No.21	0.13	2.8	11.2	10.0
No.22	0.08	8.4	8.4	6.0
No.23	0.07	<0.1	22.4	5.2
No.24	0.08	2.8	14.0	8.8
No.25	0.11	2.8	14.0	6.4
No.26	0.10	<0.1	22.4	7.0
No.27	0.08	<0.1	16.8	9.2
No.28	0.07	2.8	14.0	6..6

(ผศ. ดร.สุเทพ ทองแพ)
หัวหน้าโครงการพัฒนาวิชาการ
ดิน ปุ๋ย และสิ่งแวดล้อม

Source: Soil-Fertilizer-Environment Scientific Development Project, Kasetsart University, November 2008

RESULTS OF SOIL ANALYSIS

FOR

NEW RESETTLEMENT SITE

AND

ORIGINAL SETTLEMENTS

(1) Soil Properties of Resettlement area

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ

=====000=====

ສະຖາບັນຄົ້ນຄວ້າ ກະສິກຳ ແລະ ປ່າໄມ້ ແຫ່ງຊາດ

ສູນຄົ້ນຄວ້າການນຳໃຊ້ທີ່ດິນ ກະສິກຳ ແລະ ປ່າໄມ້

ຜົນວິໄຈດິນຂອງໂຄງການນ້ຳງຸຍ 1 ຈຳນວນ 24 ຕົວຢ່າງ

N/N	No.Lab.	Profile	Layer	Date	pH		OM	NH_4^+	NO_3^-	P_2O_5	CEC	Exchangeable cation(meq/100g)				BS
					H_2O	KCl	%	ppm	ppm	%	cmol/kg	Ca^{+2}	Mg^{+2}	K^+	Na^+	%
1	3178	Hy P01	0-15	19/7/2011	4.4	3.83	2.02	17.50	7.00	0.04	5.32	1.12	0.92	0.05	0.18	42.72
2	3179	Hy P01	15-46	19/7/2011	4.03	3.7	1.29	14.00	5.60	0.03	9.58	0.12	0.68	0.02	0.17	10.27
3	3180	Hy P01	46-77	19/7/2011	4.26	3.79	1.05	17.50	10.50	0.02	9.48	0.28	0.84	0.02	0.29	15.03
4	3181	Hy P01	77-110	19/7/2011	4.3	3.78	0.75	14.00	7.00	0.02	7.28	0.28	0.76	0.01	0.29	18.33
5	3182	Hy P02	0-14	19/7/2011	4.2	3.69	2.23	16.10	7.70	0.04	11.58	0.16	0.76	0.07	0.24	10.58
6	3183	Hy P02	14-41	19/7/2011	4.12	3.8	1.68	17.50	10.50	0.03	14.08	0.12	0.52	0.04	0.24	6.49
7	3184	Hy P02	41-68	19/7/2011	4.16	3.83	1.14	21.00	12.60	0.03	13.68	0.16	0.56	0.04	0.22	7.14
8	3185	Hy P02	68-110	19/7/2011	4.3	3.88	1.31	16.80	7.00	0.03	9.88	1.52	3.48	0.22	0.22	55.02
9	3186	Hy P03	0-16	19/7/2011	4.29	3.75	2.59	14.00	7.00	0.03	6.88	0.2	0.72	0.05	0.25	17.76
10	3187	Hy P03	16-52	19/7/2011	4.31	3.85	1.43	14.00	6.30	0.03	4.38	0.04	1.16	0.02	0.27	33.97
11	3188	Hy P03	52-73	19/7/2011	4.35	3.89	1.05	18.20	8.40	0.03	7.78	0.08	2.8	0.02	0.15	39.15
12	3189	Hy P03	73-120	19/7/2011	4.42	3.89	1.12	21.00	10.50	0.03	6.78	0.12	0.76	0.02	0.20	16.20
13	3190	Hy P04	0-16	19/7/2011	4.45	3.76	1.80	10.50	7.00	0.03	6.38	0.36	0.88	0.09	0.22	24.28
14	3191	Hy P04	16-57	19/7/2011	4.35	3.83	1.66	10.50	6.30	0.03	5.98	0.16	1.36	0.04	0.15	28.55
15	3192	Hy P04	57-83	19/7/2011	4.44	3.88	1.30	10.50	4.90	0.02	5.38	0.2	1.04	0.06	0.15	26.92
16	3193	Hy P04	83-120	19/7/2011	4.6	3.89	1.00	14.00	7.00	0.02	6.18	0.12	1.16	0.06	0.15	24.08
17	3194	Hy P05	0-14	19/7/2011	4.43	3.99	2.77	17.50	7.00	0.04	7.28	1.12	3.6	0.23	0.17	70.25
18	3195	Hy P05	14-49	19/7/2011	4.43	3.82	1.43	14.00	5.60	0.03	3.72	0.32	1.48	0.19	0.15	57.38
19	3196	Hy P05	49-74	19/7/2011	4.43	3.8	1.02	15.40	6.30	0.03	12.38	0.44	2.36	0.07	0.13	24.24
20	3197	Hy P05	74-110	19/7/2011	4.56	3.82	1.08	21.00	10.50	0.03	6.3	0.56	1.24	0.06	0.22	32.98
21	3198	Hy P06	0-15	20/7/2011	4.56	3.74	2.41	22.40	11.90	0.06	10.28	1.2	3.36	0.07	0.18	46.82
22	3199	Hy P06	15-66	20/7/2011	4.43	3.78	2.06	10.50	7.00	0.05	10.18	0.28	1.8	0.04	0.25	23.29
23	3200	Hy P06	66-87	20/7/2011	4.39	3.83	1.59	11.90	5.60	0.04	9.72	0.16	1.52	0.04	0.29	20.64
24	3201	Hy P06	87-120	20/7/2011	4.38	3.86	1.51	10.50	7.00	0.05	7.98	0.04	1.52	0.05	0.29	23.77

ຫົວໜ້າສູນຄົ້ນຄ້ວາການນຳໃຊ້ທີ່ດິນກະສິກຳ ແລະ ປ່າໄມ້ ຫົວໜ້າໜ່ວຍງານວິໄຈດິນ

Source: National Agriculture and Forest Research Institute, Lao PDR, August 2011

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ

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ສະຖາບັນຄົ້ນຄວ້າ ກະສິກຳ ແລະ ປ່າໄມ້ ແຫ່ງຊາດ

ສູນຄົ້ນຄວ້າການນຳໃຊ້ທີ່ດິນ ກະສິກຳ ແລະ ປ່າໄມ້ ນະຄອນຫຼວງວຽງຈັນ, ວັນທີ 11 AUG 2011

ຜົນວິໄຈດິນຂອງໂຄງການນ້ຳງຶມ 1 ຈຳນວນ 24 ຕົວຢ່າງ

N/N	No.Lab.	Profile	Layer	Date	Soil paricle zise(hydrometer)			Texture
					Sand %	clay %	silt %	class
1	3178	Hy P01	0-15	19/7/2011	61.48	13.24	25.28	SL
2	3179	Hy P01	15-46	19/7/2011	57.48	15.24	27.28	SL
3	3180	Hy P01	46-77	19/7/2011	59.48	17.24	23.28	SL
4	3181	Hy P01	77-110	19/7/2011	55.48	17.24	27.28	SL
5	3182	Hy P02	0-14	19/7/2011	51.48	15.24	33.28	L
6	3183	Hy P02	14-41	19/7/2011	53.48	17.24	29.28	SL
7	3184	Hy P02	41-68	19/7/2011	51.48	19.24	29.28	L
8	3185	Hy P02	68-110	19/7/2011	49.48	21.24	29.28	L
9	3186	Hy P03	0-16	19/7/2011	53.48	11.24	35.28	SL
10	3187	Hy P03	16-52	19/7/2011	49.48	19.24	31.28	L
11	3188	Hy P03	52-73	19/7/2011	47.48	21.24	31.28	L
12	3189	Hy P03	73-120	19/7/2011	45.48	23.24	31.28	L
13	3190	Hy P04	0-16	19/7/2011	51.48	15.24	33.28	L
14	3191	Hy P04	16-57	19/7/2011	49.48	17.24	33.28	L
15	3192	Hy P04	57-83	19/7/2011	43.48	23.24	33.28	L
16	3193	Hy P04	83-120	19/7/2011	45.48	25.24	29.28	L
17	3194	Hy P05	0-14	19/7/2011	47.48	11.24	41.28	L
18	3195	Hy P05	14-49	19/7/2011	43.48	21.24	35.28	L
19	3196	Hy P05	49-74	19/7/2011	49.48	25.24	25.28	SCL
20	3197	Hy P05	74-110	19/7/2011	39.48	27.24	33.28	CL
21	3198	Hy P06	0-15	20/7/2011	41.48	21.24	37.28	L
22	3199	Hy P06	15-66	20/7/2011	35.48	23.24	41.28	L
23	3200	Hy P06	66-87	20/7/2011	37.48	25.24	37.28	L
24	3201	Hy P06	87-120	20/7/2011	33.48	27.24	39.28	CL

ຫົວໜ້າສູນຄົ້ນຄ້ວາການນຳໃຊ້ທີ່ດິນກະສິກຳ ແລະ ປ່າໄມ້ ຫົວໜ້າໜ່ວຍງານວິໄຈດິນ

ສູນຄົ້ນຄ້ວາການນຳໃຊ້ທີ່ດິນ ກະສິກຳ ແລະ ປ່າໄມ້

ອະໂນລາດ ຈັນທະວົງສາ

Source: National Agriculture and Forest Research Institute, Lao PDR, August 2011

(2)Soil Properties of Two Villages (Ban Sopyouak, Ban Namyouak)

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ

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ສະຖາບັນຄົ້ນຄວ້າ ກະສິກຳ ແລະ ປ່າໄມ້ ແຫ່ງຊາດ

ສູນຄົ້ນຄວ້າການນຳໃຊ້ທີ່ດິນ ກະສິກຳ ແລະ ປ່າໄມ້

ນະຄອນຫຼວງວຽງຈັນ,ວັນທີ 11 AUG 2011

ຜົນວິໄຈດິນຂອງໂຄງການນ້ຳງຽບ 1 ຈຳນວນ 8 ຕົວຢ່າງ

N/N	No.Lab.	Profile	Layer	Date	pH		OM	NH_4^+	NO_3^-	P_2O_5	CEC	Exchangeable cation(meq/100g)				BS
					H_2O	KCl	%	mg/kg	mg/kg	%	cmol/kg	Ca^{+2}	Mg^{+2}	K^+	Na^+	%
1	3308	SG-1	0-10	26/7/2011	4.4	4.04	1. 49	14.00	5.60	0.054	15.04	1.36	0.64	0.02	0.10	14.10
2	3309	SG-1	30-40	26/7/2011	4.36	3.99	0. 92	15.40	7.00	0.065	3.12	0.96	0.84	0.01	0.12	61.81
3	3310	SG-1	60-70	26/7/2011	4.34	4.09	0. 52	10.50	3.50	0.059	6.52	0.36	0.84	0.03	0.07	19.87
4	3311	SG-1	80-90	26/7/2011	4.09	3.98	0. 62	11.90	4.90	0.063	2.80	0.76	0.64	0.02	0.09	53.69
5	3312	NG-1	0-10	26/7/2011	4.14	3.99	1. 10	17.50	10.50	0.058	36.86	0.76	0.64	0.01	0.03	3.91
6	3313	NG-1	30-40	26/7/2011	4.2	4.06	1. 02	20.30	11.20	0.063	15.32	0.36	1.24	0.03	0.09	11.18
7	3314	NG-1	60-70	26/7/2011	4.14	4.03	0. 65	14.00	5.60	0.064	23.80	0.56	0.64	0.02	0.01	5.18
8	3315	NG-1	80-90	26/7/2011	4.39	4.12	0. 69	10.50	3.50	0.069	22.16	0.36	0.64	0.03	0.07	4.95

Note ; SG : Sopyouak, NG : Namyouak

Source: National Agriculture and Forest Research Institute, Lao PDR, August 2011

N/N	No.Lab.	Profile	Layer	Date	Soil paricle zise(hydrometer)			Texture class
					Sand %	clay %	silt %	
1	3308	SG-1	0-10	26/7/2011	52.76	23.96	23.28	SCL
2	3309	SG-1	30-40	26/7/2011	66.76	21.96	11.28	SCL
3	3310	SG-1	60-70	26/7/2011	44.76	35.96	19.28	CL
4	3311	SG-1	80-90	26/7/2011	60.76	27.96	11.28	SCL
5	3312	NG-1	0-10	26/7/2011	72.76	15.96	11.28	SL
6	3313	NG-1	30-40	26/7/2011	48.76	29.96	21.28	SCL
7	3314	NG-1	60-70	26/7/2011	64.76	27.96	7.28	SCL
8	3315	NG-1	80-90	26/7/2011	46.76	33.96	19.28	SCL

ຫົວໜ້າສູນຄົ້ນຄ້ວາການນຳໃຊ້ທີ່ດິນກະສິກຳ ແລະ ປ່າໄມ້

ອະໂນລາດ ຈັນທະວົງສາ

ຫົວໜ້າໜ່ວຍງານວິໄຈດິນ

Note ; SG : Sopyouak, NG : Namyouak

Source: National Agriculture and Forest Research Institute, Lao PDR, August 2011

(3) Soil Properties of Left bank at downstream of re-regulation dam

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ

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ສະຖາບັນຄົ້ນຄວ້າ ກະສິກຳ ແລະ ປ່າໄມ້ ແຫ່ງຊາດ

ສູນຄົ້ນຄວ້າການນຳໃຊ້ທີ່ດິນ ກະສິກຳ ແລະ ປ່າໄມ້ ນະຄອນຫຼວງວຽງຈັນ,ວັນທີ 11 AUG 2011

ຜົນວິໄຈດິນຂອງໂຄງການນ້ຳງຶບ 1 ຈຳນວນ 4 ຕົວຢ່າງ

N/N	No.Lab.	Profile	Layer	Date	pH		OM	P_2O_5	Exchangeable cation(meq/100g)			
					H_2O	KCl	%	%	Ca^{+2}	Mg^{+2}	K^+	Na^+
1	3316	NN-1	0-18	24/7/2011	4.27	4.0	11.68	0.054	0.36	1.04	0.03	0.01
2	3317	NN-1	18-40	24/7/2011	4.19	3.98	12.20	0.043	0.16	0.84	0.02	0.10
3	3318	NN-1	40-78	24/7/2011	4.23	4.04	10.22	0.046	0.16	0.64	0.02	0.05
4	3319	NN-1	78-125	24/7/2011	4.04	4.02	7.89	0.041	0.36	0.64	0.02	0.07

Source: National Agriculture and Forest Research Institute, Lao PDR, August 2011

N/N	No.Lab.	Profile	Layer	Date	Soil paricle zise(hydrometer)			Texture class
					Sand %	clay %	silt %	
1	3316	NN-1	0-18	24/7/2011	56.76	17.96	25.28	SL
2	3317	NN-1	18-40	24/7/2011	52.76	23.96	23.28	SCL
3	3318	NN-1	40-78	24/7/2011	48.76	29.96	21.28	SCL
4	3319	NN-1	78-125	24/7/2011	46.76	27.96	25.28	SCL

ຫົວໜ້າສູນຄົ້ນຄ້ວາການນຳໃຊ້ທີ່ດິນກະສິກຳ ແລະ ປ່າໄມ້

ອະໂນລາດ ຈັນທະວົງສາ

ຫົວໜ້າໜ່ວຍງານວິໄຈດິນ

Source: National Agriculture and Forest Research Institute, Lao PDR, August 2011

ANNEX B

RESULTS OF AQUATIC BIOTA SURVEY

Table B-1 Instantaneous Number of Zooplanktons per Unit Volume in Nam Ngiep River at the Project Sites (x100/m^3)

No	Names	Stations									
		1	2	3	4	5	6	7	8	9	10
1	*Ascomorpha ecaudis*						16.1				
2	*Ascomorpha spp.*	31									
3	*Asplanchna priodonta*						14.89				
4	*Asplanchnopus multiceps*										15.21
5	*Brachionus rubens*					31.61					
7	*Cephalodella gibba*				14.89						31.29
8	*Ceprotintinnus spp.*									16.23	
9	*Collozum inerme*	14.72		14.12							
10	*Conochilus dossuaius*									31	
11	*Dictyocysta spinosa*				14.21						
12	*Epiphanes macourus*					11.65					
13	*Filinia opoliensis*			16.39							
14	*Gastropus stylifer*					17.12					
15	*Haraella thomassoni*					46					
16	*Lecane ludwigi*					15.21					
17	*Macrochaetus spp.*					15.03					
18	*Paramecium caudatum*					14.91					
19	*Penaeid nauplius*					14.9					
20	*Philodina*						14.79				
21	*Ploesoma hudsoni*			17.12							
22	*Pompholyx complanata*								12.79		
23	*Pompholyx sulcata*										14.89
24	*Pyxicola Spp.*			14.72							
25	*Rhinoglena pelagica*								16.89		
26	*Spirostromum spp.*					46.01					
27	*Stenosemella producta*					14.89					
28	*Stenosemella ventricosa*			46.1							
29	*Synchaeta oblonga*								15.24	29.09	
30	*Synchaeta tremula*						15.12				
31	*Tintinnopsis cratera*		14.39								
32	*Tintinnopsis oblongata*			14.9							

No	Names	Stations									
		1	2	3	4	5	6	7	8	9	10
33	*Tintinnopsis spp.*							14.89			
34	*Tintinnopsis tubulosa*			16.12					15.23		
35	*Tintinnosis turgida*									14.89	
36	*Trchocerca porcellus*			31.01							
37	*Trchocerca rosea*			46.1							
38	*Trichocera pusilla*	15.03									
39	*Trichocerca cylindrica*						15.12				
40	*Tricocera weberi*							14.12			
	Total	60.75	14.39	216.89	29.1	227.33	76.02	29.01	60.15	91.21	61.39

Note:

Station 1 Ban Phiengta Station 2 Ban Songkhone Station 3 Ban Pou Station 4 Ban Houaypamom
Station 5 Ban Sopphouan Station 6 Ban Sopyouak Station 7 Ban Hatsaykham Station 8 Ban Hat Gniun
Station 9 Ban Somseun Station 10 Ban Pak Ngiep

Table B-2 Abundance Status of Phytoplanktons in Nam Ngiep River at the Project Sites (x100/m^3)

No	Names	Stations									
		1	2	3	4	5	6	7	8	9	10
1	*Achnanthes brevipes*							14,678			
2	*A. maewensis*					29,976					
3	*Amphora normani*		15,300					46,005			
4	*Anabaena affinis*					29,895					
5	*A. helicoidea*					106,871	14,761				
6	*Bacillaria paxillifer*								14,671		
7	*Characium*			14,891							
8	*Chlorella ellipsoidea*										612,000
9	*Closteriopsis longissima*										512,897
10	*Coelastrum microporum*										60,513
11	*C. sphaericum*					14,765					
12	*Cymatosira lorensiana*							31,000			
13	*Cymbella affinis*	15,130									
14	*C. maejoensis*							14,610			
15	*C. naviculiformis*					16,453					
16	*C. ventricosa*			46,021		31,091					
17	*Cystodinium bavariense*					14,765					
18	*Epithemia zebra*							149,812			
19	*E. argus*				321,300						
20	*Euglena acus*					31,002					
21	*E. oxyuris*					44,987					
22	*E. stripteris*						15,100				
23	*E. subehrebergii*				15,300		673,200			14,987	
24	*Eunotia lineolata*							31,013			
25	*E. sudetica*							90,453			
26	*Gloeotrichia echinulata*					46,132					
27	*Gomphonema gracile*		16,021								
28	*G. undulatum*							31,456			
29	*Guinardia delicatula*							29,341			
30	*Haslea tromphii*								15,312		
31	*Lagerheimia subsalsa*		15,721	75,980			14,980			136,981	

No	Names	Stations									
		1	2	3	4	5	6	7	8	9	10
32	*Menoidium obtusum*			46,000							
33	*Microcystis aeruginosa*					61,200					
34	*Navicula salinarum*							149,543			
35	*N. varikuli*							13,987			
36	*Neidium dubium*					14,876					
37	*Nitzchia dissipta*							16,100			
38	*Nostoc verrucosum*										15,298
39	*Ornithocercus heteroponus*					14,907					
40	*O. quadratus*					15,122					
41	*Pediastrum biradiatum*					14,875					
42	*Peranema cuneatum*					16,134					
43	*P. curricauda*			15,312	15,300		31,005			14,789	
44	*Phacus angulatus*			14,632							
45	*P. curvicauda*					14,651			15,100		14,671
46	*P. granum*					29,813					
47	*P. stokesii*	16,213									
48	*Phormidium tenue*					14,678					
49	*Pinnularia breviscostata*	14,764									
50	*Plagiotropis lepidoptera*							14,983			
51	*Rhabdomonas spiralis*			14,987							
52	*Rhoicosphenia currata*							16,901			
53	*Sellaphora bacillum*	16,100									
54	*Stephanodiscus carconensis*					62,312					
55	*Striatella delicatula*					60,750					
56	*Surirella angusta*							46,006			
57	*S. biseriata*							29,312			
58	*S. elegans*							60,981			
59	*Tetradinium intermedium*								75,980		
60	*Treubaria setigerum*						62,012				
61	*T. setigerum*								654,021		
62	*Triceratium farus*					14,681					
63	*T. favus*		14,890								

No	Names	Stations									
		1	2	3	4	5	6	7	8	9	10
64	*Trubaria setigerum*			62,001							
Total		62,207	61,932	289,824	351,900	699,936	811,058	786,181	775,084	166,757	1,215,379

Note:
Station 1 Ban Phiengta Station 2 Ban Songkhone Station 3 Ban Pou Station 4 Ban Houaypamom
Station 5 Ban Sopphouan Station 6 Ban Sopyouak Station 7 Ban Hatsaykham Station 8 Ban Hat Gniun
Station 9 Ban Somseun Station 10 Ban Pak Ngiep

Table B-3 Benthic Fauna Occurrence and Their Density in the Project Area (number/m^2)

No	Names	Stations									
		1	2	3	4	5	6	7	8	9	10
1	Aquatic earthworm	120							120	12000	1320
2	Beetle			80		120			40		
3	Caddisfly larvae		40	40				40	40		
4	Damselfly Nymph		40		520	40	720	80			
5	Dragonfly nymph			40				80			
6	Earwing		40			40				40	
7	Fly larvae										40
8	Freshwater mussel	40		40							
9	Freshwater Snail	80									
10	Mayfly nymph			40		40	520		120		
11	Midge larvae (Chironomus)		160								
12	Stonefly Nymph			120	280		40		80		
Total		240	280	360	800	240	1280	200	400	12040	1360

Note:
Station 1 Ban Phiengta Station 2 Ban Songkhone Station 3 Ban Pou Station 4 Ban Houaypamom
Station 5 Ban Sopphouan Station 6 Ban Sopyouak Station 7 Ban Hatsaykham Station 8 Ban Hat Gniun
Station 9 Ban Somseun Station 10 Ban Pak Ngiep

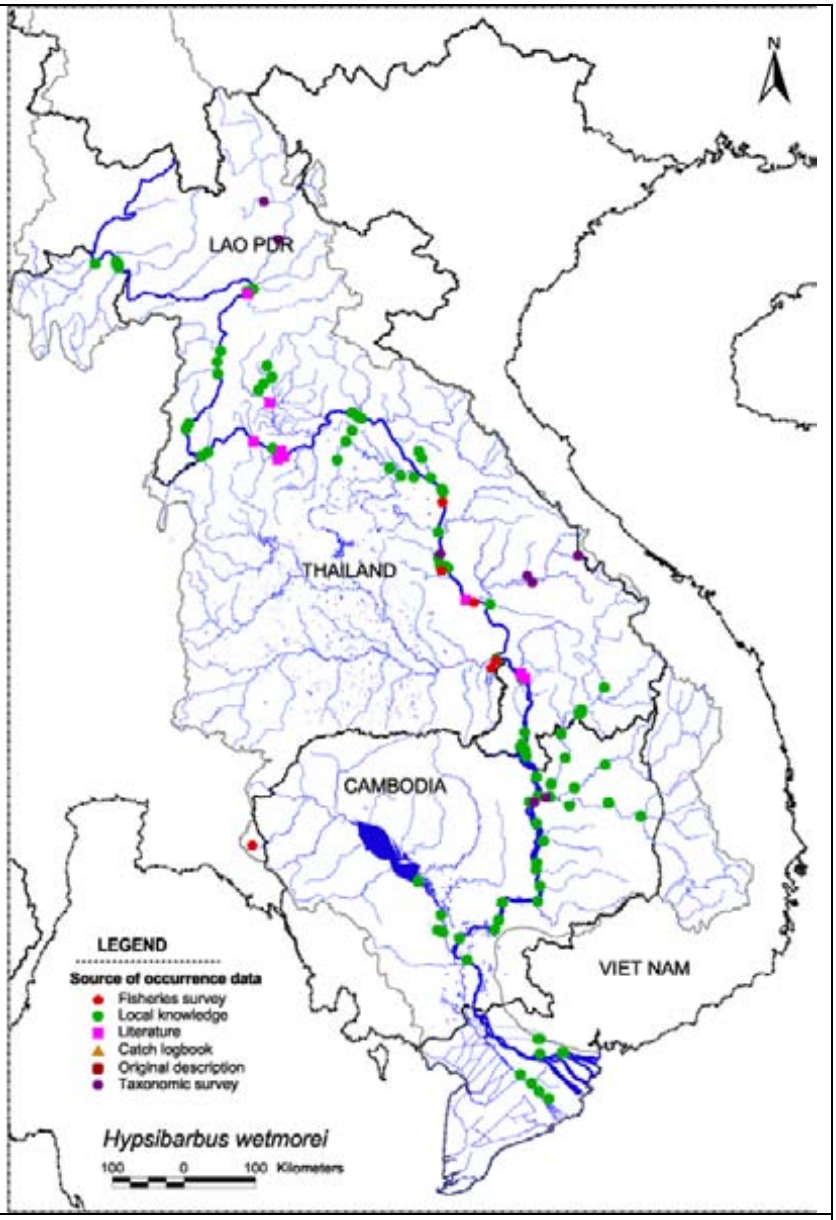
Table B-4 Species of fish found in Nam Ngiep project area

No.	Family	Scientific Name	Number	F/C
1	Cyprinidae	*Hypsibarbus vernayi*	465	F
2	Cyprinidae	*Hypsiberbus wetmorei*	775	F
3	Cyprinidae	*Opsarius pulchellus*	34,487	C
4	Cyprinidae	*Oxygaster pointoni*	2,209	C
5	Cyprinidae	*Poropuntius sp.*	4,574	F
6	Cyprinidae	*Pumtius brevis*	8,501	F
7	Cyprinidae	*Raiamas guttatus*	4,816	F
8	Cyprinidae	*Rasbora borapetensis*	6,279	F
9	Cyprinidae	*Rasbora danioconius*	4,884	F
10	Cyprinidae	*Barbodes gonionotus*	155	F
11	Cyprinidae	*Brachirus harmandi*	78	F
12	Cyprinidae	*Cirrhinus molitorella*	233	F
13	Cyprinidae	*Garra sp.*	85	F
14	Cyprinidae	*Hampala dispar*	194	C
15	Cyprinidae	*Barbodes altus*	116	F
16	Cyprinidae	*Cyclocheilichthys sp.*	127	F
17	Cyprinidae	*Labeo erythropterus*	197	F
18	Cyprinidae	*Mystacoleucus sp.*	465	F
19	Cyprinidae	*Neolissochilus blanci*	233	F
20	Cyprinidae	*Osleochilus sp.*	78	F
21	Cyprinidae	*Scaphognathops theunensis*	310	F
22	Cyprinidae	*Scaphognathops stejnegeri*	155	C
23	Cyprinidae	*Sikukia gudgeri*	140	F
24	Cyprinidae	*Onychostome sp.*	426	F
25	Cobitidae	*Acanthopsoides delphax*	2,698	F
26	Balitoridae	*Homaloptera smithi*	186	C
27	Engraulididae	*Setipinna melonochir*	162	C
28	Gobiidae	*Papuligobius ocellatus*	78	C
29	Belonidae	*Xenentodon canciloides*	477	C
30	Pristolepidae	*Pristolepis fasciata*	85	C
31	Mastacembelidae	*Mastacembellus armatus*	116	C
32	Ambassidae	*Parambassis siamensis*	233	C
33	Siluridae	*Bagarius yarrelli*	120	C
34	Siluridae	*Kryptopterus sp.*	78	C
35	Notopteridae	*Chitala lopis*	116	C
36	Notopteridae	*Notopterus notopterus*	116	C
37	Bagridae	*Mystus albolineatus*	85	C
38	Bagridae	*Hemibargrus nemurus*	155	C
39	Bagridae	*Hemibargrus wychioides*	78	F
40	Pangasidae	*Helicophagus wanndersii*	116	C
41	Synbranchidae	*Monopterus albus*	116	C
42	Tetraodontidae	*Montrete cambogensis*	78	C
Total	15	42	75,075	

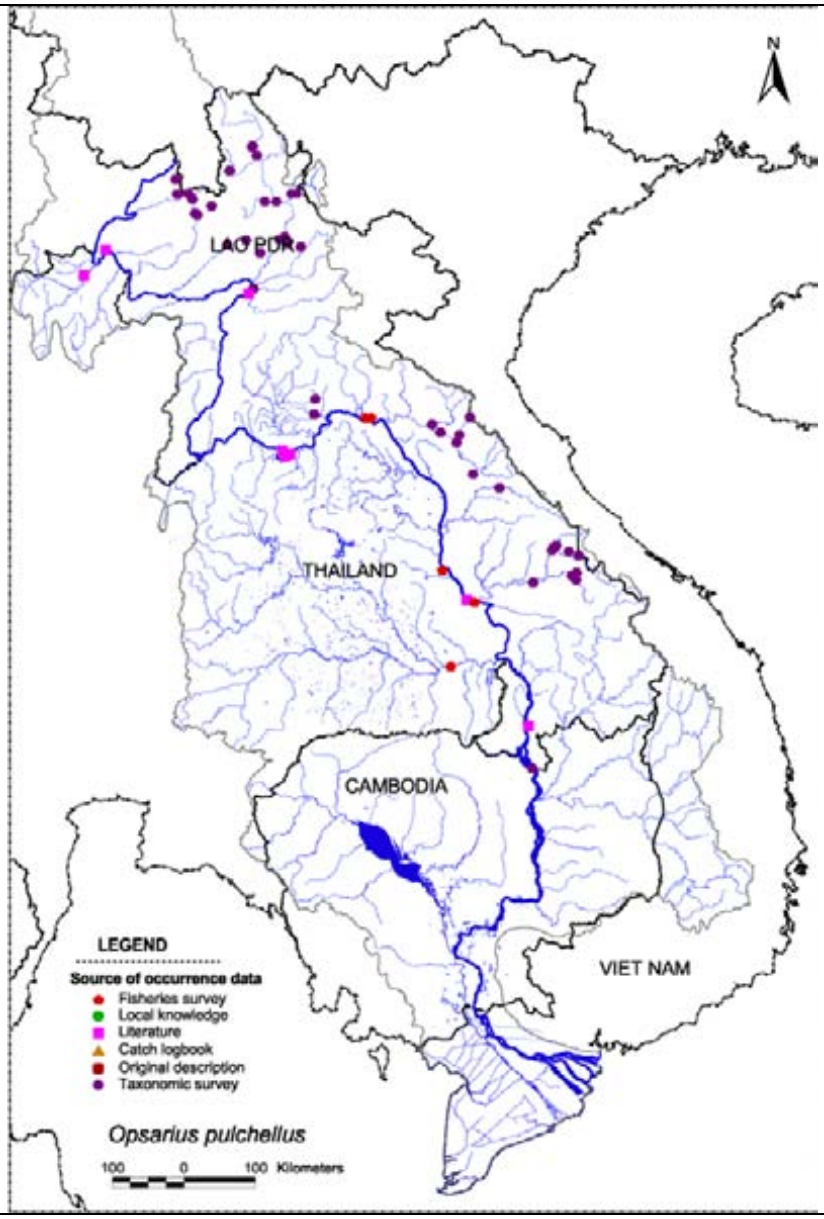
Note: F = Forage / Herbivorous species
C = Carnivorous species

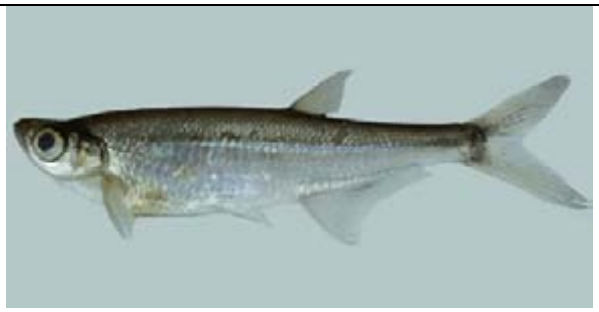
The following descriptions are the details of a number of fish species found during the survey.

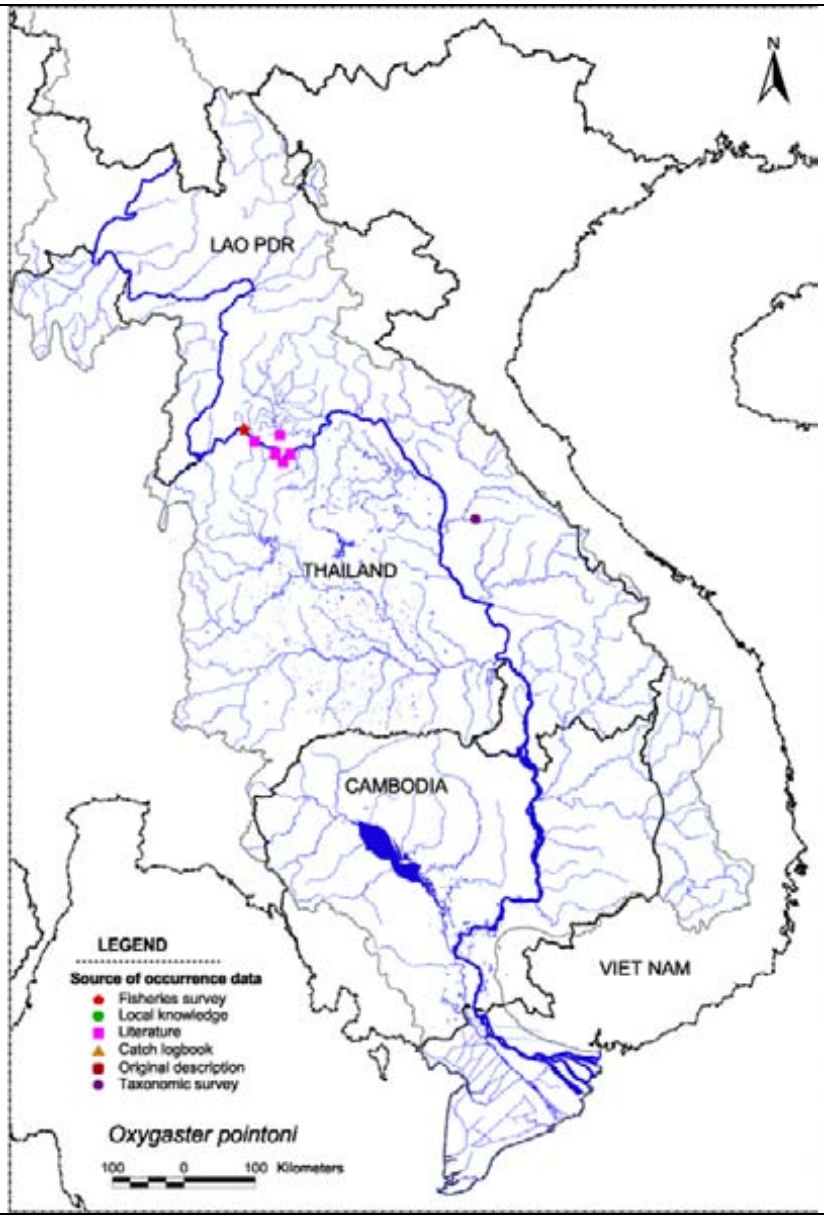
Common Name: Pa bpak thong luang; Pa bpak kham; Pa bpak	
Scientific Name	*Hypsiberbus wetmorei*
Status	Indigenous
Summary	A herbivorous species found mainly in medium sized forest streams; Probably spawns towards the end of the dry season; Eaten but the meat is sometimes mildly toxic; caught with seines, gill-nets, traps and hooks.
Habitat	Found at midwater to bottom depths of medium-sized streams in forests and occasionally in the main stream.
Feeding	Feeds on filamentous algae, leaves, bark, and roots, grasses,, fruits, flowers of trees, fish, shrimps, snails, small molluscs, and worms; This species certainly relies heavily on forest leaves for food in the rainy season, and is probably mainly an algae feeder in the dry season.
Ecology	Does not tolerate impoundments.
Migration	According to Rainboth not known to migrate, but may move upstream during periods of high water levels; However Baird et al states that it migrates up from Cambodia to southern Lao PDR in May - June.
Spawning	A 42 cm female weighing 1,300 g examined in February was full of eggs.
Fisheries	Taken by seines, gill-nets, cast-net, Chan trap, Lee trap, and hook-and-line; Flowers of Telectadium edule can be put on hooks to catch this species.
Disposal	Most likely sold fresh like other members of the genus; The meat of the species is known to be toxic to humans in the high-water season when the fish has eaten certain toxic fruits (e.g.. Hydnocarpus anthelminthica and Samandura harmandii); Even when the meat is toxic, it is apparently not life threatening to humans since it only causes slight dizziness and nausea. Villagers are not afraid of it, and readily consume its meat.
Mekong Distribution	Occurs in the Sekong Basin.
Global Distribution	Occurs in the Mekong, Chao Phraya and Mekhlong Basins and the Malay Peninsula.

Occurrence Map	
Source	Mekong River Commission, 2003.

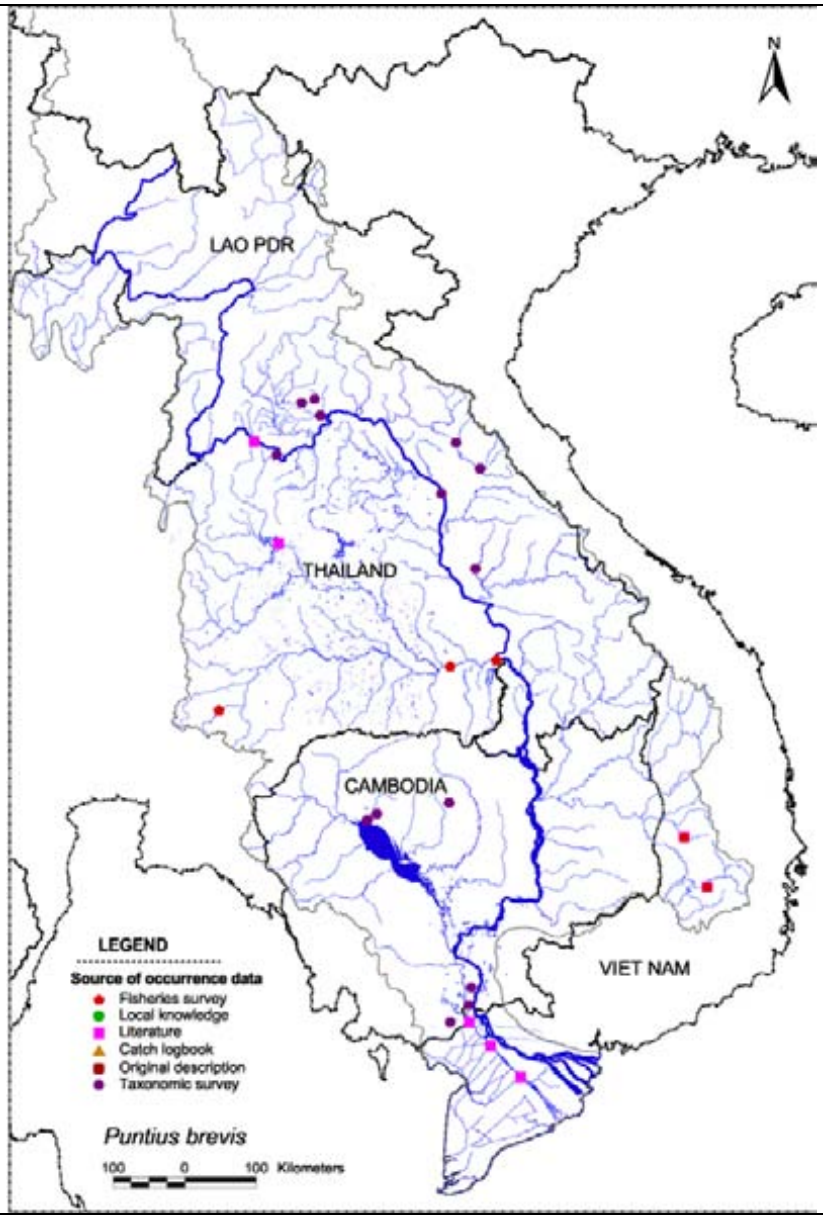
Common Name: Pa sew ao; Pa sew	
Scientific Name	*Opsarius pulchellus*
Status	Indigenous
Summary	An insectivorous species with a preference for dragonfly larvae; Found over gravel substrate in fast current; Rarely sold; Caught with seines and cast-nets.
Habitat	Found over gravel substrate in clear, swift, small streams up to rapidly flowing stretches of large rivers, especially areas with clear, running water with small rocks on the bottom.
Feeding	Diet consists of insect larvae, especially odonatans.
Fisheries	Caught with seines cast-nets , gill net, Tone trap and Say trap.
Disposal	Rarely seen in markets.
Mekong Distribution	Thailand, Laos, Yunnan; Reported from Xe Bangfai and Nam Theun basins.
Global Distribution	Found in the Mekong, Chao Phraya, and Nam Ma Basins.

Occurrence Map	
Source	Mekong River Commission, 2003.

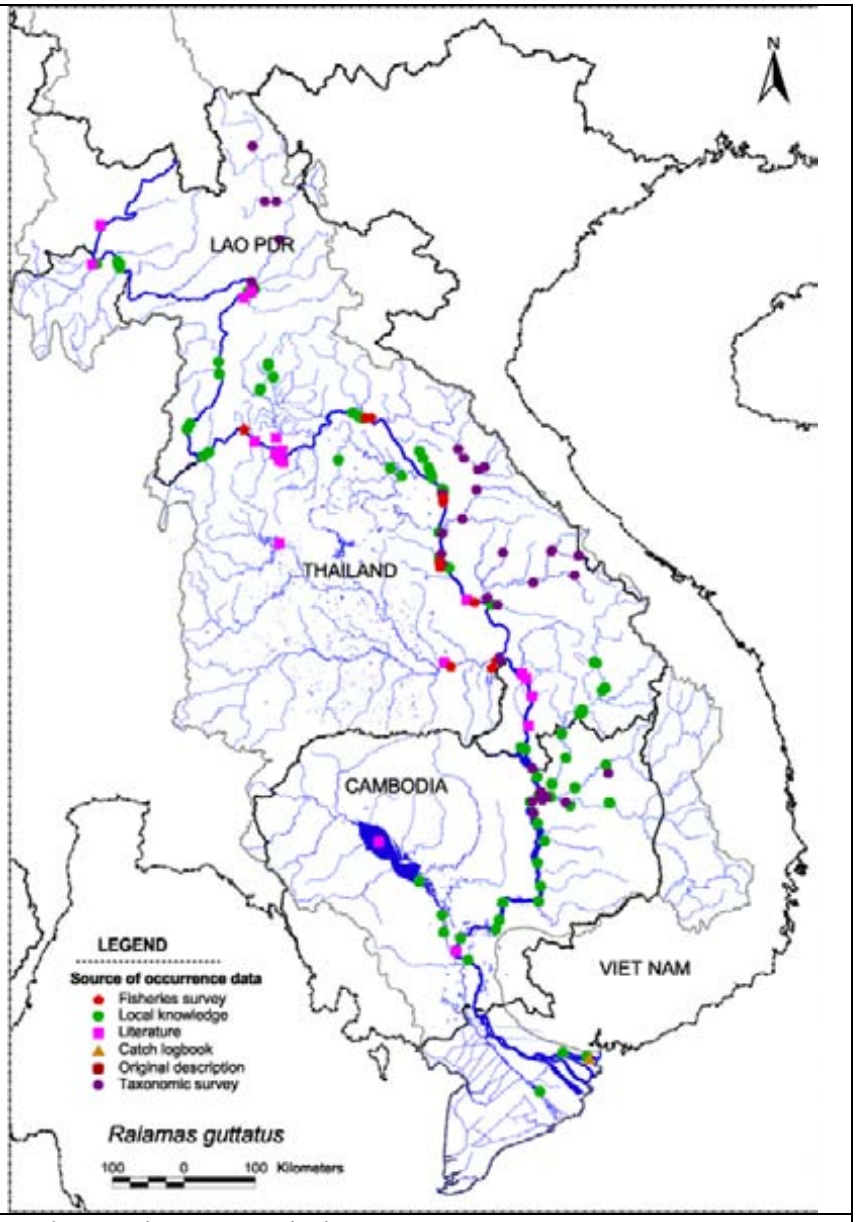
Common Name: Pa sew ao; Pa taap	
Scientific Name	*Oxygaster pointoni*
Status	Indigenous
Summary	A carnivorous species occurring sporadically at the surface of medium-sized rivers; Rarely sold; Caught with seines, cast-nets, and traps.
Habitat	Found at the surface in medium-sized rivers.
Feeding	Its diet includes terrestrial insects, insect larvae, including chironomids; and small molluscs.
Fisheries	Caught by seines, cast-nets gill net, and lee trap.
Disposal	Rarely seen at fish markets.
Mekong Distribution	Occurrence seems to be sporadic in the main stem of the Mekong ; It also occurs in the Xe Bangfai Basin; Houay Khalieng.
Global Distribution	Known from mainland Southeast Asia; Found in Mekong and Chao Phraya basins.

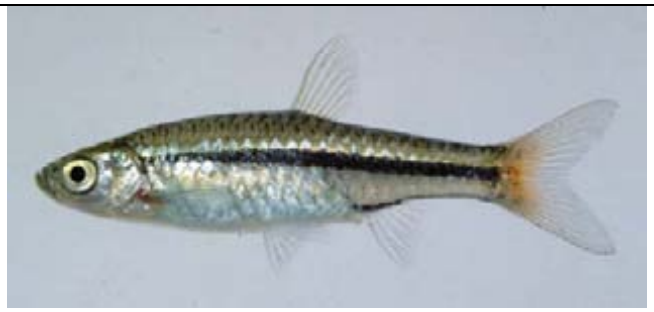
Occurrence Map	
Source	Mekong River Commission, 2003.

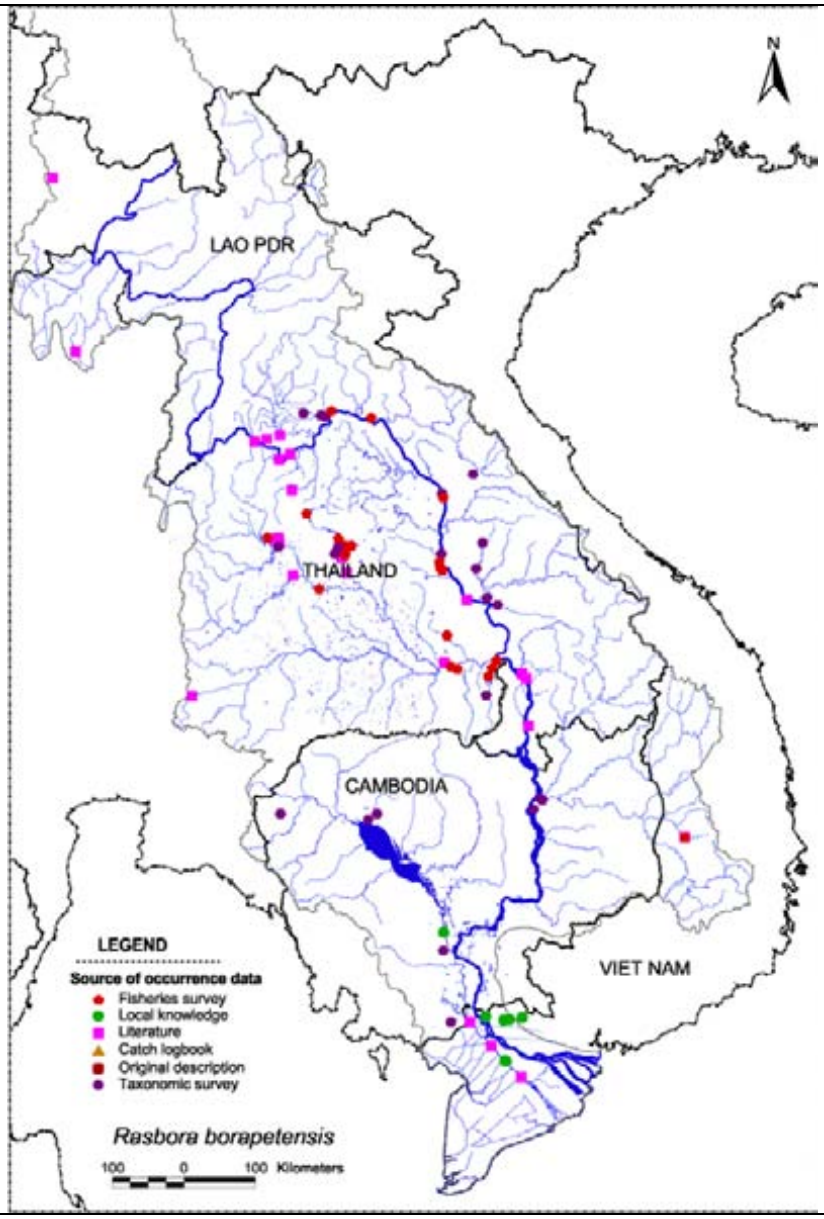
Common Name: Pa kao; Pa kao mon	
Scientific Name	*Pumtius brevis*
Status	Indigenous
Summary	An omnivorous species found in slow moving or standing water with abundant aquatic vegetation including reservoirs; Moves into inundated land where it spawns late in the rainy season; Caught with nets and traps.
Habitat	Usually found in slow moving or standing water; including floodplains, canals, ditches, and small sluggish streams, where it inhabits areas with abundant aquatic vegetation.
Feeding	Eats crustaceans, tubificid worms, zooplankton, algae, mud , terrestrial and aquatic plants, green algae and diatoms; Insect larvae, and shrimps.
Ecology	Proliferates in impoundments.
Migration	A white fish species; Moves onto newly inundated land during flood season.
Spawning	Females with ripe ovaries are found in July and spawning season may be in late rainy season, from July to October; The fish has adhesive eggs and spawns in newly inundated land; Females reach maturity at 7.6 cm, and males at 4.6 cm.
Fisheries	Caught with seines, cast-net, gill-net, Tone trap, and Lee trap.
Mekong Distribution	Recorded from the Nam Theun and Xe Bangfai Basins; Houay Ta Euang a nd Phapho swamp and Xe Lamphao; Larvae/juveniles have been recorded from the drift in the Mekong River in An Giang.
Global Distribution	Found from Indonesia to Thailand; Found in the Mekong and Chao Phraya basins and is also known from the Malay Peninsula and Java.

Occurrence Map	
Source	Mekong River Commission, 2003.

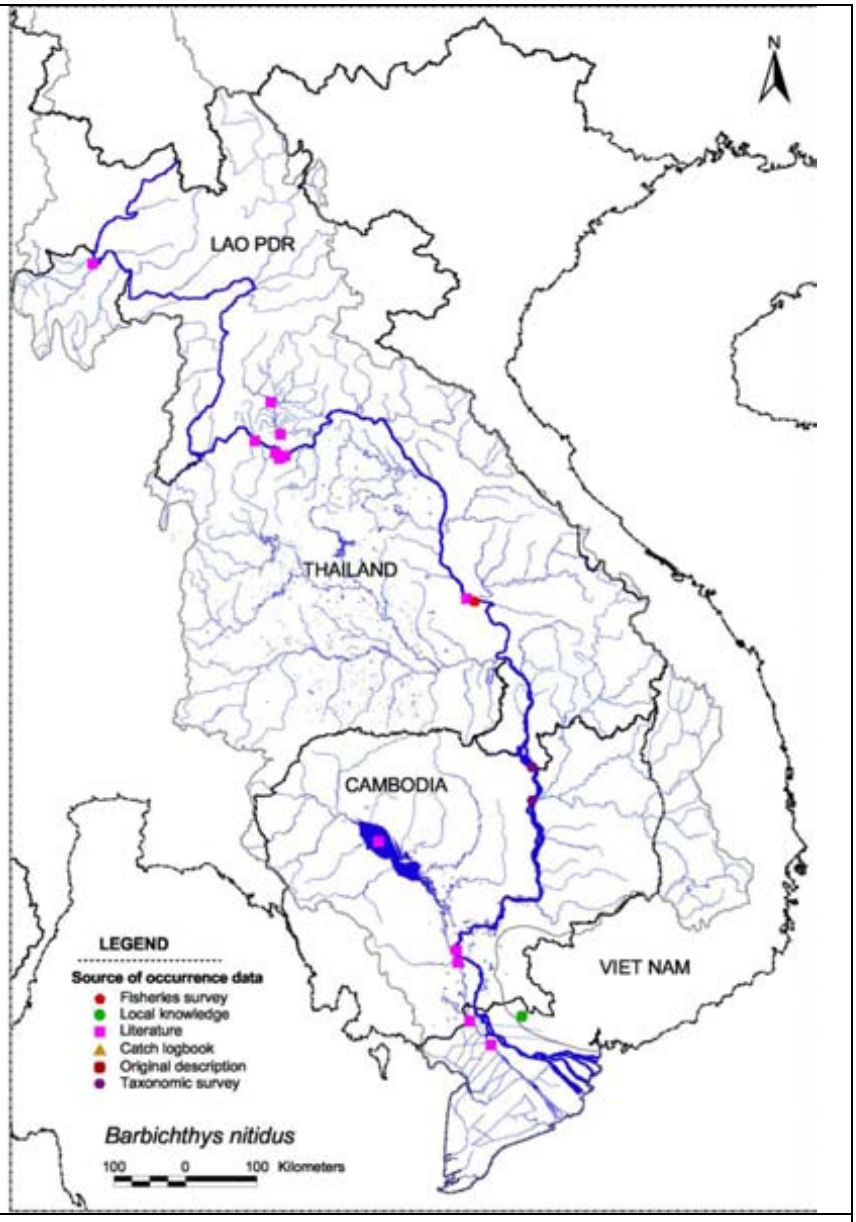
Common Name: Pa sa nak noi; Pa sa nak; Pa hao	
Scientific Name	*Raiamas guttatus*
Status	Indigenous
Summary	An omnivorous species found in rapidly flowing rivers and streams with clear water; Caught with nets and hooks; Rarely marketed.
Habitat	Found in rapidly flowing stretches of large rivers and in small streams with many rocks on t he bottom, including deep hill streams; Adults prefer clear waters with moderate to swift currents, while juveniles occur in quiet pools further downstream; Found in shady areas with muddy bottoms and over gravel substrate.
Feeding	Feeds on fish, insects, detritus and shrimps.
Migration	A white fish species.
Fisheries	Usually taken with seines, and large individuals can be taken by hook-and-line, cast-net, and gill-net.
Disposal	Rarely seen in markets; One of the most delicious fish in Nepal.
Mekong Distribution	Found basin wide in the mainstream of the Mekong; It has been recorded from the Great Lake in Cambodia, and it also occurs in the Xe Bangfai and Nam Theun basins.
Global Distribution	Known from the northern Malay Peninsula and Myanmar; from the Irrawaddy to the Mekong; also in the Chao Phraya, and Salween basins; also recorded from the India and Nepal.

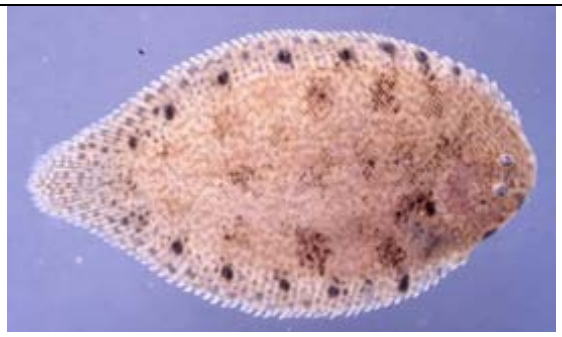
Occurrence Map	
Source	Mekong River Commission, 2003.

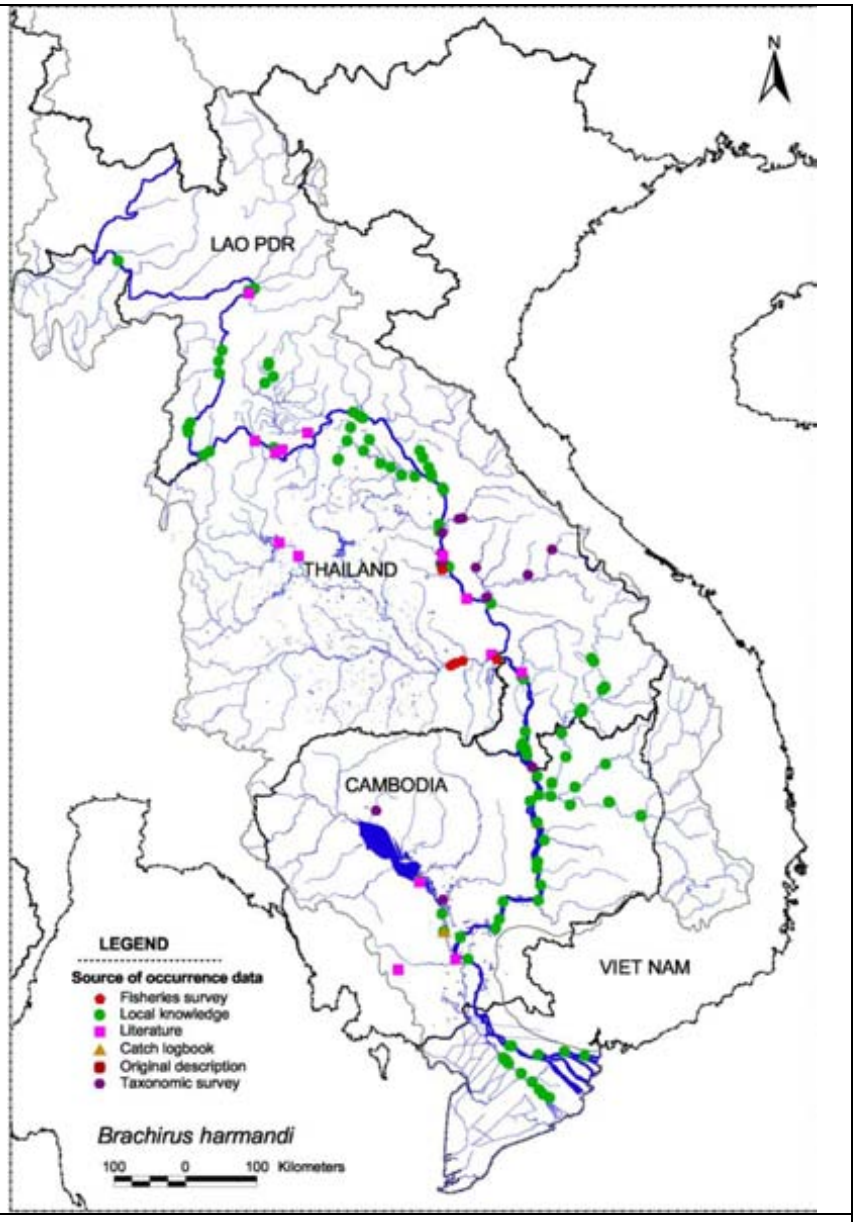
Common Name: Pa sew kow; Pa sew	
Scientific Name	*Rasbora borapetensis*
Status	Indigenous
Summary	A small omnivorous species found in slow flowing somewhat turbid water and also reservoirs; Caught with nets and traps; Important in the aquarium trade.
Habitat	Found from midwater levels to surface in ponds, streams and drains, usually in slow flowing somewhat turbid water; Also in reservoirs along the margins at less than 2 m depth; In running water with dense vegetation.
Feeding	Feeds on zooplankton, insects, worms and crustaceans, and plants.
Ecology	The species is always found in schools.
Fisheries	Taken by seine, cast-net, and trap; Tone trap and scoop net.
Disposal	Common in the aquarium trade.
Mekong Distribution	Occurs throughout the Mekong; Reported from the Xe Bangfai Basin; Larvae/juveniles have been recorded from the drift in both the Mekong and Bassac Rivers in An Giang.
Global Distribution	Recorded from the Mekong, Chao Phraya, and Meklong basins; also known from the northern Malay Peninsula, and Singapore.

Occurrence Map	
Source	Mekong River Commission, 2003.

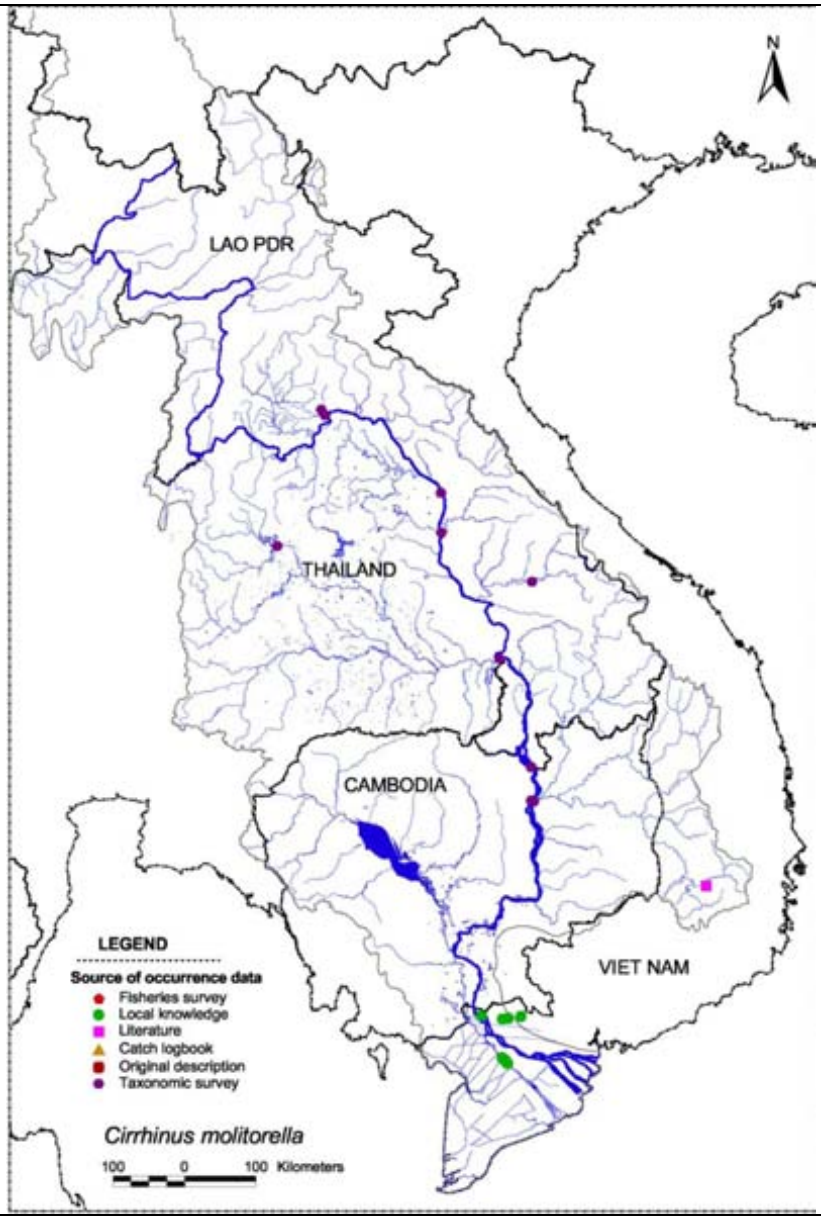
Common Name: Pa soi	
Scientific Name	*Barbodes gonionotus*
Status	Indigenous
Summary	A herbivorous species found in large and medium sized rivers, and in streams and canals in the floodplain in the rainy season; Of limited importance in the fishery.
Habitat	Occurs in large rivers during the dry season, and in floodplain streams and canals during the wet season.
Feeding	Feeds on algae and phytoplankton.
Ecology	Not known to persist in impoundments.
Migration	A white fish species; Migrates up small streams, and canals to ponds, swamps and floodplains in the rain season to spawn.
Fisheries	Taken with seines, gill-nets, cast-net, Tone trap and Lee trap.
Disposal	Not seen in markets.
Mekong Distribution	Found in large and medium-sized rivers in Laos, Thailand, Cambodia and Viet Nam. In Tonle Sap it is seen from October through December as flood waters recede, but fishermen now report it as rare; Juveniles found in the Songkhram river.
Global Distribution	Known from Thailand and Cambodia; Mekong and Chao Phrya.

Occurrence Map	
Source	Mekong River Commission, 2003

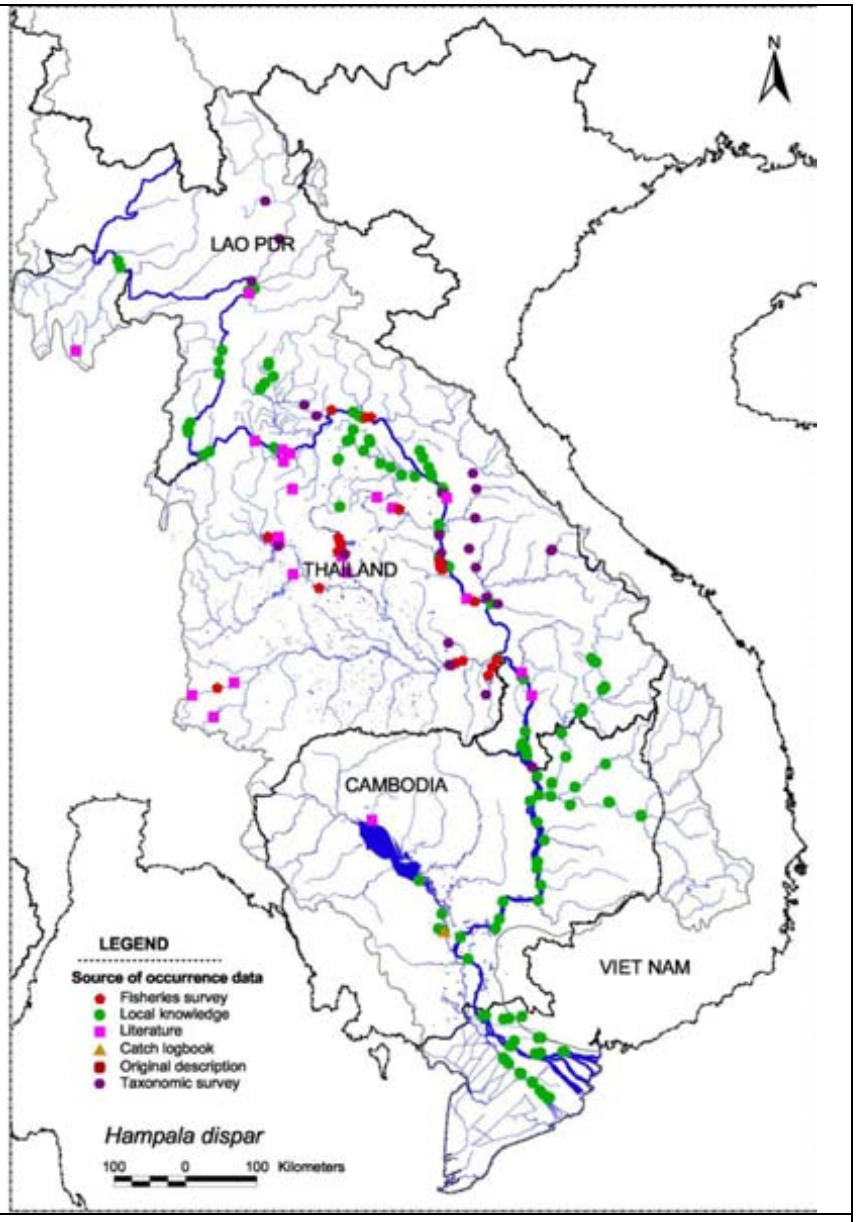
Common Name: Pa bpan; Pa lin ma; Pa bpaa	
Scientific Name	*Brachirus harmandi*
Status	Indigenous
Summary	A benthic carnivorous species in large rivers; It is of some importance as food and is caught with various nets.
Habitat	Found along the bottom in flowing waters of large and medium-sized rivers.
Feeding	Feeds primarily on benthic invertebrates.
Fisheries	Caught with seines, trawls, and set-nets.
Disposal	Caught with seines, trawls, and set-nets.
Mekong Distribution	Reported from the Xe Bangfai Basin; Larvae/juveniles recorded from the drift in both the Mekong and Bassac Rivers in An Giang.
Global Distribution	Occurs on the Southeast Asian mainland.

Occurrence Map	
Source	Mekong River Commission, 2003

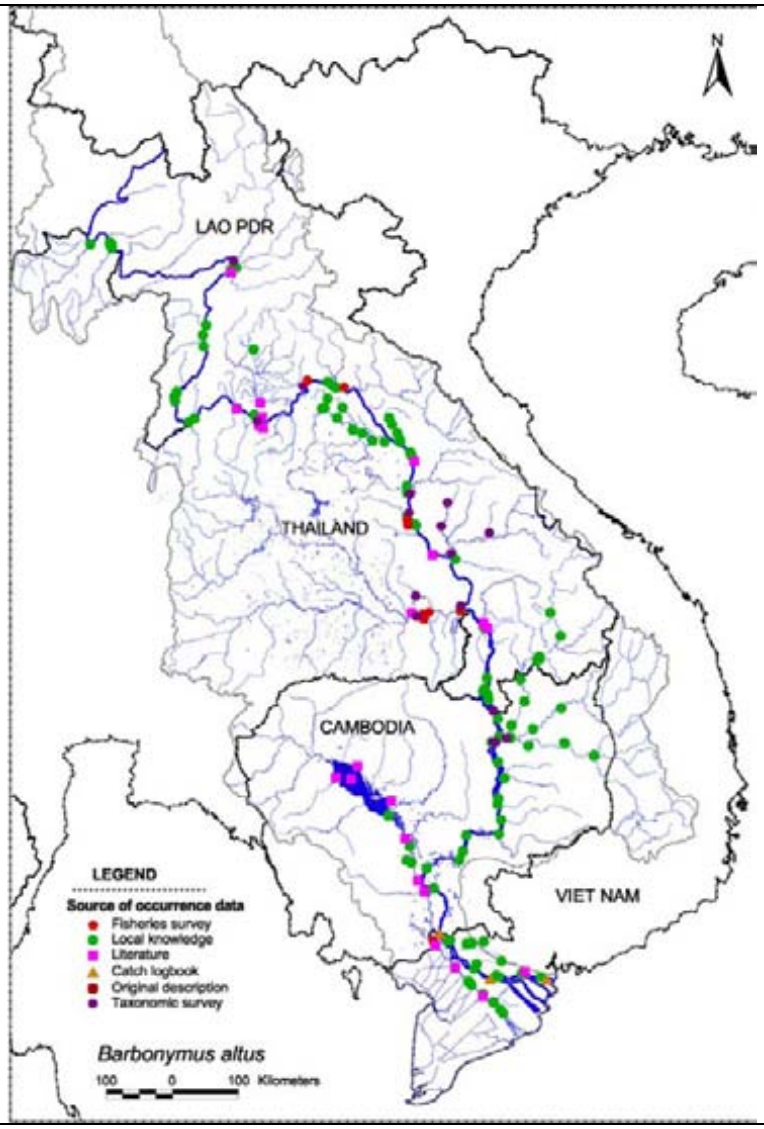
Common Name: Pa gaang	
Scientific Name	*Cirrhinus molitorella*
Status	Indigenous
Summary	An omnivorous migratory riverine species, which occurs in large rivers in the Middle and Upper Mekong Basin; It spawns in floodplains and in large rivers during the wet season; It is an important commercial species which is caught by nets and traps and marketed fresh; It is a medium sized fish with a good potential for aquaculture.
Habitat	Found in large rivers and some impoundments; Reported to inhabit deep pools at least part of the year.
Feeding	Feeds on algae including filamentous algae, periphyton and also other plant material and detritus; Juveniles feed on aquatic and terrestrial plants; Lim et al. (1999) however postulated that it is omnivorous.
Ecology	It is a riverine benthopelagic species, which is not known to persist in impoundments. It is medium to long-lived.
Migration	Wild stocks are strongly migratory, while the cultivated stocks probably have lost the migratory behaviour; Engages in upstream dry-season migrations in the Mekong mainstream of southern Lao PDR in January-February and either enters tributaries, or remains in the Mekong mainstream for spawning during the wet-season months, also known to migrate into floodplains.
Spawning	It spawns in floodplains and mainstreams of large rivers during wet-season; It is a pelagic spawner, which produces buoyant or semi-buoyant eggs.
Fisheries	Caught by gill-net, cast net, Lee trap, and Tone trap.
Disposal	Good quality flesh. Commands a high market price when sold fresh.
Aquaculture	A harmless species that is not known to impact on other fish populations. May represent a suitable candidate for aquaculture in net cages and pens. Has been successfully spawned in Lao PDR over a number of years.
Mekong Distribution	Occurs in Middle and Upper Mekong; has also been reported from the Nam Theun, Xe Bangfai , Nam Sekong and tributaries, Xe Kamanh, Xe Pian and Xe Sou.
Global Distribution	Found in the Mekong, Chao Phraya, Red River, Mekhlong and Tapi Basins; and south eastern China; Introduced to Hainan,

	Hong Kong, Taiwan, Singapore, Indonesia.
Occurrence Map	
Source	Mekong River Commission, 2003

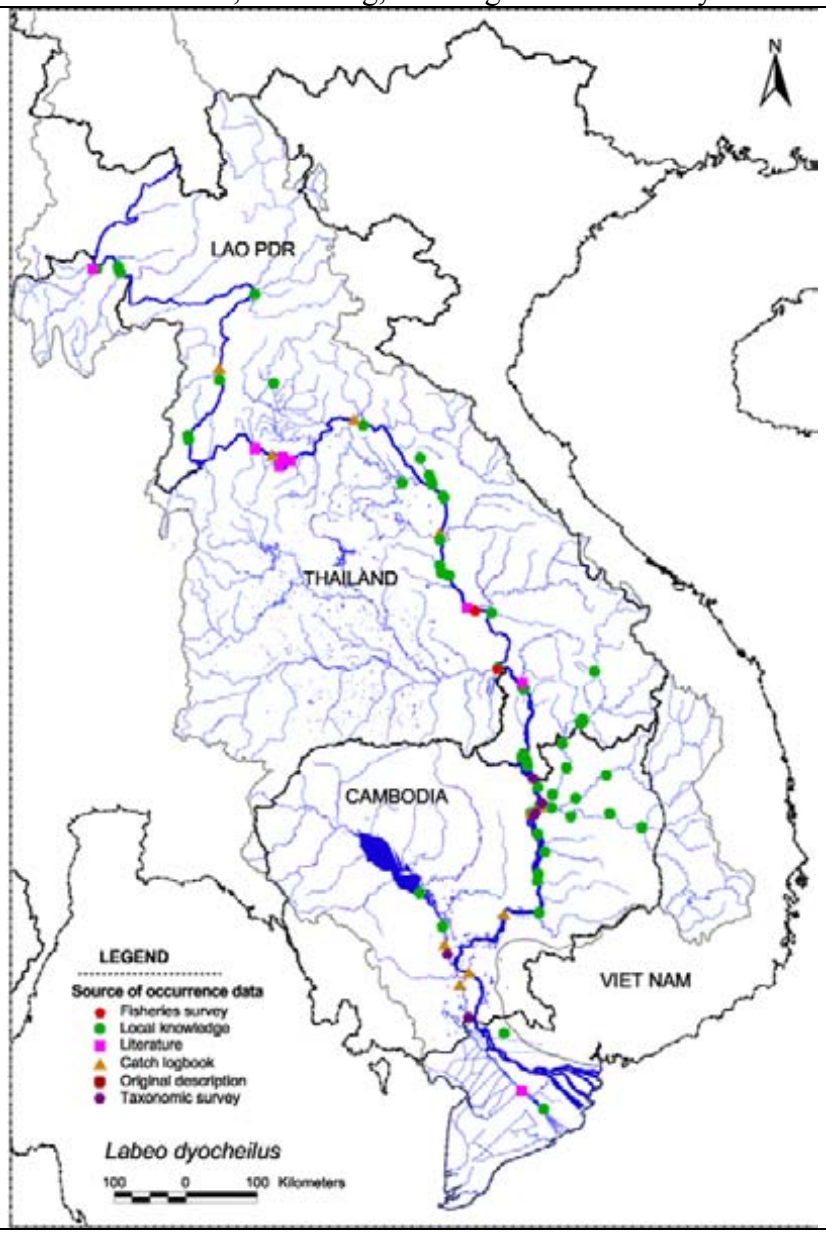
Common Name: Pa sood	
Scientific Name	*Hampala dispar*
Status	Endemic
Summary	An endemic carnivorous species which is found basin wide in slowly moving or standing water habitats, and which adapts easily to reservoirs; It is of some importance as a food fish and is caught with various nets and traps.
Habitat	Most commonly in slowly moving or standing water habitats; Deep ponds; It is also common in impoundments, where small individuals frequent areas of dense vegetation; It is reported to inhabit deep pools in the mainstream at least part of the year.
Feeding	Feeds on some fishes, but mostly prawns, crabs, and shrimps, along with some insect larvae.
Migration Record	Displays Longitudinal as well as Lateral migrations.
Spawning	Breeds in the beginning of the rainy season in April May and the young are found in seasonally flooded habitats in June.
Fisheries	Taken with seines, cast-nets, gill-nets, hook-and-line, Lee trap, and Tone trap.
Disposal	Marketed fresh.
Mekong Distribution	Mekong Basin in Laos, Yunnan, Thailand, Cambodia and Viet Nam; Found basin wide in tributaries of the Lower Mekong; Reported from the Xe Bangfai Basin, and the Nam Se.
Global Distribution	Mekong endemic.

Occurrence Map	
Source	Mekong River Commission, 2003

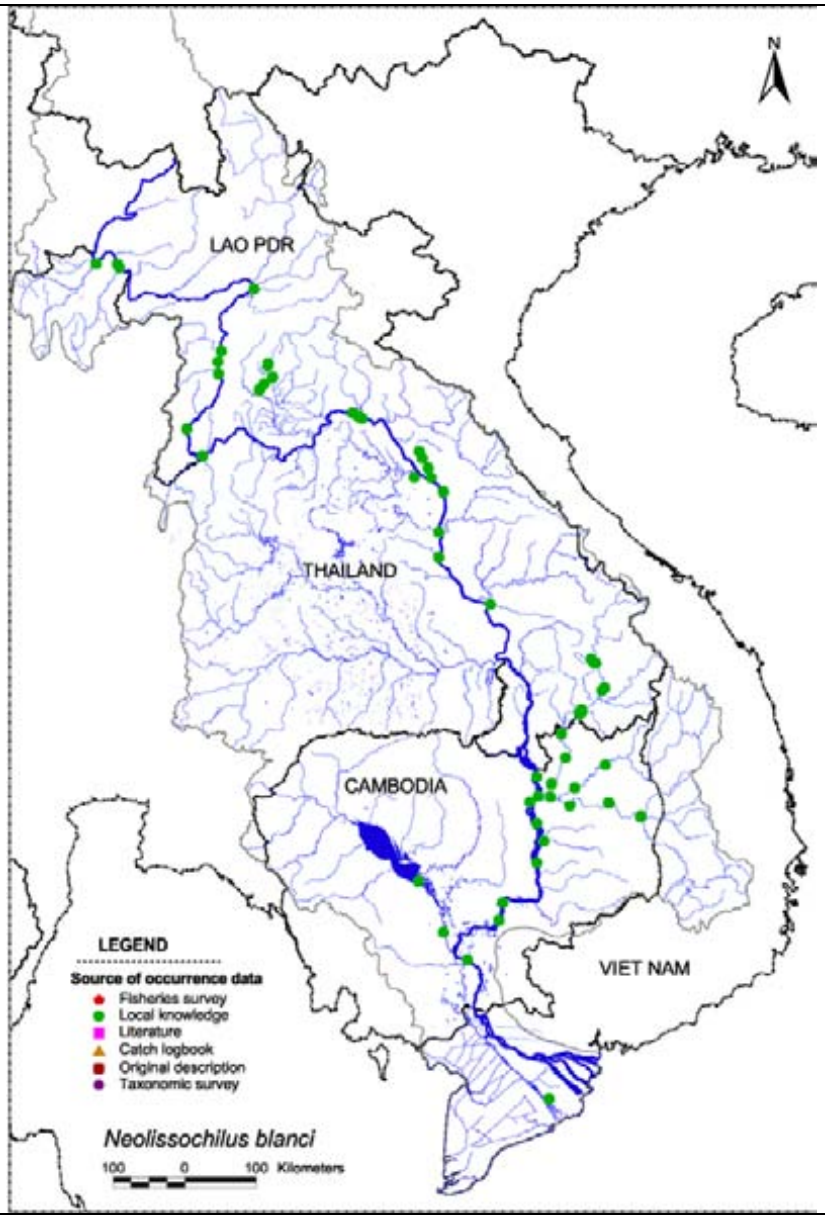
Common Name: Pa vien fai; Pa pood choh; Pa mak mong	
Scientific Name	*Barbodes altus*
Status	Indigenous
Summary	An omnivorous species, which is found basin wide in large and medium-sized rivers at midwater depths; It is migratory and colonises flooded areas during the inundation period; It lays floating or pelagic eggs in floodplains and flooded forest; It has a protracted spawning season with a peak in the late rainy season; It is important in the fishery, is of good aquaculture potential and is also used in the aquarium trade.
Habitat	It is a riverine species, which is found at midwater depths in large and medium-sized rivers and floodplains, including flooded forest .
Feeding	Feeds on a wide variety of animal and plant matter, gastropod snails, earthworms, shrimp, and fine green algae, filamentous algae, detritus, and terrestrial fruits and plants falling in the water.
Ecology	It is semi-pelagic and appears to thrive in standing waters, but it has a requirement to return to flowing water to spawn. It is medium to long-lived.
Migration	A white fish species; Undertakes annual upstream and downstream non-reproductive and reproductive migrations; Migrates up from Cambodia to Southern Lao PDR in January-February, and migrate back to Cambodia in May-June; Colonises inundated forest from where the adults migrate back to the river in October. Young of the year follow in the next few months as water levels recede.
Migration Record	Displays Longitudinal as well as Lateral migrations.
Spawning	Bardach (1959) mentioned that it becomes adult at 25 c m, however, recent research has shown that it matures already at a length of 13 c m; Fish of body l ength of 19-21 cm may carry 24,673 eggs . It spawns in July-August; However the species appears to have a protracted spawning season with a peak in the late rainy season in September; It spawns pelagically in floodplains and flooded forest, or among flooded vegetation; and has buoyant or semi-buoyant eggs, with an initial diameter of 0.74 m m, which hatch 12 hours after fertilization at 28ºC. Although the species appears to thrive in standing waters, it has a requirement to return to flowing water to spawn.
Fisheries	Caught with seines, set-nets; cast-net, gillnet, Sone net, Lee-trap

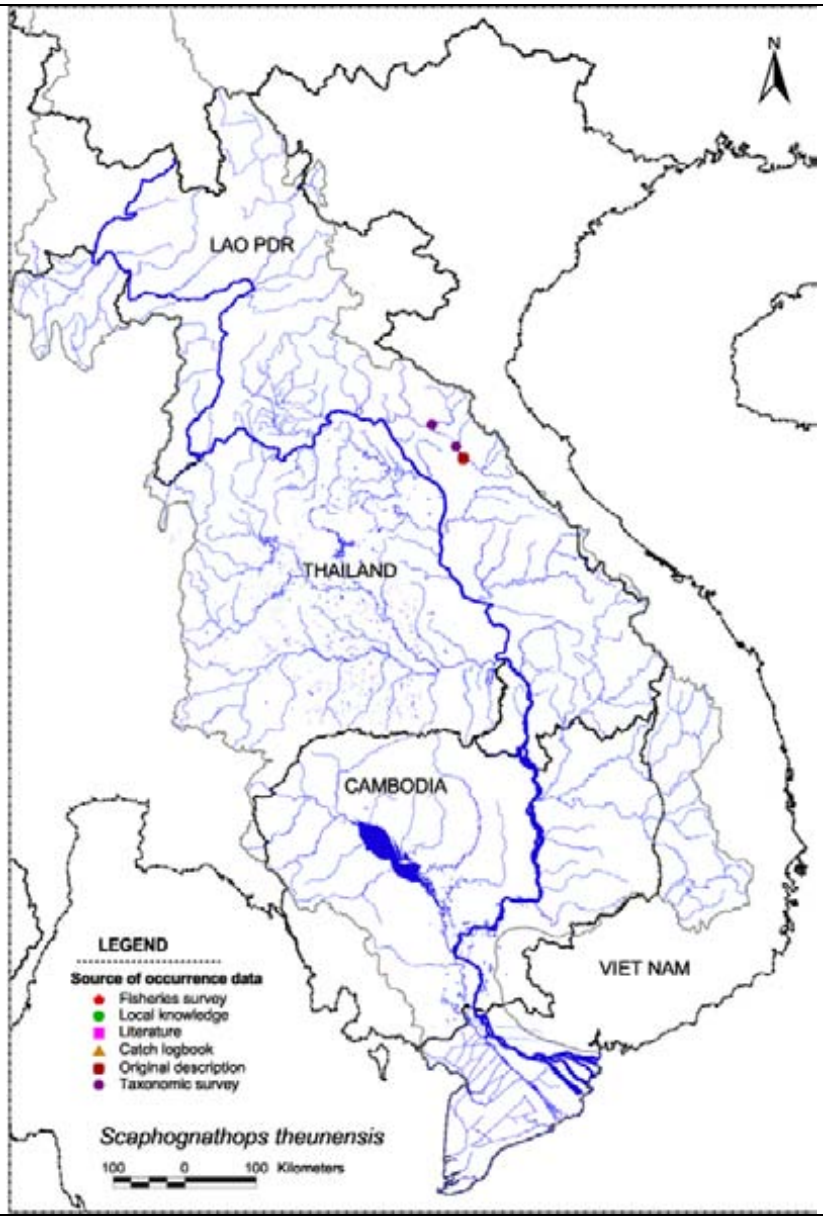
	and Tone trap; 65-250 mm individuals (mainly juveniles) are abundant in the dai fishery.
Disposal	Large individuals are marketed fresh, smaller ones are used to make Prahoc and Nuoc Mam; It has good qua lity flesh, and it commands a high market price when sold fresh; The meat of the fish is occasionally mildly toxic because it c onsumes toxic vegetation, but locals are not fearful of eating it. It is also a popular fish in the aquarium trade; and in Thailand it is captured from the wild for the ornamental fish trade.
Aquaculture	An important food-fish, cultured in floating cages in Vietnam; Easily bred in captivity, it is a harmless species that is not known to impact on other fish populations.
Mekong Distribution	Found basin wide in the mainstream of the Lower Mekong; also reported from the Xe Bangfai basin; Larvae/juveniles have been recorded from the drift in the Mekong and Bassac Rivers in An Giang.
Global Distribution	Known from the Mekong and Chao Phrya Basins.
Occurrence Map	
Source	Mekong River Commission, 2003

Common Name: Pa va suang; Pa va khai; Pa va	
Scientific Name	*Labeo erythropterus*
Status	Indigenous
Summary	A herbivorous species found in floodplains and lowland rivers with fairly fast currents, however it adapts fine to reservoirs; It spawns pelagically in the mainstream in the wet season; Marketed fresh and processed to Prahoc; Caught with nets and traps; Good aquaculture potential.
Habitat	Found in lowland rivers and floodplains; It prefers large rivers with fairly fast currents and clear water; It is reportedly often found inside the trunks of large flooded forest trees during the high-water season.
Feeding	Feeds on algae; fine and filamentous algae, bottom algae, phytoplankton, periphyton , and detritus.
Ecology	Long-lived, benthopelagic, riverine species, which is known to proliferate in impoundments .
Migration	A white fish species; In the rainy season it moves into the floodplain, where it enters flooded forests, preferring areas with at least some current. The species migrates up from Cambodia to southern Lao PDR in January-February; Small individuals migrate upstream in May-July .
Migration Record	Only seems to display Longitudinal migrations.
Spawning	The fish species spawning on A ugust-September; It spawns pelagically in the mainstream in the wet season the eggs are buoyant or semi-buoyant.
Fisheries	Taken with seines, set-nets, cast-nets, Gill-net, Lee trap, and Tone trap; It was among the most important fish species in catches with large meshed gillnets at Ban Hang Khone in southern Laos.
Disposal	Large individuals are marketed fresh, smaller ones are used to make Prahoc; It has good quality flesh, which commands a very good market price when sold fresh.
Aquaculture	A harmless species that is not known to impact other fish populations. May represent a suitable candidate for aquaculture in net cages and pens. Has been spawned artificially with success in Lao PDR over a period of several years.
Mekong Distribution	Found basin wide in the mainstream; and large rivers in the Lower Mekong Basin, including the upper edge of the freshwater tidal zone, and also known from the Tonle Sap,

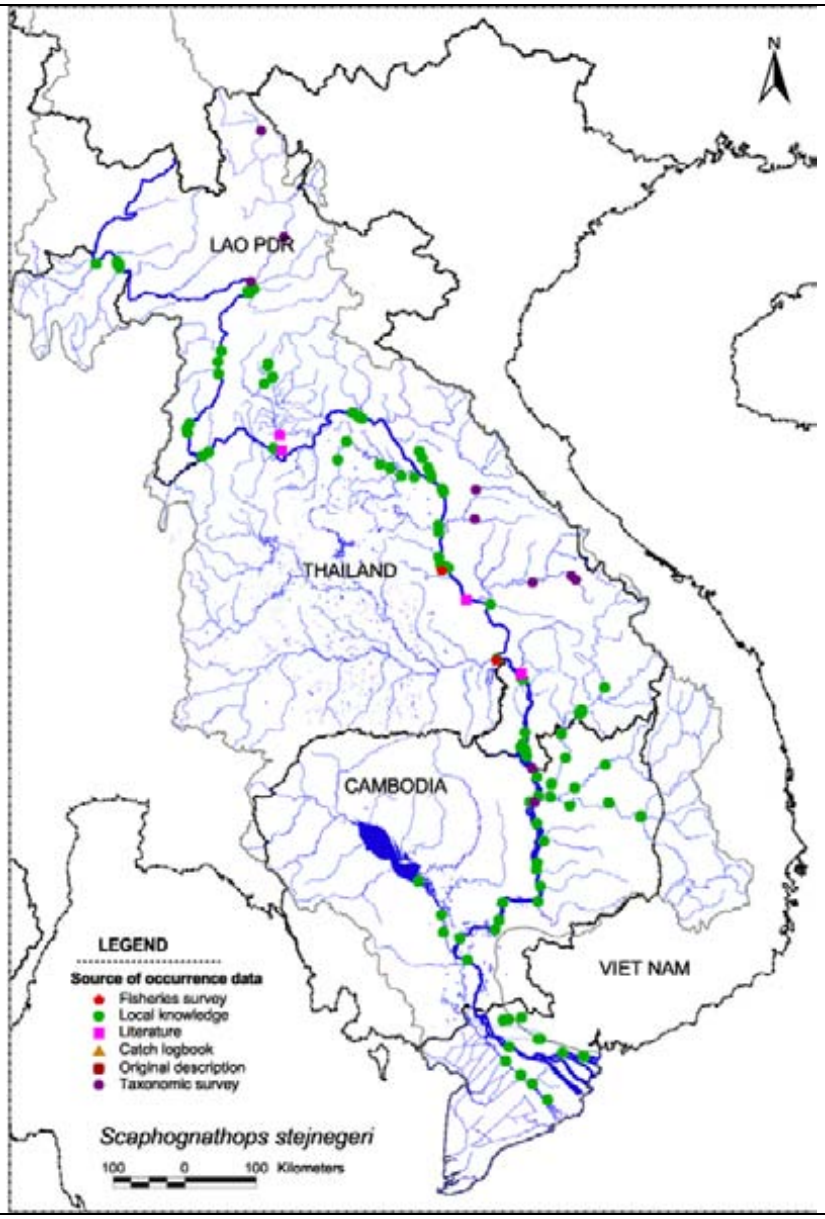
	Sekong Basin, Xe Pian, Xe Kamanh, and Xe Sou; According to Warren (2000) absent from lower section of the Cambodian Mekong; However larvae/juveniles have been recorded from the drift in both the Mekong and Bassac Rivers in An Giang.
Global Distribution	Known from Pakistan, India, Bangladesh and Nepal; Recorded from the Salween, Maeklong, Mekong and Chao Phraya Rivers.
Occurrence Map	
Source	Mekong River Commission, 2003

Common Name: Pa phong	
Scientific Name	*Neolissochilus blanci*
Status	Endemic
Summary	A Mekong endemic, which occurs in clear forest streams and rivers in the Middle Mekong Basin; Sensitive to human activities; Caught by hook-and-line, cast-nets, and gill-nets.
Habitat	Found in pools of clear forest streams and rivers.
Feeding	Primarily a predator, feeding on fish , insects, and zooplankton but also feeds on some types of plant matter, particularly fruits and tree leaves.
Ecology	Disappears when forest canopy is cut and suspended solids in streams increase because of human activities.
Fisheries	Caught by hook-and-line, cast-nets, and gill-nets.
Mekong Distribution	Occurs in the Middle Mekong, primarily of Laos, and possibly still in extreme northern Thailand. Not yet encountered in Cambodia, but expected from the northern part of the country; Recorded from the Nam Theun Basin; Xe Done and Xe Nam Noy.
Global Distribution	Mekong endemic.

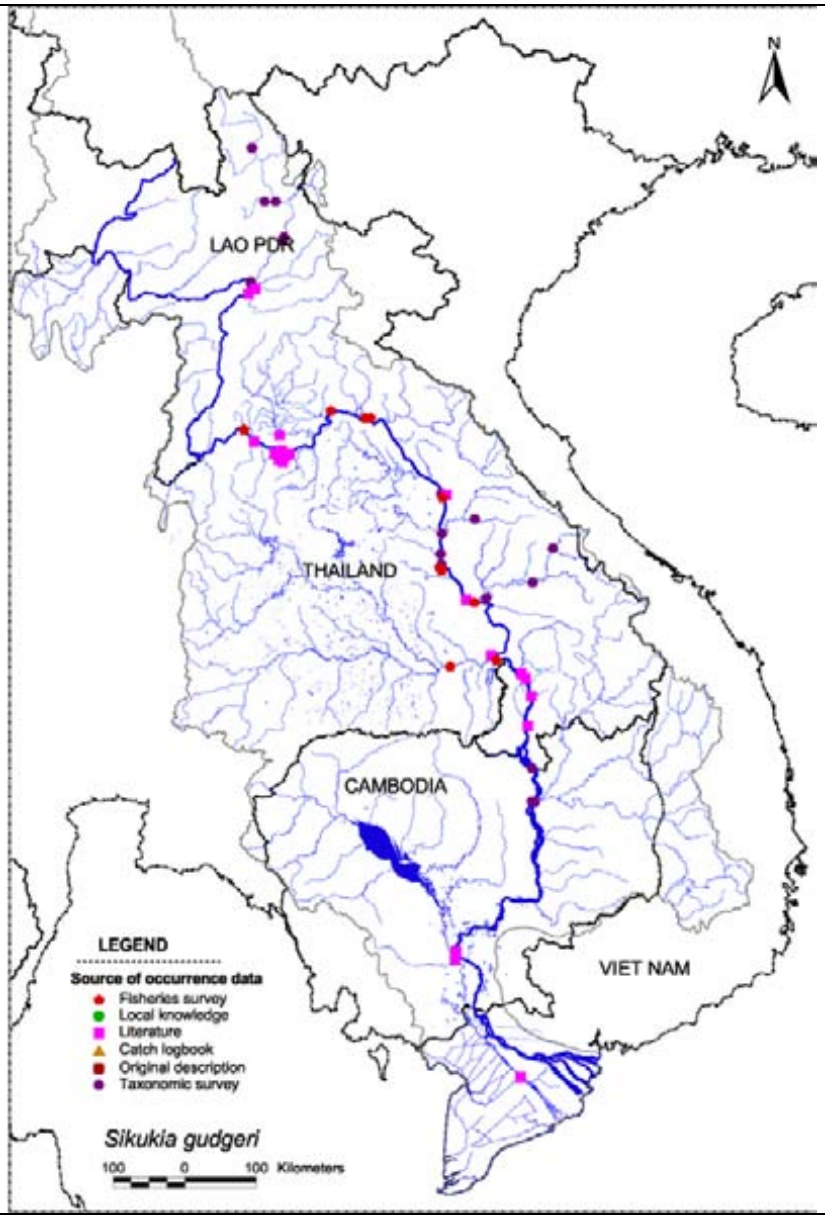
Occurrence Map	
Source	Mekong River Commission, 2003

Common Name: Not available	-
Scientific Name	*Scaphognathops theunensis*
Status	Endemic
Summary	A Mekong endemic known from the Nam Theun Basin.
Mekong Distribution	Endemic to the Nam Theun Basin.
Global Distribution	Mekong endemic.
Source	Mekong River Commission, 2003
Occurrence Map	
Source	Mekong River Commission, 2003

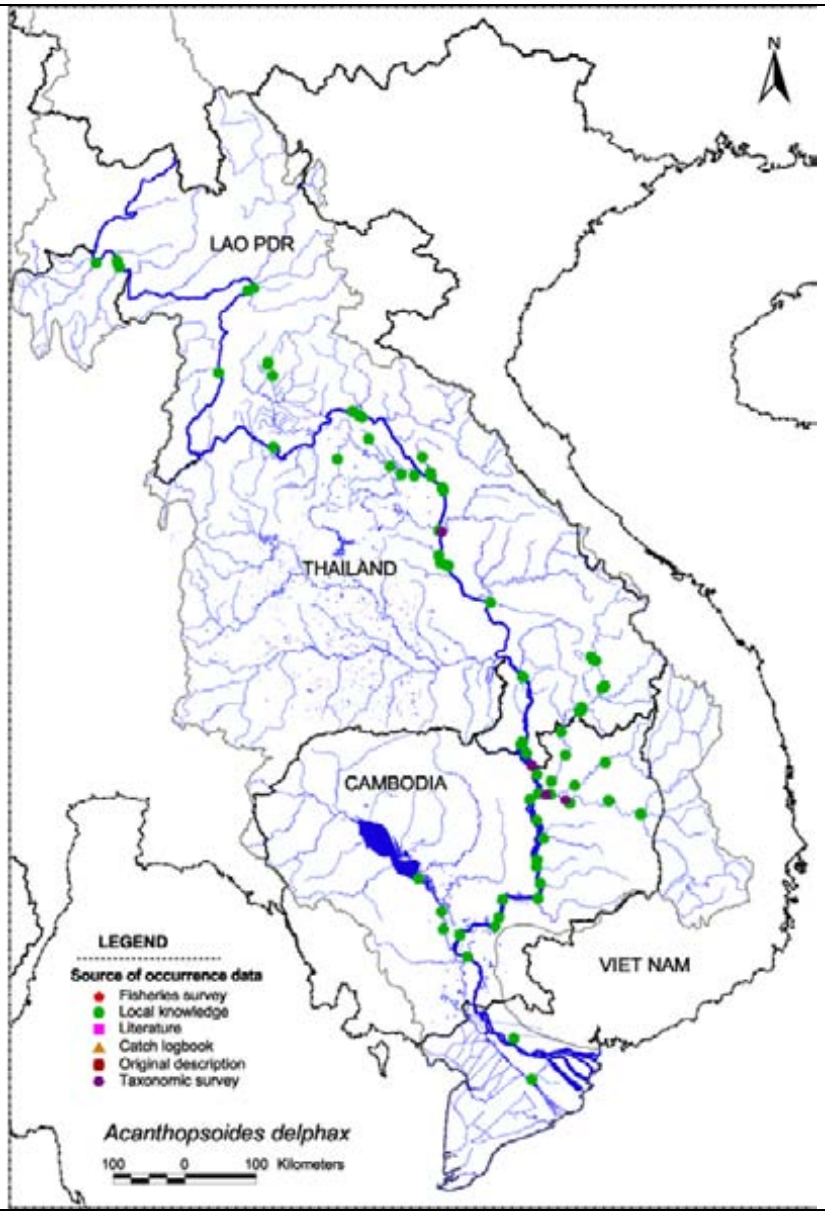
Common Name: Pa bpien; Pa phien; Pa pare	
Scientific Name	*Scaphognathops stejnegeri*
Status	Endemic
Summary	An omnivorous endemic species, which is known only from the Middle Mekong Basin; Migrates into the flooded areas during the high water period; Caught with various nets; Marketed fresh.
Habitat	Known large and medium sized rivers.
Feeding	It feeds on de tritus and algae along with worms, crustaceans, and insects and insect larvae.
Ecology	It has not been found in any impoundments.
Migration	It is not known to migrate longitudinally; This fish migrate into small streams and floodplains a the beginning of the rainy season; Probably leaves the main stream for flooded forests during the periods of high-water.
Migration Record	Only seems to display Longitudinal migrations.
Spawning	Spawns in February-March.
Fisheries	Taken with seine, cast-net, gill-net, Tone trap, Lee trap, and Lop trap.
Disposal	Marketed fresh.
Mekong Distribution	Known only from the Middle Mekong Basin; Recorded from the Xe Bangfai Basins.
Global Distribution	Mekong endemic.

Occurrence Map	
Source	Mekong River Commission, 2003

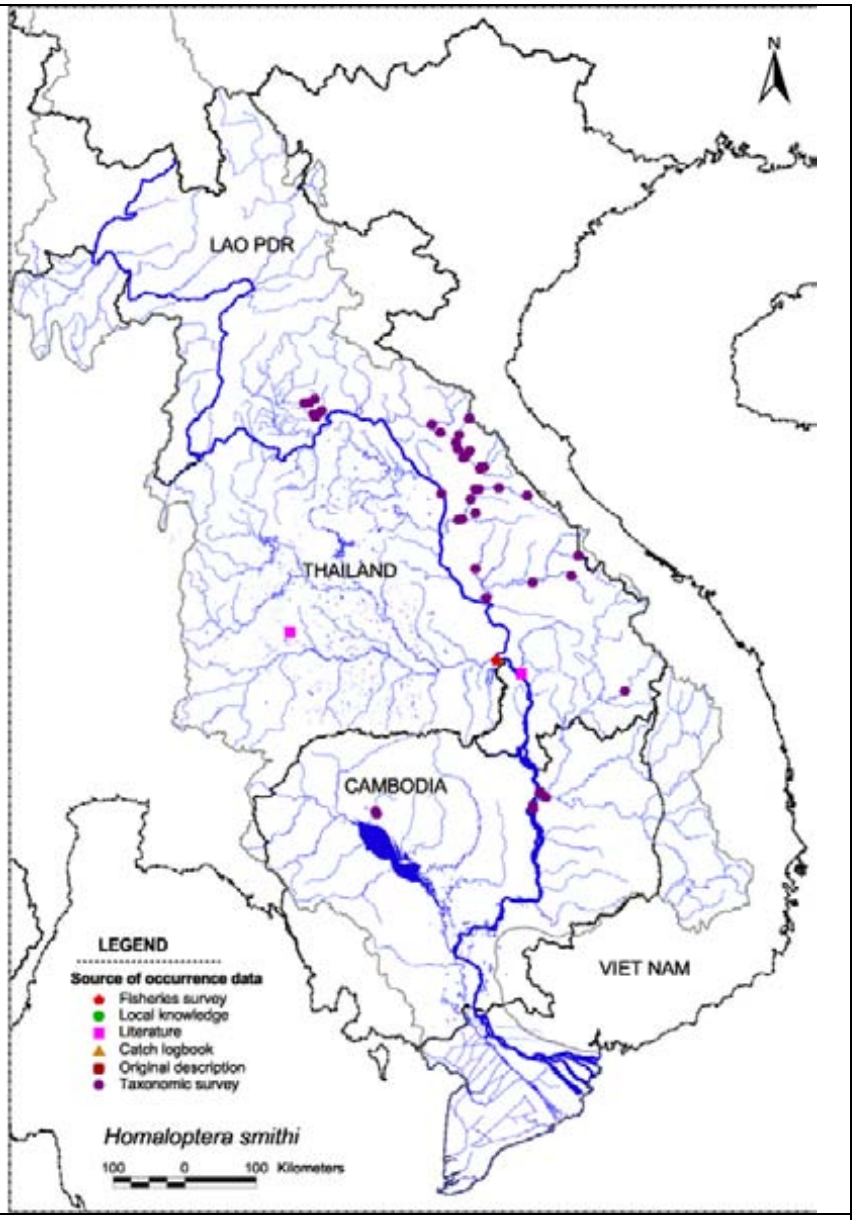
Common Name: Pa kao na; Pa ta say; Pa ta chuan	
Scientific Name	*Sikukia gudgeri*
Status	Indigenous
Summary	An omnivorous species which is found basin wide in large upland rivers; Caught with trawls and haul seines; Marketed fresh.
Habitat	Always found in flowing water in large upland rivers usually occurring very near the bottom of the channel over sand substrate.
Feeding	Strains sand for detritus, diatoms, algae, worms, and other organisms; The gut often contains sand that may be swallowed inadvertently; Feeds on e arthworms, green leaves, and forest fruits; Algae and aquatic plants.
Migration	This fish migrate in large quantities up from Cambodia to Lao PDR in January-February, it enters small and medium sized streams in June-July and returns to large rivers in November-December; It probably enters inundated areas to feed on vegetation during the high-water season.
Spawning	It spawns in July-August.
Fisheries	Taken in large numbers by trawls and haul seines in the Middle Mekong along the Thai-Lao border; Also with cast-net, gill-net, Lee trap, and Tone trap.
Disposal	Usually sold fresh in the market at Stung Treng.
Mekong Distribution	Found basin wide in the mainstream of the Mekong; Recorded from the Xe Bangfai Basin.
Global Distribution	Found in the Mekong and Chao Phraya basins.

Occurrence Map	
Source	Mekong River Commission, 2003

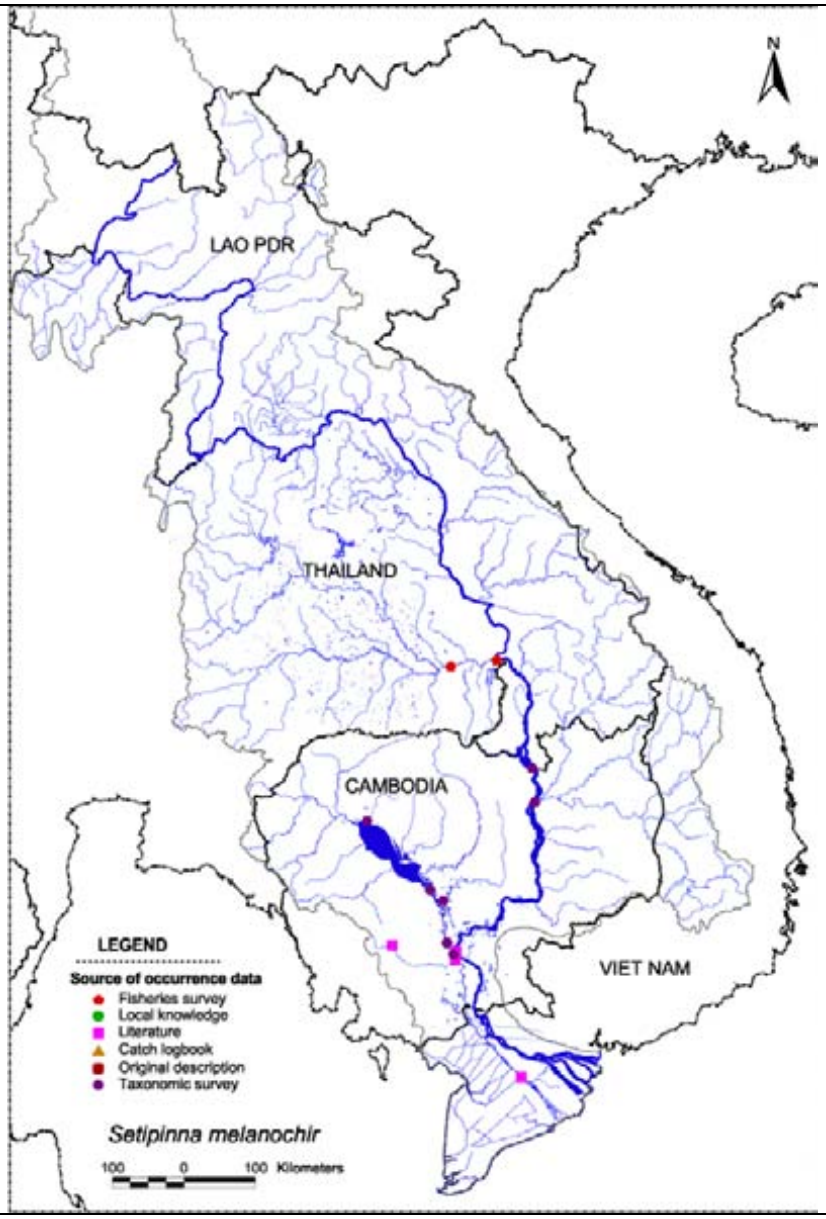
Common Name: Pa hak kuy	
Scientific Name	*Acanthopsoides delphax*
Status	Indigenous
Summary	A small indigenous Mekong species, which occurs in large rivers of the Middle Mekong Basin; It is a benthic species which burrows in mud or sand and feeds on invertebrates; It is not a commercial species and only caught as a bycatch.
Habitat	Inhabits rivers with slow current and muddy to sandy substrate where it probably burrows to avoid predation.
Feeding	Feeds on benthic invertebrates.
Fisheries	Not caught commercially, but is taken with seines and trawls.
Mekong Distribution	Recorded from large river habitats in upland areas of the Mekong Basin on the Khorat Plateau; and from the Xe Bangfai Basin.
Global Distribution	Found in Mekong, Salween, Chao Phraya basins.

Occurrence Map	
Source	Mekong River Commission, 2003.

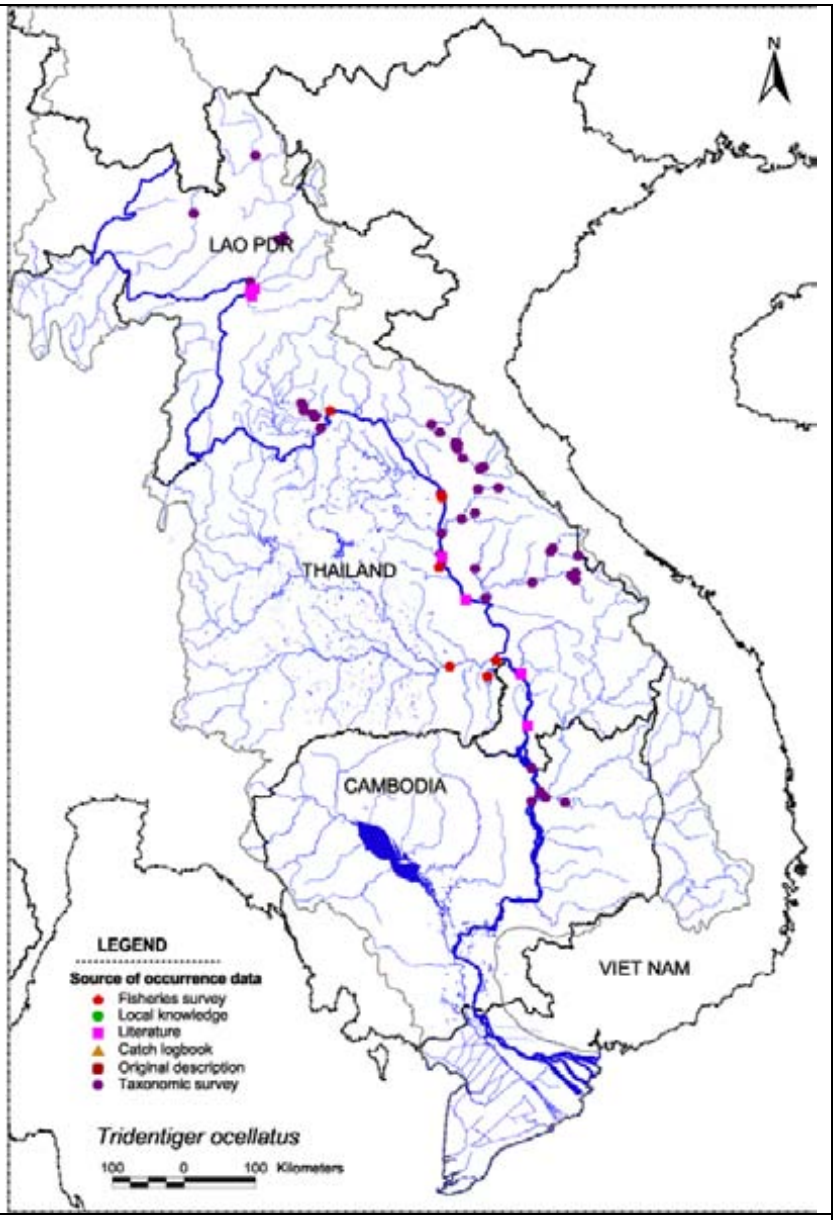
Common Name: Pa tit hin; Pa pik	
Scientific Name	*Homaloptera smithi*
Status	Indigenous
Summary	Found in high gradient streams and rapids with hard bottom where it mainly feeds on i nsect larvae; Caught with various nets; With some potential for the aquarium trade.
Habitat	Adults are found in high gradient streams over fast bedrock, cobble runs, and rapids, and juveniles occur in slower stretches of gravel and exposed tree roots.
Feeding	Feeds on aquatic insect larvae, particularly odonatans; Plants and algae.
Migration	Probably makes relatively limited seasonal movements.
Fisheries	Caught with seines, dip nets, and possibly cast-nets.
Disposal	Not fished commercially, but has some potential for the aquarium trade.
Mekong Distribution	Found in running waters of the Mekong Basin; including the Xe Bangfai and Nam Theun basins; .
Global Distribution	Found in the Mekong Basin and is also known from the Malay Peninsula.

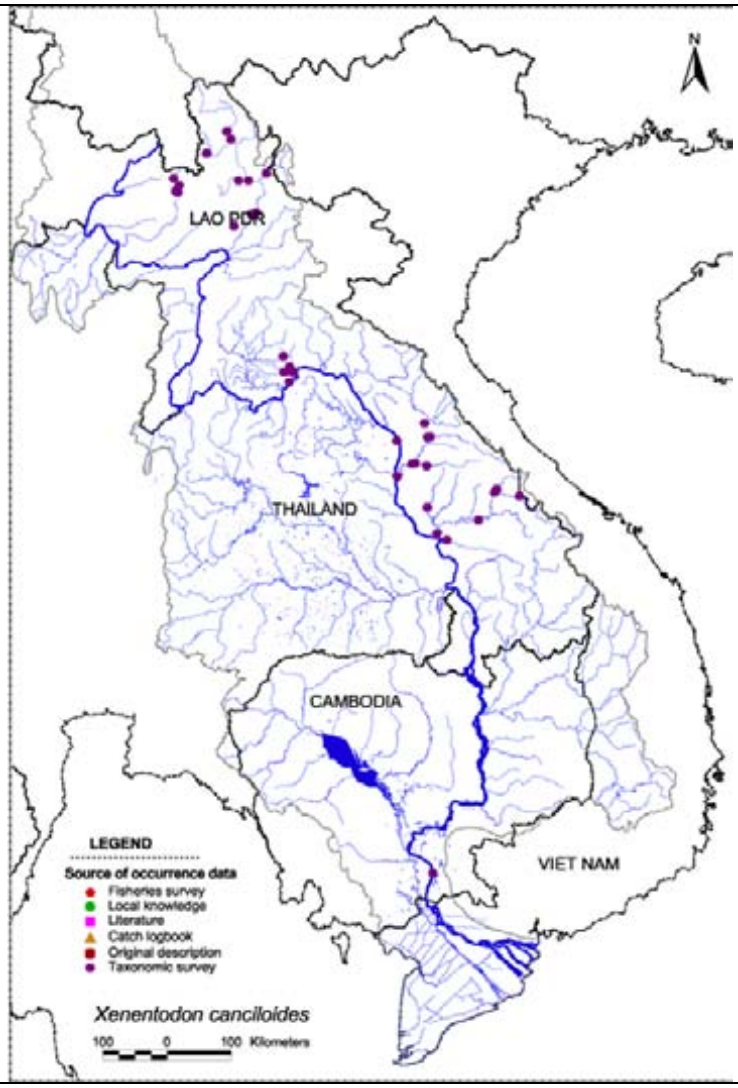
Occurrence Map	
Source	Mekong River Commission, 2003.

Common Name: Pa meo	
Scientific Name	*Setipinna melonochir*
Status	Indigenous
Summary	A common carnivore which occurs in the Mekong, as far upstream as Thailand; Caught with nets and traps and processed into fish paste.
Habitat	Found in large rivers up to 210 km from the sea, but it is not known if these are permanent freshwater populations or migrants from the sea.
Feeding	Primarily feeds on insect larvae and small fishes.
Migration	A white fish species.
Fisheries	At least small numbers occur in artisanal river and lake fisheries, where it is taken with seine, set-net, traps, cast-net and gill net.
Disposal	Used to make Prahoc.
Mekong Distribution	Common in the Mekong, as far upstream as Thailand; Mekong Basin in Laos downstream of Khone falls, Cambodia and Viet Nam; Becomes abundant in the Middle Mekong when the water levels rise and turbidity increases.
Global Distribution	Known from the Western Central Pacific: Thailand south to Java, including rivers, e.g., the Chao Praya in Thailand and the Rokan, Kapuas and Barito in Indonesia; Mekong and Chao Phrya Basins.

Occurrence Map	
Source	Mekong River Commission, 2003

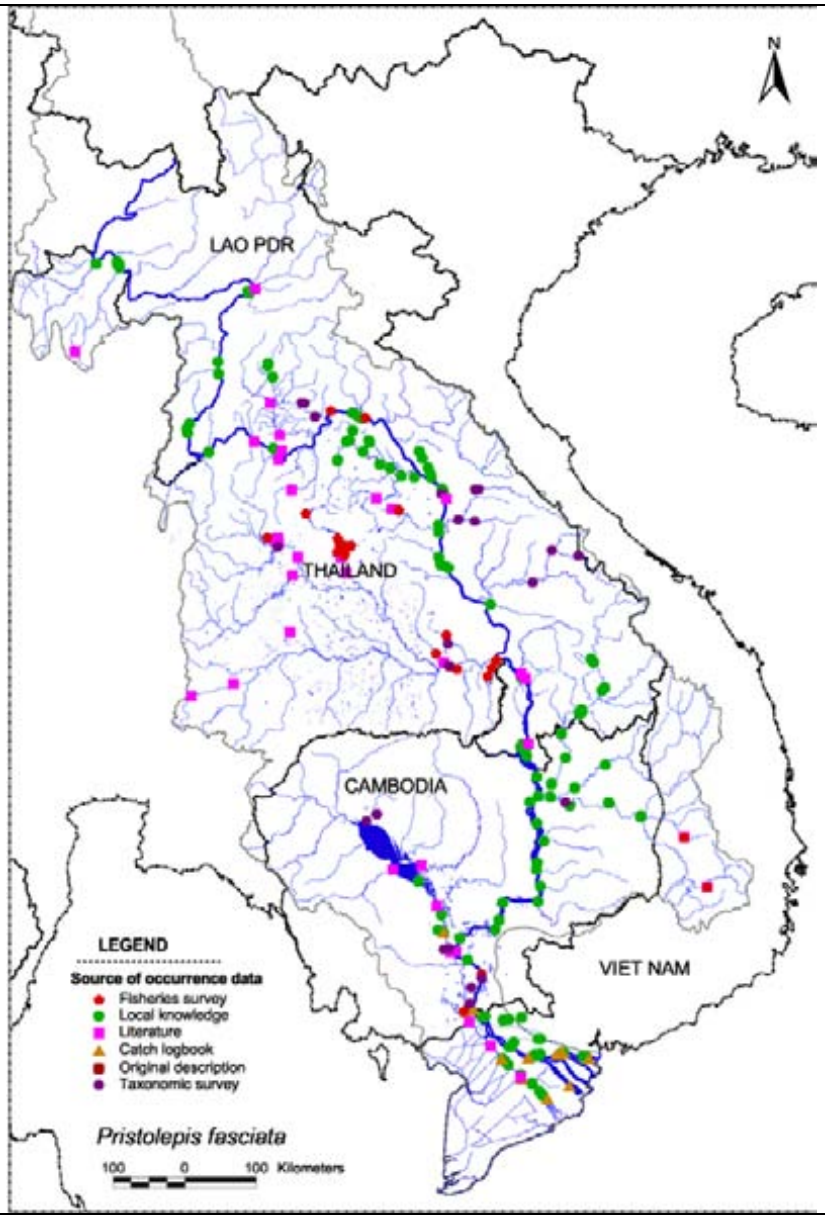
Pa bu; Pa sai beu ban	
Scientific Name	*Papuligobius ocellatus*
Status	Endemic
Summary	An endemic carnivore found in freshwater reaches of the Mekong and tributaries; Occasionally marketed; Caught with nets and traps.
Feeding	Feeds on insects and zooplankton.
Fisheries	Caught with seines, cast-nets, and traps.
Disposal	Occasionally marketed mixed with other species.
Mekong Distribution	Found in freshwater reaches of the Mekong, including upstream from Khone Falls along the Thai-Lao border; Recorded from the Xe Bangfai and Nam Theun basins.
Global Distribution	Mekong endemic.

Occurrence Map	
Source	Mekong River Commission, 2003.

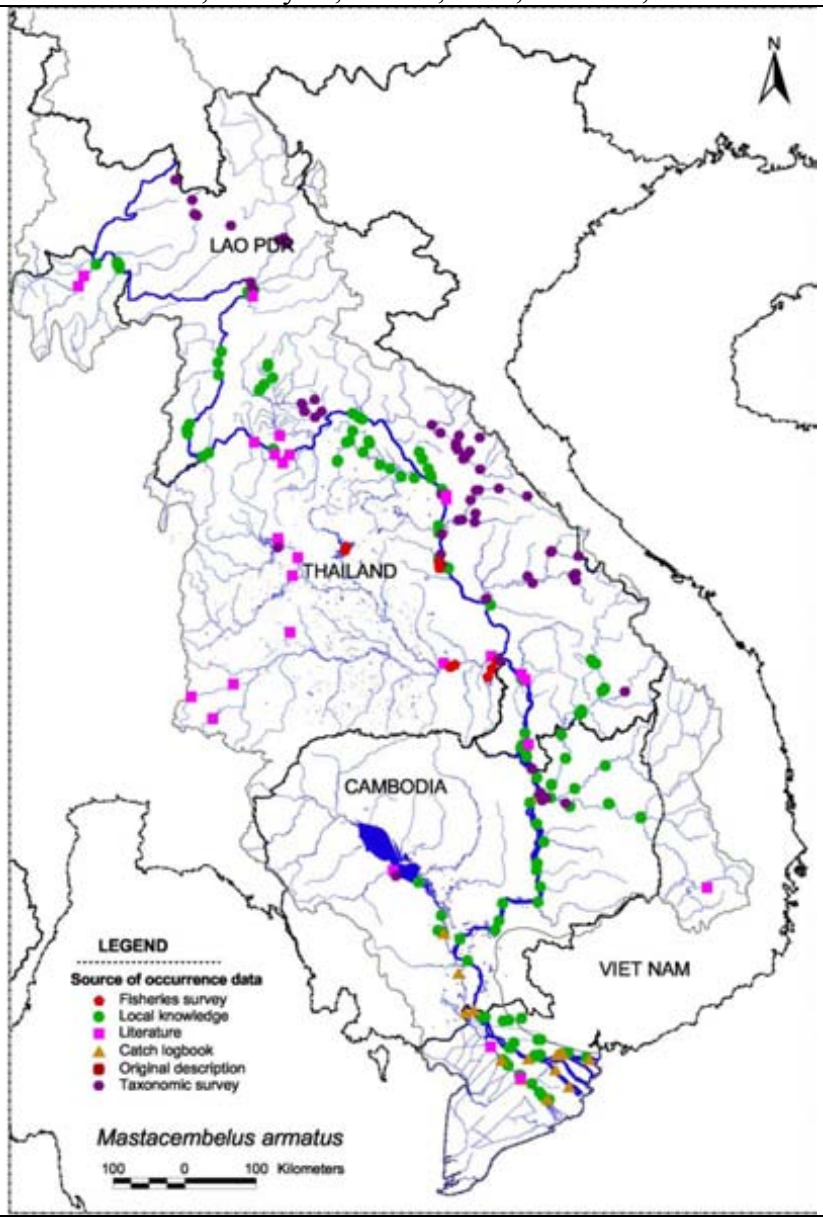
Common Name: Not available	
Scientific Name	*Xenentodon canciloides*
Status	Indigenous
Summary	A medium sized surface orientated species which can be found in both flowing and standing waters.
Habitat	Found at the surface in flowing and non-flowing waters.
Disposal	Not seen in Cambodian markets.
Mekong Distribution	Mekong Basin in Laos, Thailand, Cambodia and Viet Nam.
Global Distribution	Found from Thailand and the Mekong to Indonesia.
Occurrence Map	
Source	Mekong River Commission, 2003.

Common Name: Pa ga; Pa ee bpaa; Pa xang yeup; Pa ga dteup; Pa e	
Scientific Name	*Pristolepis fasciata*
Status	Indigenous
Summary	A small omnivorous species which is widely distributed in the Mekong mainstream and tributaries; It prefers slow current or standing water and adapts well to reservoirs; It moves seasonally between permanent water bodies and the floodplain; It spawns throughout the rainy season and all the year in reservoirs; It is important in the fisheries and has potential as an aquaculture species.
Habitat	Found in slow or standing waters, with logs or dead trees at the bottom; Also reservoirs; The species is more common in permanent lakes than in the main river; However it has been reported to inhabit deep pools in the main stream at least part of the year; It is frequently found in areas with a lot of aquatic and submerged terrestrial vegetation; It is mainly benthic, but also occupies the pelagic zone while feeding.
Feeding	Feeds on filamentous algae, submerged land plants, fruits, and seeds, periphyton on s ubmerged vegetation; Insects, aquatic insects, crustaceans, including shrimps; Zooplankton; Earthworms, juvenile gastropods, and small gastropods, other benthic organisms, and fish.
Ecology	It has upper and lower palatal tooth plates which it uses to grind coarse or shelled food organisms; Feeding activity peaks at 6 AM and reaches a minimum at 10 PM. It is a demersal or semi-pelagic species and probably short-lived.
Migration	A black fish species; Enters smaller streams and floodplains at the onset of the floods. These movements are triggered mainly be changes in water levels.
Migration Record	Displays Longitudinal as well as Lateral migrations.
Spawning	Eggs were reported from March to October with a peak from April to June, and it spawns from June to August or September in the Mekong; and March to September in the Maeklong; In reservoirs it spawns at almost any time of the year with a peak spawning probably takes place in the wet-season months ; May to June or from May to August; In reservoirs it spawns at the inlet, and it has a preference for submerged leafy vegetation. According to some reports eggs are sticky, large and yolky, others state that they are floating or pelagic with a diameter of

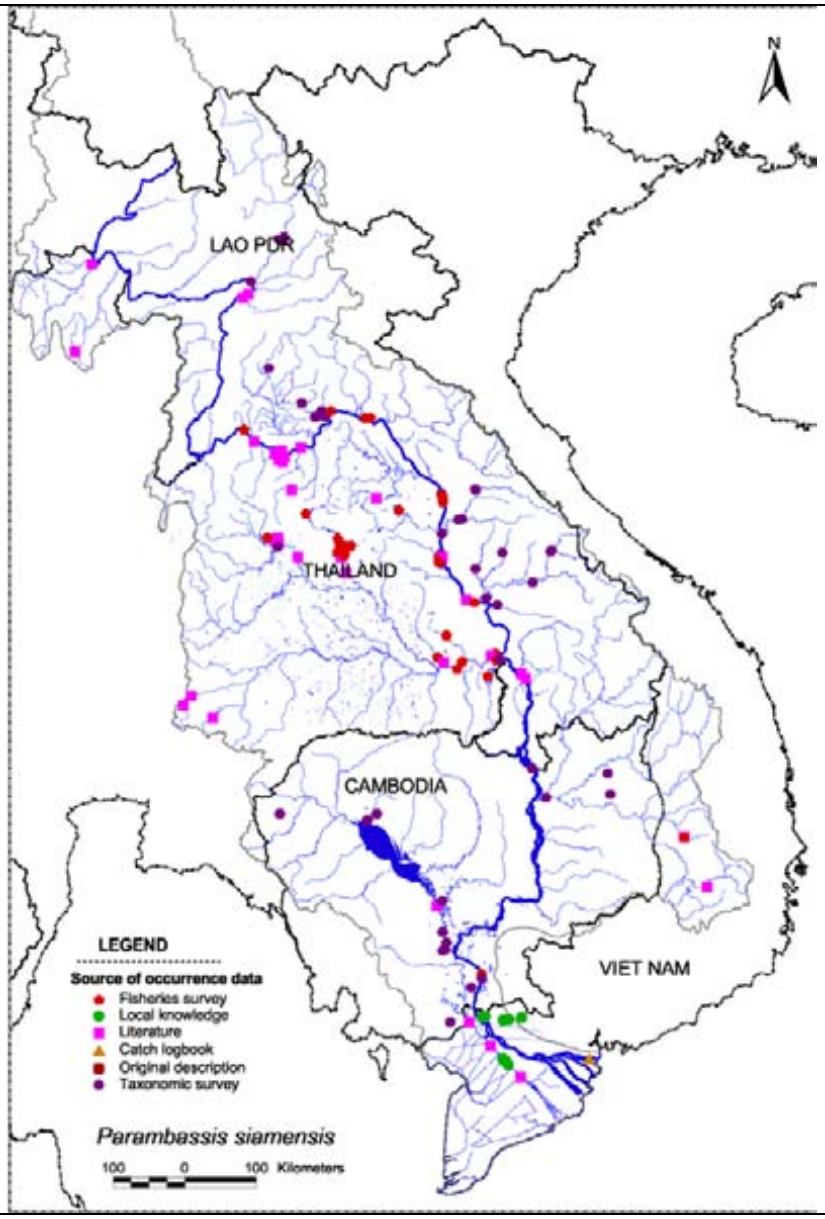
	0.6-0.8 mm , H atching occurs after around 22 hr at 28-29ºC; The size of larvae at hatching is around 2.5 mm in total length. Females attain sexual maturity around 7-10 cm total length; Females 10-18 cm long and weighing 15-80 g contain around 20,000 eggs; Fish measuring 14.0-20.0 cm have 5,476-34,441 eggs with a diameter of 0.85-0.95 mm.
Fisheries	Caught with seines, lift-nets, dip-nets, gill-nets, and set-nets; Worms, prawns, crickets and grasshoppers are used as bait when angling for this fish; In Srinakarine Reservoir, the maximum catch, in 1979, was 140 tons, which reduced to 49 tons in 1990; In Ubolratana Reservoir, the catch was the catch was 21,383 kg in 1971 and 337 kg in 1978, at present, although the fish exist in the reservoir, the catch is not recorded.
Disposal	Not a high-priced commercial species, but is important in local markets in the areas where it is abundant. Marketed fresh ; The flesh is bony, but has a good flavour, but is generally regarded as inferior to that of Anabas testudineus.
Aquaculture	Widely distributed species that is not known to impact on other species. May be of some potential use, but slow growth may be its main disadvantage. Probably would adapt to a wide range of diets.
Mekong Distribution	Occurs throughout the mainstream from Chiang Saen to the Mekong Delta; and in tributaries; Recorded from the Xe Bangfai Basin; Larvae/juveniles have been recorded from the drift in both the Mekong and Bassac Rivers in An Giang.
Global Distribution	Found from China and Myanmar to Indonesia and the East Indian islands; Recorded from the Mekong and Chao Phraya Basins.

Occurrence Map	
Source	Mekong River Commission, 2003

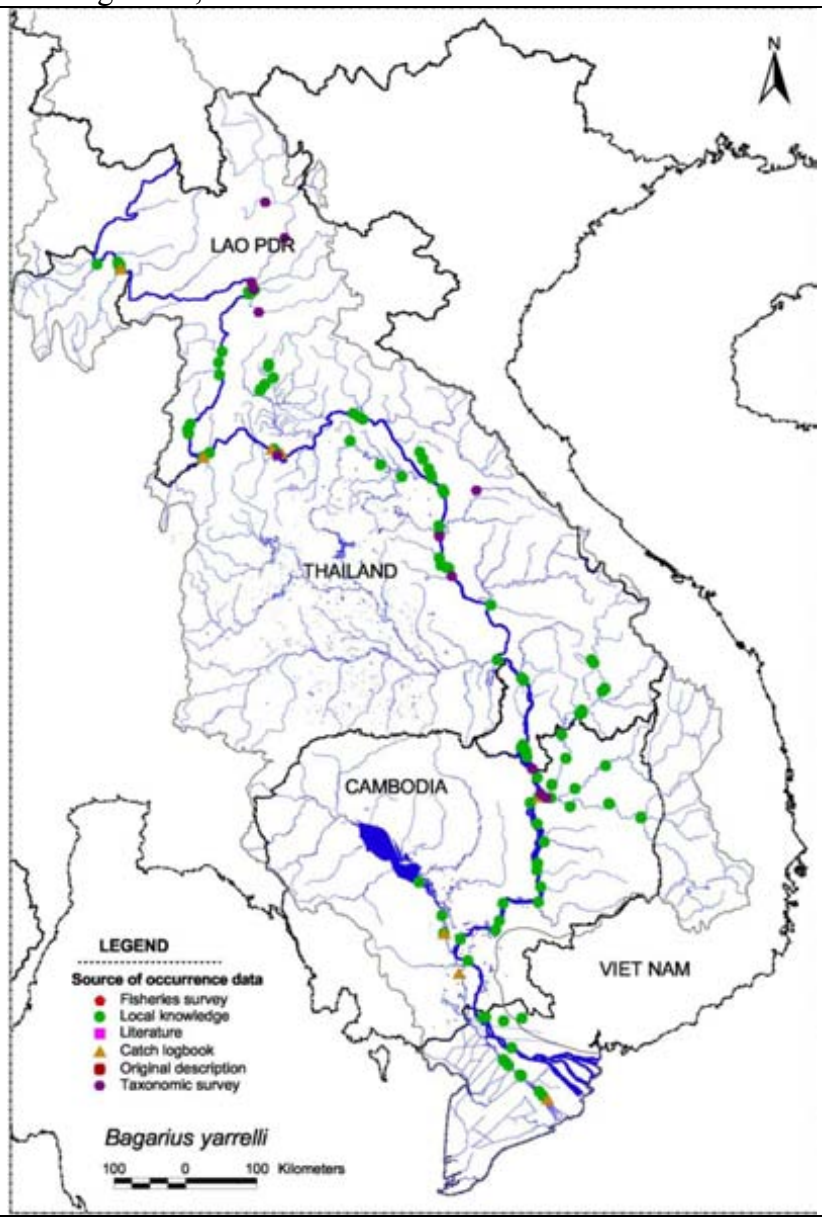
Common Name: Pa lat	
Scientific Name	*Mastacembellus armatus*
Status	Indigenous
Summary	A night active omnivore, which does not show systematic movements; Occurs from Chiang Saen to the Lower Mekong Delta; Stays in rocky parts of the mainstream during the dry season, some individuals may move into inundated areas to feed during the flood season; Spawns at the onset of the flood; Marketed fresh and is used in the aquarium trade; Caught with seines, traps, and hook-and-line.
Habitat	Found in running streams near waterfalls where the bottom is sandy; It has very strict habitat requirements (at least to its dry season habitat). In the dry season it is only found in the main river in areas with a rocky bottom, where it lives in crevices and under rocks, but it enters canals, lakes and other floodplain areas during the flood season; It is reported to inhabit deep pools at least part of the year; Occasionally found in reservoirs.
Feeding	Feeds on fishes and insects, benthic insect larvae, worms, and some submerged plant material .
Ecology	Sometimes rests partially buried in fine substrates, and forages at night.
Migration	t is a non-migratory or at least relatively stationary species, which performs only short local migrations; however during the flood season part of the population moves to floodplain habitats in the vicinity of the dry season refuges mainly to feed.
Migration Record	Displays Longitudinal as well as Lateral migrations.
Spawning	Has developed eggs all the year with a peak in April-June; Was reported to spawn in a whirlpool in April – May, where the eggs stuck to filamentous algae in the whirlpool; It was however also reported to spawn in rice fields. The eggs have a diameter of 1.8-1.9 mm.
Fisheries	Caught with seines, traps, and by hook -and-line; and in the dry season there is a s pecialised fishery for this species (and other Mastacembelus spp.) with longlines and set hook and line baited with earthworm.
Disposal	Marketed fresh and frequently seen in the aquarium trade.
Mekong Distribution	The species occurred at all mainstream stations from Chiang Saen to the Lower Mekong Delta, and at many stations it occurs all the year. The level of abundance, however, is very variable, even between

	closely situated stations. In Cambodia south of Kratie fishers indicate that it is a rare species; Larvae/juveniles have been recorded from the drift in both the Mekong and Bassac Rivers in An Giang;
Global Distribution	Found from Sri Lanka to Indonesia; Pakistan through Thailand to southern China, Malaysia, Burma, Laos, Vietnam, and Cambodia.
Occurrence Map	
Source	Mekong River Commission, 2003

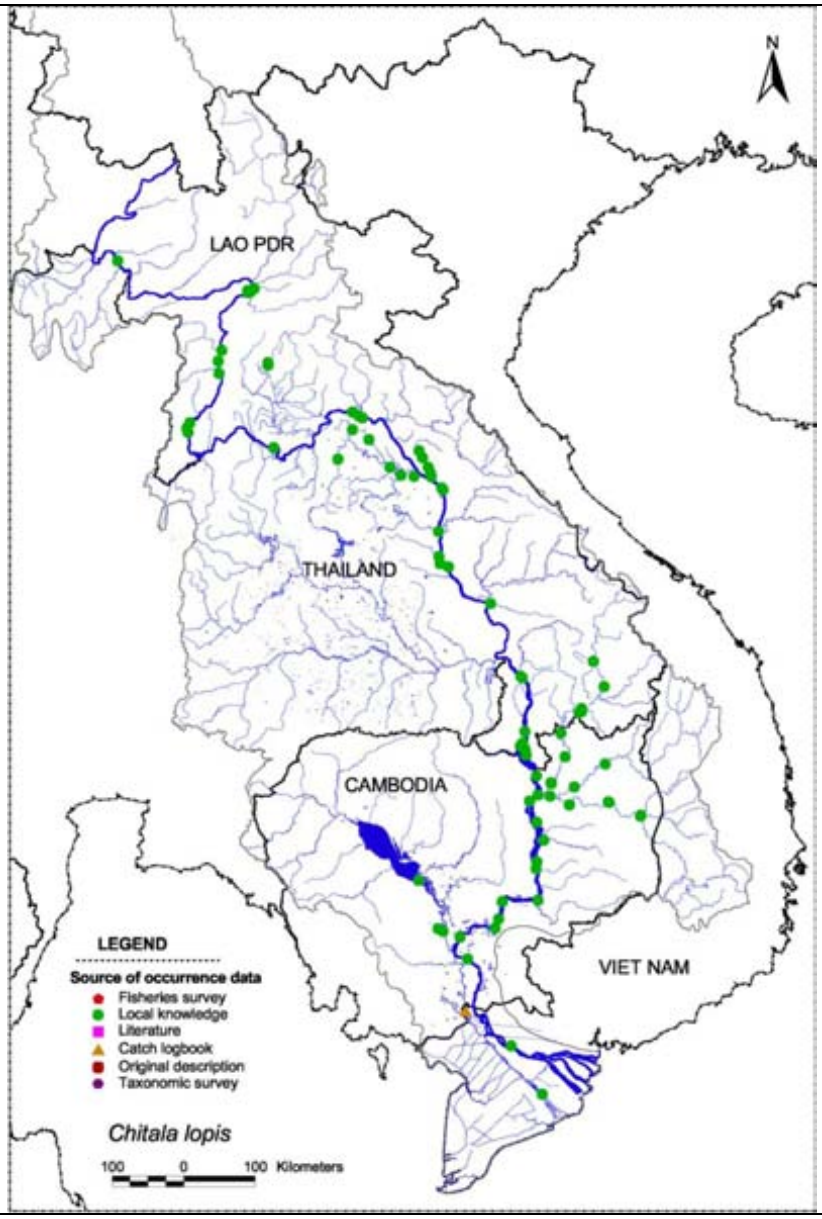
Common Name: Pa khap kong	
Scientific Name	*Parambassis siamensis*
Status	Indigenous
Summary	A carnivorous species, which is found in sluggish and standing water including reservoirs in the Middle and Lower Mekong Basin; Sold for food and used in the aquarium trade; Caught with various nets and traps.
Habitat	Found in sluggish and standing water.
Feeding	Feeds on invertebrates.
Ecology	A common species proliferating in impoundments.
Fisheries	Caught with seines, traps, lift-nets, cast-nets, and set-nets.
Disposal	Used mostly by artisanal and subsistence fishermen; Occasionally seen in markets and often found in the aquarium trade.
Mekong Distribution	Found in the Middle and Lower Mekong Basin; mainly in tributaries; Larvae/juveniles have been recorded from the drift in the Mekong River in An Giang.
Global Distribution	Found throughout most of mainland Southeast Asia; Found in the Mekong Basin and in lowland rivers throughout Thailand, the Malay Peninsula and Java, Indonesia.

Occurrence Map	
Source	Mekong River Commission, 2003

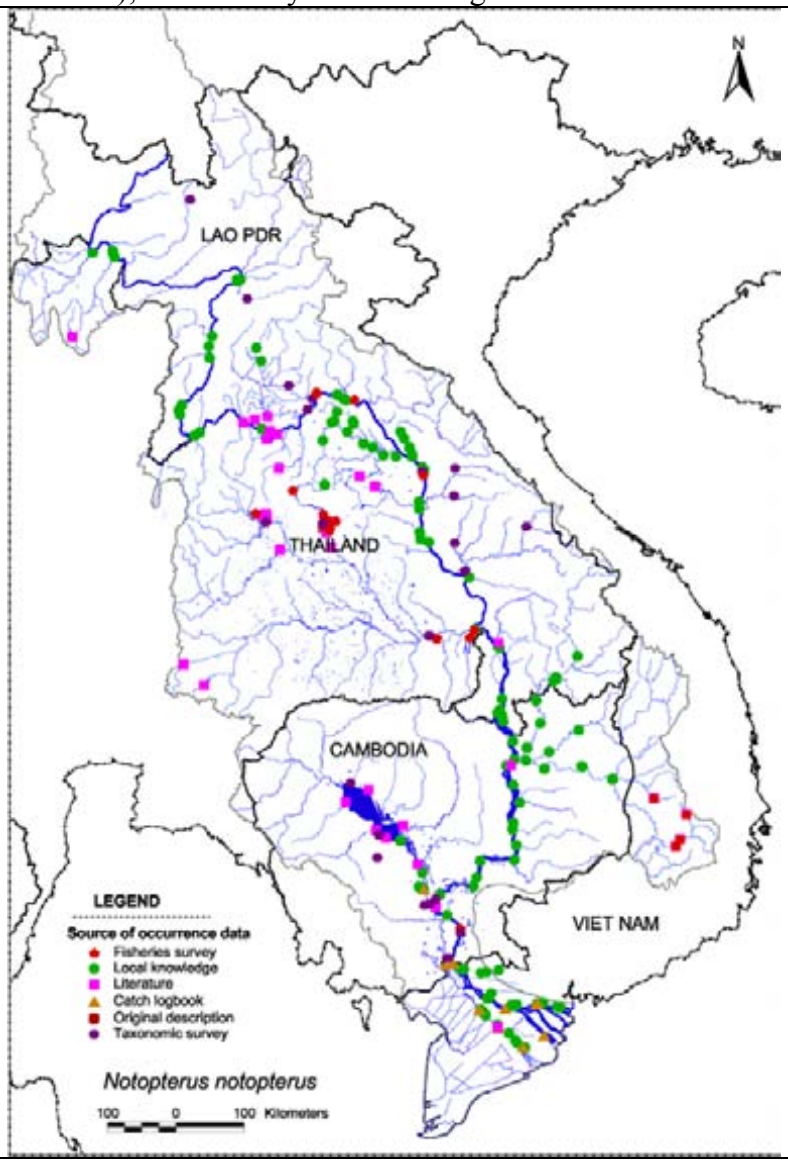
Common Name: Pa kaa	
Scientific Name	*Bagarius yarrelli*
Status	Indigenous
Summary	A carnivorous species which is widely distributed in the freshwater part of the Mekong mainstream and in some large tributaries where it has a preference for rocky areas with strong current; It undertakes only short migrations and mainly for food, and probably spawns over a long period with a peak at the beginning of the flood; It is an important food fish caught with various gears.
Habitat	It is found in large rivers where it likes to stay near the bottom in rocky areas with strong current, where it is found among boulders, often in the white water of the rapids (Ref. 6868), it inhabits seasonally inundated riverine habitats in the high-water season, but probably does not go far into the flood zone; It is reported to inhabit deep pools in the mainstream at least part of the year.
Feeding	Feeds primarily on prawns but will take small fishes and aquatic insects, earthworms, and crabs; It also scavenges and may take some detritus.
Ecology	Rests on the bottom, even in swift currents; Some fishers report that the fish migrate to follow its prey. It is a nocturnal species.
Migration	The species is not highly migratory; however it does migrate upstream for dispersal and feeding during the wet season; it migrates in schools, and it was mentioned that it follows Catlocarpio siamensis during its upstream migration. Below the Khone Falls the fish is migrating upstream from October to February and downstream from April to September. Upstream from the Khone Falls the fish migrates upstream in the period from March to August. The main migration apparently starts close to peak flood when the current is very strong and the water is still turbid. Downstream migration in this area takes place from October to December. It was reported that the fish is fatter during its downstream migration.
Migration Record	Only seems to display Longitudinal migrations.
Spawning	Only very rarely do fishers see this fish in reproductive condition at any time of the year; The eggs are brown and semibouyant and occur from April to September and mostly from June-July, however, juveniles of only 2 cm in length are seen all the year, and that indicates that the spawning period is more protracted than the data for occurrence of eggs show; Spawns in rivers before the rainy season.

Fisheries	It is taken by hook-and-line as well as by seines or gill-nets. In some parts of its range it is taken incidentally by s port fishermen who consider it a nuisance because of its tendency to break tackle; It was the fourth most important fish species by weight in catches with large meshed gillnets at Ban Hang Khone.
Disposal	Seen at several markets along the Mekong where it is marketed fresh; It is a highly esteemed food fish in Thailand.
Mekong Distribution	Occurs in the Mekong mainstream from Chiang Saen to the Mekong Delta except for the southernmost part, however most common in the reaches from Kratie and upstream; also reported from the Xe Bangfai basin.
Global Distribution	Found in large rivers from peninsular India to Indonesia; Indus and Ganges drainages, most of southern India east of the western Ghats, Mekong Basin, to Indonesia.
Occurrence Map	
Source	Mekong River Commission, 2003

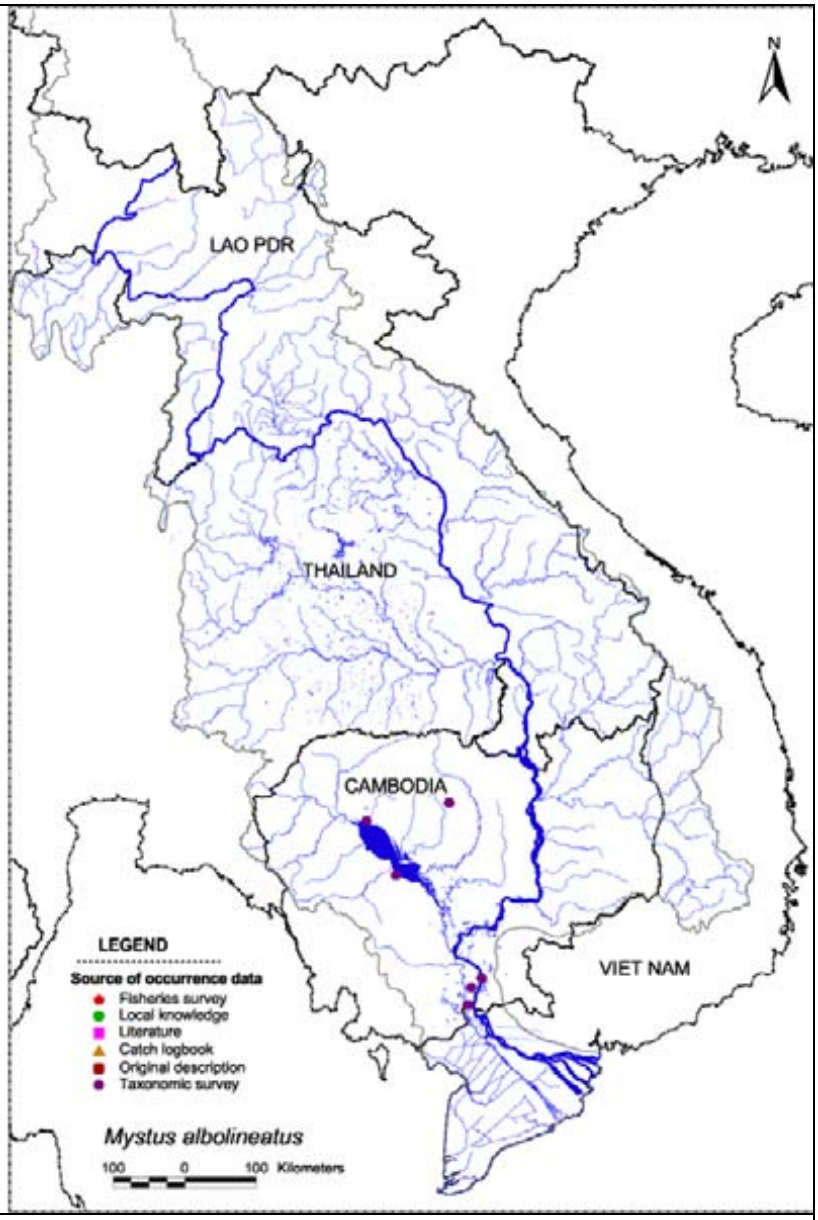
Common Name: Sa tue	
Scientific Name	*Chitala lopis*
Status	Indigenous
Summary	A rare night active piscivore mainly found in permanent upland swamps between Khone Falls and Kratie; Caught with various gears.
Habitat	It is mainly found in permanent swamps in the upland area; However it is also reported to inhabit deep pools in the mainstream at least part of the year.
Feeding	Piscivorous.
Ecology	Probably has a crepuscular or nocturnal activity pattern.
Fisheries	Caught by hook-and-line, cast-nets, gill-nets, and seines.
Mekong Distribution	Found most often in the upland area from Khone Falls to Kratie, and is not known from the Great Lake; but is also known from Thailand.
Global Distribution	Known from Borneo, Sumatra and Java in Indonesia, Malaya, and Thailand; Mekong and Chao Phraya Basins.

Occurrence Map	
Source	Mekong River Commission, 2003

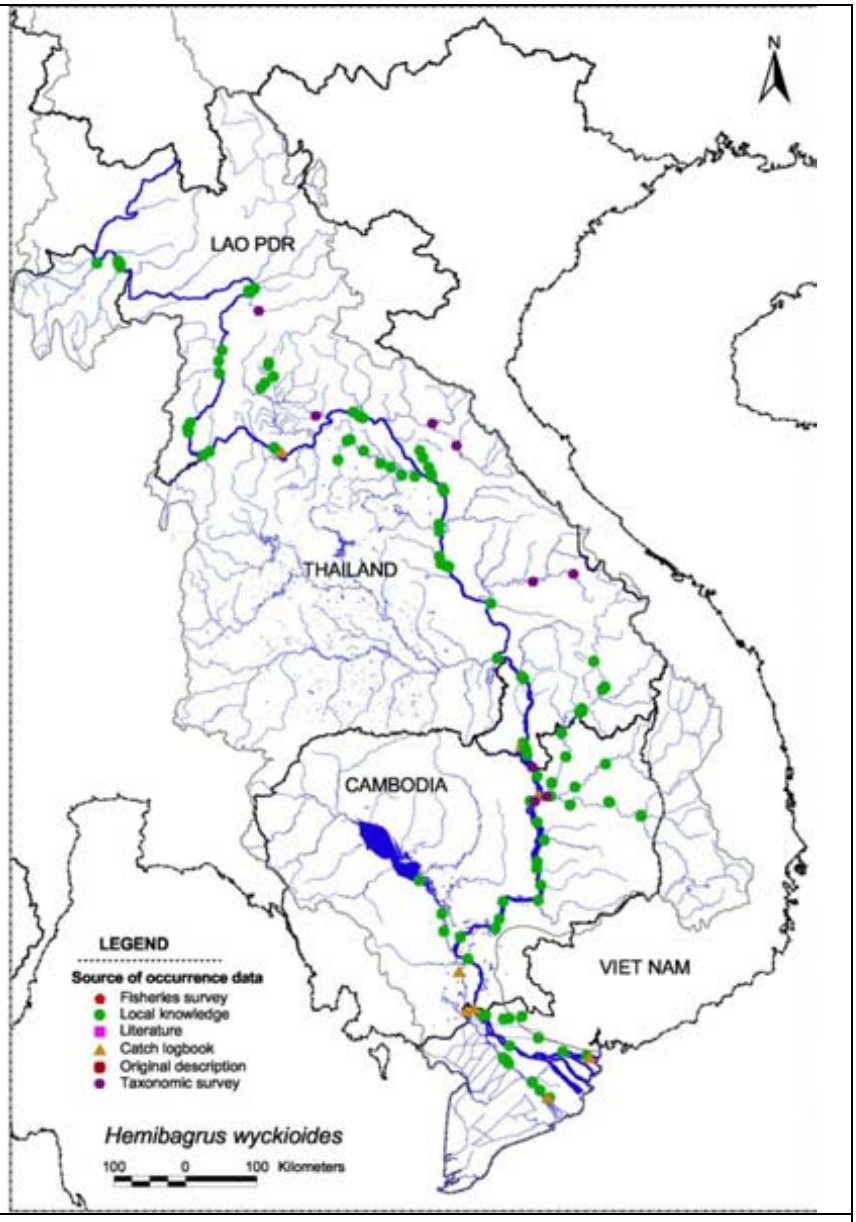
Common Name: Pa tong na; Pa tong noi; Pa tong	
Scientific Name	*Notopterus notopterus*
Status	Indigenous
Summary	An crepuscular, omnivorous species found in standing and sluggish water from the Mekong Delta to at least Chiang Saen; Undertakes localised lateral migrations from the main river to floodplains during the flood season; An important commercial food fish; Caught by seines, lift-nets, weirs, and barrages.
Habitat	Found in moderately shallow waters in large rivers, streams and in standing and sluggish waters of lakes, floodplains, canals, and ponds; In the Lower Mekong it is more common in permanent lakes that in the main river channel; However in the Middle and Upper Mekong it is common in the main river as well as in tributaries, where it lives in pools with submerged woods and shrubs; In the flood season it inhabits the floodplains up to the littoral zone and areas with submerged vegetation mostly found in deep water; in the dry season it may stay in deep pools in the mainstream; It has been reported to enter brackish water.
Feeding	Feeds on insects, shrimps, vegetation, fish, and earthworms, in that order of importance ; and also seeds, crustaceans, young roots of aquatic plants, crabs, molluscs and detritus
Ecology	Most active during the twilight and at night.
Migration	Postulated by Bardach to be a white fish species; It is however closer to his definition of a black fish since the species only undertakes localised lateral migrations from the main river to floodplains during the flood season, and back to the main river or other permanent water bodies during the dry season, however at several places, it is reported to move into tributaries during the flood season.
Migration Record	Displays Longitudinal as well as Lateral migrations.
Spawning	It carries eggs in May and June, and is reported to spawn from May to August; The eggs are laid in small clumps on submerged vegetation in seasonally inundated areas, although it may breed in both riverine and standing water habitats. It is sexually mature at a weight of 50 g; A female measuring 21-25 cm usually lays 1,200-3,000 eggs; 18-23 cm fish have 688-1,211 eggs of 2.1-2.8 mm diameter.
Fisheries	Caught by seines, lift-nets, weirs, barrages, gill net, hook-and-

	line, cast net, Lee trap, and Tone trap.
Disposal	The fish is relished both in fresh and dried state. Soup made from it is reported to be given to people with measles; Large numbers are shipped on ice from fish landings around the Great Lake to markets in Thailand.
Aquaculture	Common in tanks throughout the greater parts of India.
Mekong Distribution	It is distributed throughout the mainstream, from the Mekong Delta to Chiang Saen; and found in tributaries of the Lower Mekong; Also reported from the Lower and Middle Xe Bangfai in Laos; Larvae/juveniles have been recorded from the drift in both the Mekong and Bassac Rivers in An Giang.
Global Distribution	Found in south and southeastern Asia; where it has been recorded from Pakistan, India, Nepal, Bangladesh, Myanmar, Thailand, Malaysia, and Indonesia; Has never been reported in Borneo and is not present in the Red River basin of Tonkin (N. Vietnam); Chao Phraya and Mekong Basins.
Occurrence Map	
Source	Mekong River Commission, 2003

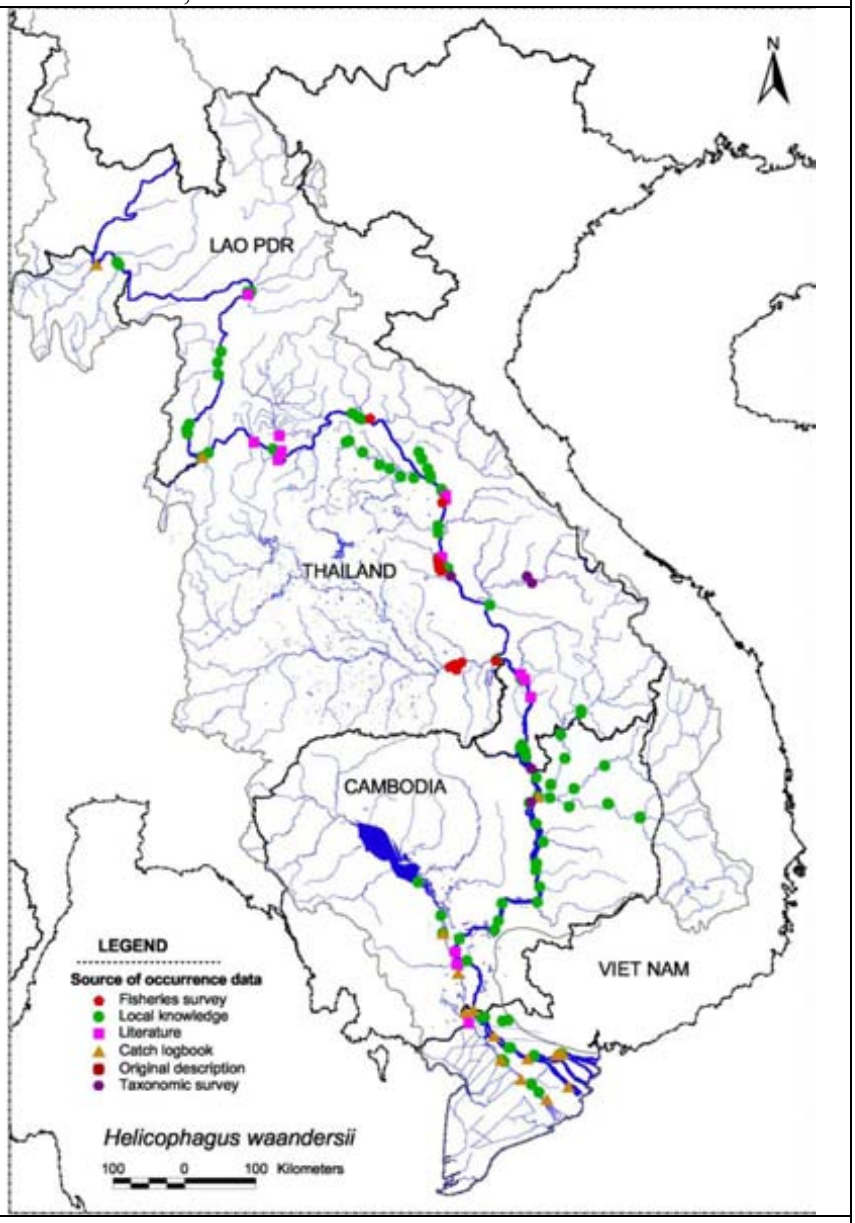
Common Name: Pa ka nyeng ; Pa ka nyeng kho; Pa ka nyeng khang l	
Scientific Name	*Mystus albolineatus*
Status	Indigenous
Summary	An omnivorous species known from flowing and standing waters; Spawns at the onset of the rainy season; Marketed fresh or smoked; Caught with nets and traps.
Habitat	Known from flowing and standing waters especially around submerged woody vegetation.
Feeding	Feeds on i nsect larvae, including chironomids, as well as zooplankton and fishes.
Spawning	Spawns just prior to, or at the onset of the rainy season and its young are first seen in July and August.
Fisheries	Taken with seines, cast-nets, gill-nets, and traps.
Disposal	Marketed fresh or smoked.
Global Distribution	Found in the Mekong, Chao Phraya and Bangpakong basins.

Occurrence Map	
Source	Mekong River Commission, 2003

Common Name: Pa kheang;	
Scientific Name	*Hemibargrus wychioides*
Status	Indigenous
Summary	A carnivorous species, which occurs in large upland and lowland rivers with irregular bottom; It is, at least locally, a migratory fish; It is an important food fish, which is caught with hooks, nets and traps.
Habitat	Occurs most commonly in areas with irregular depths, tree roots, and rocky bottoms.
Feeding	Feeds on shrimp, fish crabs, insects earthworms, and snails.
Migration	Although Bardach indicated that it is a black fish species it has been found to migrate upstream from July-September, it also enters inundated areas; migratory activity is mainly concentrated in early to the mid June and again towards the end of the month. The purpose of the migration seems to be dispersal and feeding, although heavy fat deposits were found around the viscera during the migration period.
Migration Record	Displays Longitudinal as well as Lateral migrations.
Fisheries	Usually caught by hook-and-line, less often by drift gill-nets and seines the hooks are often baited with live spotted algae eaters (Gyrinocheilus pennocki) or walking catfish (Clarias batrachus); It is also one of the most important species in the lee trap fisheries in southern Laos.
Disposal	Commercially high-valued species, which is marketed fresh.
Mekong Distribution	Occurs in large upland rivers and sometimes in the Tonle Sap and floodplain rivers of the Lower Mekong; Recorded from the Nam Theun basin.
Global Distribution	Found in the Salween and Mekong Basins.

Occurrence Map	
Source	Mekong River Commission, 2003

Common Name: Pa na nu; Pa nu; Pa hoi	
Scientific Name	*Helicophagus wanndersii*
Status	Indigenous
Summary	A molluscivorous catfish which occurs basin wide in large rivers; It is migratory and breeds throughout the rainy season; It stays in the mainstream of large rivers throughout the year; It has some importance as a food fish, and is caught with various nets and traps.
Habitat	Found in large rivers. The fish stays in permanent river channels and does not move into flooded forests.
Feeding	Molluscivorous: Feeds almost exclusively on bivalve molluscs .
Migration	Above the Khone Falls migrates upstream during late dry season and/or early flood season; these migrations are relatively short, and the purpose seem to be spawning, although they may also involve migrations for dispersal and feeding by sub-adults. The fish moves downstream as water clears at the end of the flood season. Below the Falls the pattern is opposite with a downstream migration at the onset of the flood season and an upstream migration from the during the dry season. Some populations migrate into major tributaries (e.g. Nam Ngum River and Songkhram River; In Mun River, the species migrates upstream from the beginning of the rainy season to the end of August and move back downstream from late September to November.
Migration Record	Displays Longitudinal as well as Lateral migrations.
Spawning	Eggs occur from March to July with a peak in May June, which probably is the main spawning season is during the period May to June, but may extend until September - October; However the species has also been reported to spawn in January to April. 2-4 cm juveniles have been reported both below (down stream to Can Tho and Dong Thap) and above Khone Falls (upstream to Nong Khai Province).
Fisheries	Caught with seines, gill-nets, cast-nets, and traps; Driftnet; Hook-and-line. Main season from November to July.
Disposal	Marketed fresh.
Mekong Distribution	Found basin wide in the mainstream of the Mekong.

Global Distribution	Found in the Mekong and Chao Phraya basins and also known from Sumatra, Indonesia.
Occurrence Map	
Source	Mekong River Commission, 2003

Common Name: Eel	
Scientific Name	*Monopterus albus*
Status	Indigenous
Summary	Lives on or in holes in the bottom of muddy ponds, swamps, canals and rice fields; It is a bubble nest builder, which spawns during the rainy season; Can burrow deeply into the mud to survive the dry season; Marketed fresh; Caught with hook-and-line, traps and dry-pumping.
Habitat	Prefers standing water especially muddy ponds, swamps, canals and rice fields, where it is found along the bottom and often in holes; has a preference for areas with dense vegetation.
Feeding	Feeds on small animals, crustaceans, and molluscs, and detritus.
Ecology	Can burrow up to 1.5 m down into the mud where it survives dry periods.
Spawning	A bubble nest builder at the water surface near the shoreline during the rainy season.
Fisheries	Taken with hook-and-line, traps, dry-pumping, or bare hands in the rainy season. During the dry season the deepest parts of swamps are excavated to find them.
Disposal	Marketed fresh and can be kept alive for long periods of time as long as the skin is kept moist; Good flesh.
Mekong Distribution	Larvae/juveniles recorded from the drift in the Mekong River in An Giang.
Global Distribution	Found from Myanmar and China to Indonesia; India to China, Japan, Malaysia and Indonesia. Probably occurring in Bangladesh.

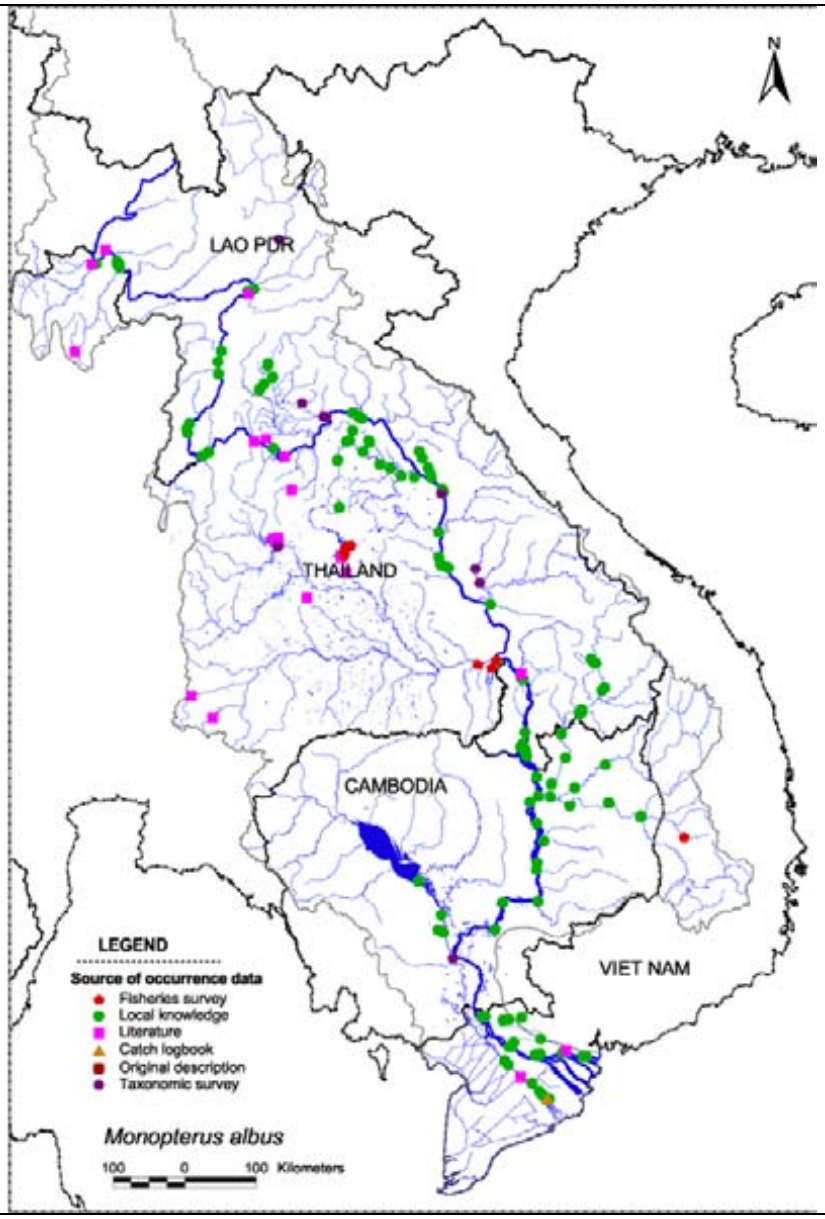
Occurrence Map	
Source	Mekong River Commission, 2003

Figure B-1 Fish found in Nam Ngiep project area

These figures elucidate the fish sampling stations.

Station 1: Ban Piengta

Station 2: Ban Hatsamkhone


Station 3: Ban Pou

Station 4: Ban Houaypamom


Station 5: Ban Sopphuane

Station 6: Sopyouak

Station 7: Ban Hatsaykham

Station 8: Ban Hat Gniun

Station 9: Somseun

Station 10: Ban Pak Ngiep

Figure B-2 Fish sampling

ANNEX C

WATER QUALITY MODELING ASSUMPTIONS AND RESULTS

WATER QUALITY MODELING ASSUMPTIONS AND RESULTS

The EIA study for the NNHP1 project was conducted by EGAT and ERIC. The NEWJEC, an international engineering firm based in Japan, carried out water quality simulations. This included making quantitative predictions of water quality in the main reservoir, as well as along the Nam Ngiep River downstream of the re-regulating dam, in response to requests from EGAT and ERIC.

The analysis of water quality for the EIA studyutilized a numerical simulation model to predict water quality after reservoir creation. In order to model this data, NEWJEC tested the assumptions on a number of reservoirs in Japan.The initial assumptions were verified and calibrated by actual monitoring data. Several assumptions and data input are summarized below.

1 ASSUMPTIONS FOR DEVELOPING THE WATER QUALITY MODEL

1.1 STRUCTURE OF THE MODEL

The water quality model for the Nam Ngiep 1 Project was composed of the following three sections: main reservoir, re-regulation reservoir, downstream river.

Although the accuracy of the one-dimensional model is empirically sufficient for water quality prediction, the two-dimensional water quality model was adopted for the main reservoir because the reservoir of the main dam is quite long and topographically complicated in vertical and longitudinal direction.

One-dimensional models were applied to assess the water quality of the re-regulation reservoir and the downstream river.

1.2 MAJOR FEATURES OF MODEL

Main Reservoir	Modeling the distribution of the water quality variables in the reservoir
- Type	Vertical two-dimensional model
- Governing equations	Continuity equation; Momentum equation; Conservation of heat; Conservation of water quality concentrations; Equations for some components of the dissolved oxygen budget
- Predicted values	Temperature; Suspended Solid; Dissolved Oxygen
Re-regulating Reservoir	Settlement of the suspended solid and organic materials according to the hydraulic retention time, considering reaeration from the atmosphere, heat transfer to and from the atmosphere.

- Type	One-dimensional model
- Predicted values	Temperature; Dissolved Oxygen (Suspended solid (SS) was not predicted conclusively because SS would be trapped and settled in the main reservoir and SS concentration would decrease)
Downstream River	Modeling the transport of water quality variables along the river reaches
- Type	One-dimensional model
- Predicted values	Temperature; Dissolved Oxygen (Suspended solid was not predicted)

1.3 DATA PREPARATION

Geometric data	Topographic maps of reservoirs and downstream river
Meteorological data	- Temperature, humidity, wind speed: observed data in Vientiane (MRC) - Solar radiation: estimated from observed cloud coverage in Nongkhai (Thailand) and Savionv's equation
Stream inflows to the impounded area	- Calculated using Tank Model method (see EIA 5.1.11 Hydrology) - Tributary inflows: Stream inflows from nine major tributaries downstream of the re-regulating dam, were calculated in consideration for basin area of each tributary
Water level	- Main dam: water-surface elevation estimated by reservoir operation model - Mekong River: observed value at Paksan - Downstream zone: estimated by non-uniform analysis
Quality of water coming into the main reservoir	
- Water temperature	The correlating equation was derived from water temperature at the Nam Ngiep River (observed by JICA) and air temperature in Vientiane (MRC). Temperature of inflowing water was calculated from the correlating equation, using the air temperature in Vientiane.
- Dissolved oxygen	DO is oxygen that is fully mixed and saturated in the inflowing water into the reservoir. DO of water coming from tributaries downstream of the re-regulating dam was correlated considering for observed DO (JICA).
- Suspended solids	SS was estimated by the correlating equation, which was derived from measured data of SS (JICA) and inflow into the reservoir. The fine particle size distribution was assumed as 30% for less than 1μm and 10% for 1-5μm of suspended load.

1.4 OTHER MODEL PARAMETERS & ASSUMPTION

Parameters were given with reference to a number of data sources. Similar cases of dam projects were studied in consideration of meteorology factorsincluding the Nam Theun 2 project, and average values widely used in prediction computation were adopted.

Dispersion coefficient	- Longitudinal dispersion coefficient - Vertical dispersion coefficient
Solar radiation	- Light absorption rate at the water surface - Light reflection at the water surface - Light attenuation factor
Dissolved oxygen	- Reaeration coefficient - Photosynthesis by benthic algae - Oxygen consuming rate by decay of organic material - Oxygen consuming rate by t he decomposition at the bottom

1.5 CALIBRATION

Water dynamics as well as a distribution of water quality variables are modeled in the simulation of the main reservoir. Calibration of the two-dimensional model was carried out based on a review of literature regarding the simulation of the existing dam reservoir in Japan. Parameters were based on dam projects situated in similar meteorological conditions, including the adjacent Nam Theun 2 project, and average values widely used in prediction computation.

Simulation of normal dam operation was carried out based on eight years (1991-1998) of hydraulic data;any effects of initial impoundment were not considered. Calculation was conducted on a daily interval.

The outflow from the reservoir of the main dam was used as an input variable for the downstream models (re-regulation dam and river downstream). Parameters were set based on the simulation of the existing dam reservoirs. Calibration of the change in water temperature along the downstream course of the river was conducted using observed data.

2 RESULT OF THE WATER QUALITY MODEL

2.1 WATER LEVEL FLUCTUATION AND WATER QUALITY ON THE DOWNSTREAM RIVER

2.1.1 PREDICTION OF WATER LEVEL FLUCTUATION WITH NON-UNIFORM FLOW ANALYSIS

Non-uniform flow analysis was adapted to estimate various water level fluctuations along the downstream river stretching from the dam site to the Mekong. Two scenarios – without the dam (“before construction”) and with the dam (“after construction”) – were analyzed. In the computation, water level is set as a boundary condition.

2.1.1.1 Monthly fluctuation

Water level of the river, again looking from the dam site to the Mekong, is computed for each month under both dam scenarios mentioned in section 2.1.1 above (Figure C-1). The charts in Figure C-2 show the water level under both scenarios at varying distances from cross-section no. 1.

Class-1	Class-2	Class-3	Class-4	Flow	Case
With/without project	Monthly	Before const.	Jan	79.1 m^3/s	1
			Feb	66.6 m^3/s	2
			Mar	57.9 m^3/s	3
			Apr	66.6 m^3/s	4
			May	118.1 m^3/s	5
			Jun	209.6 m^3/s	6
			Jul	289.1 m^3/s	7
			Aug	327.4 m^3/s	8
			Sep	252.3 m^3/s	9
			Oct	143.9 m^3/s	10
			Nov	113.7 m^3/s	11
			Dec	92.5 m^3/s	12
		After const.	Jan	126.6 m^3/s	13
			Feb	121.2 m^3/s	14
			Mar	115.0 m^3/s	15
			Apr	127.7 m^3/s	16
			May	154.6 m^3/s	17
			Jun	160.5 m^3/s	18
			Jul	189.5 m^3/s	19
			Aug	222.7 m^3/s	20
			Sep	215.5 m^3/s	21
			Oct	142.9 m^3/s	22
			Nov	122.1 m^3/s	23
			Dec	125.8 m^3/s	24

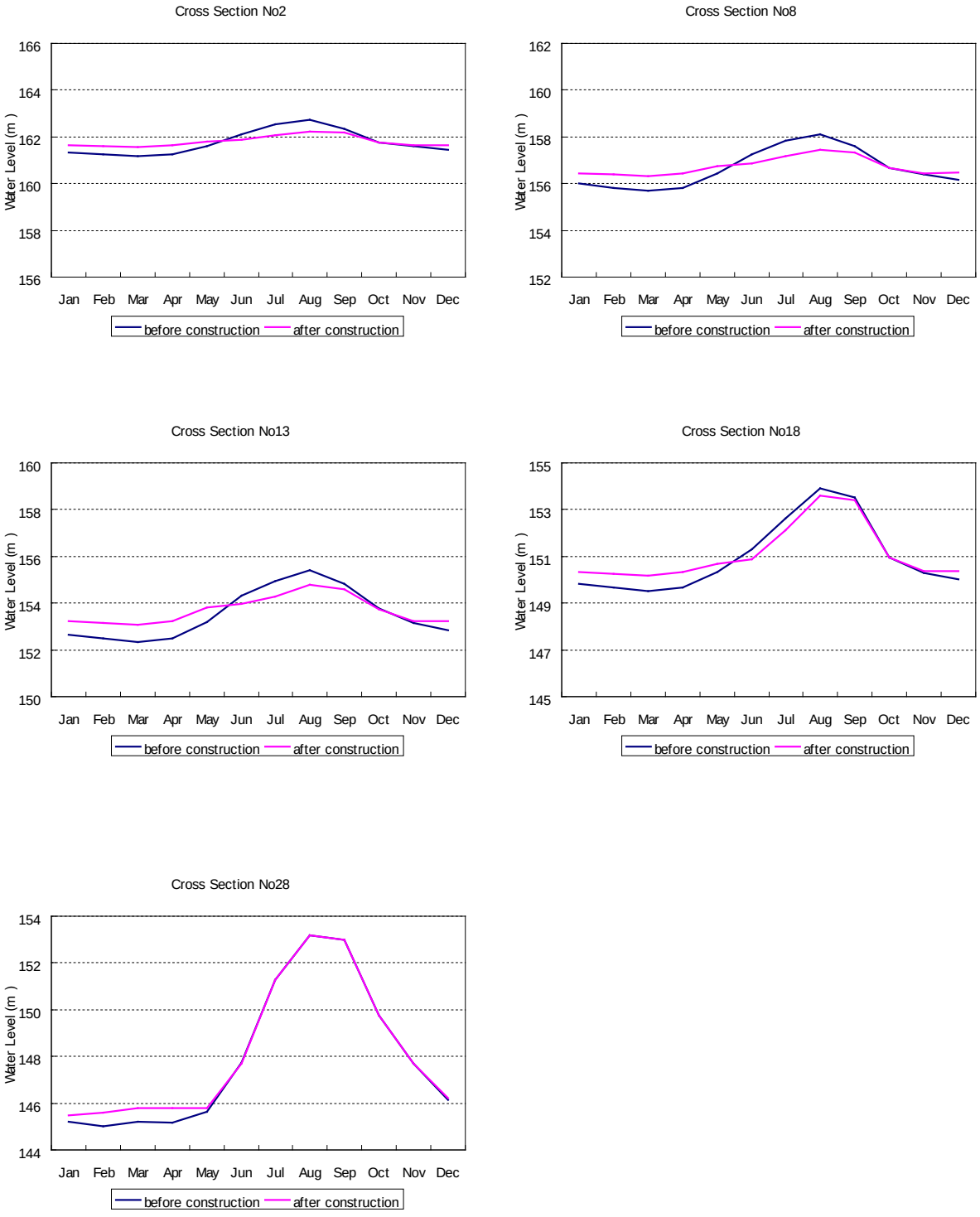
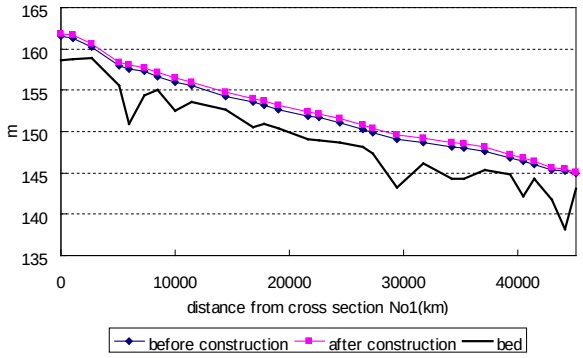


Figure C-1 Prediction of seasonal water levels with and without the dam (at representative points)

Jan



Feb

Mar

Apr

May

Jun

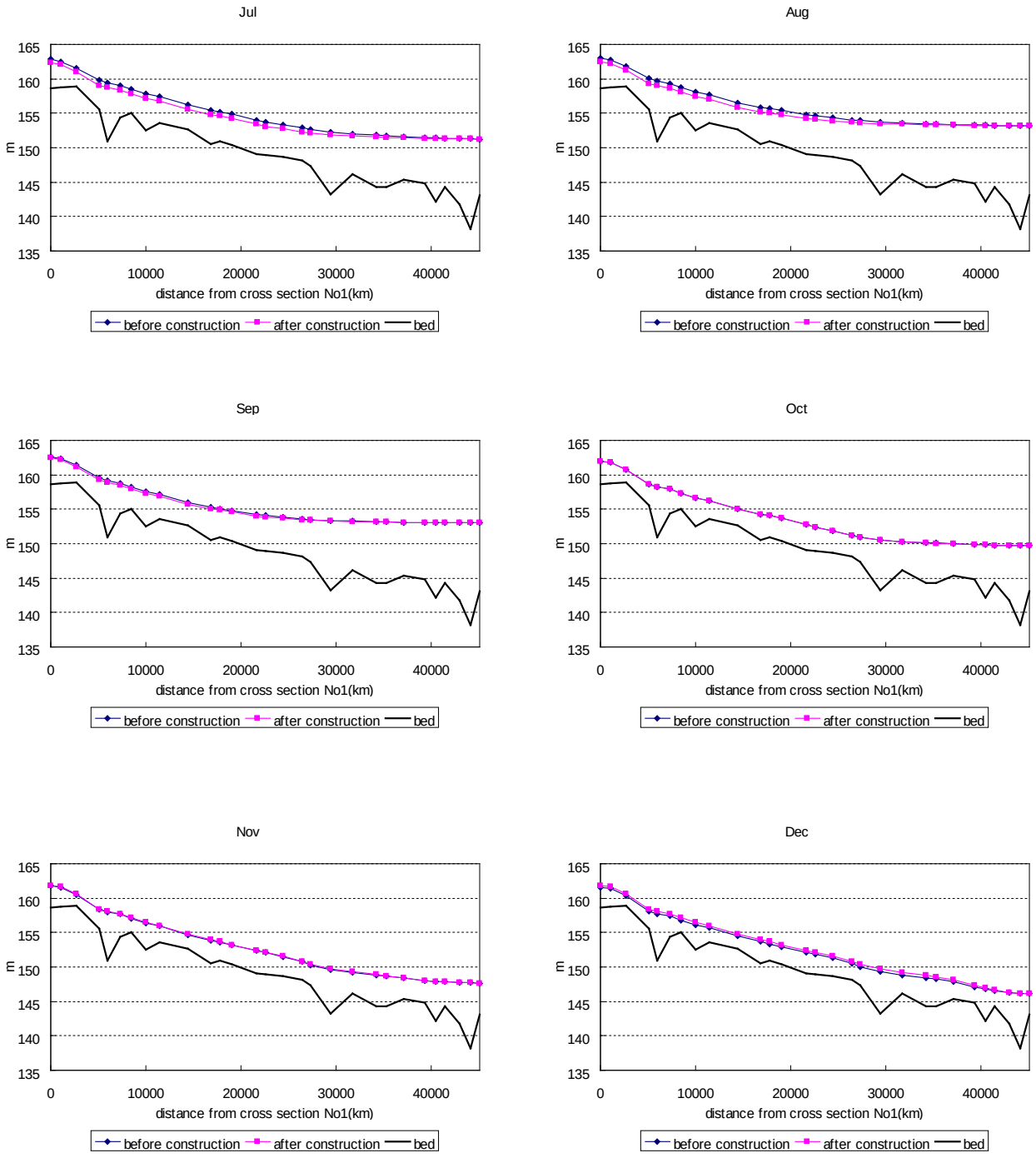


Figure C-2 Prediction of monthly water level （Longitudinal profile of the river）

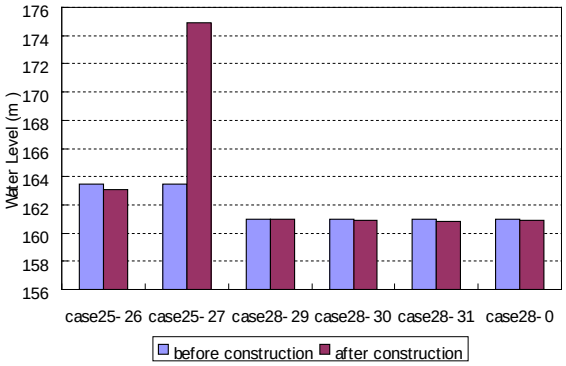
2.1.1.2 Maximum and minimum flows

The maximum and minimum flows under two conditions – without the dam ("before construction") and with the dam ("after construction") – are shown in Table C-1 below. For each case listed, Figure C-3 includes graphs of predicted water levels at maximum and minimum flow.

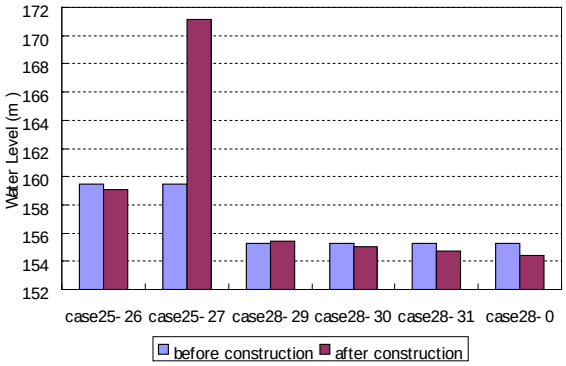
Table C-1 Study cases for maximum and minimum flows

Class-1	Class-2	Class-3	Class-4	Flow	Case
With/without the dam	Maximum	Before const.	Maximum in 10yrs	483.0 m^3/s	25
		After const.	Maximum in 10yrs	405.0 m^3/s	26
			Design flood	5,210.0 m^3/s	27
	Riparian release	Before const.	Minimum in 10yrs	31.4 m^3/s	28
		After const.	Minimum possible flow for power generation	40.0 m^3/s	29
			Target discharge	20.0 m^3/s	30
			Guaranteed flow	7.5 m^3/s	31
			Non-release	0.0 m^3/s	0

Cross Section No2



Cross Section No8



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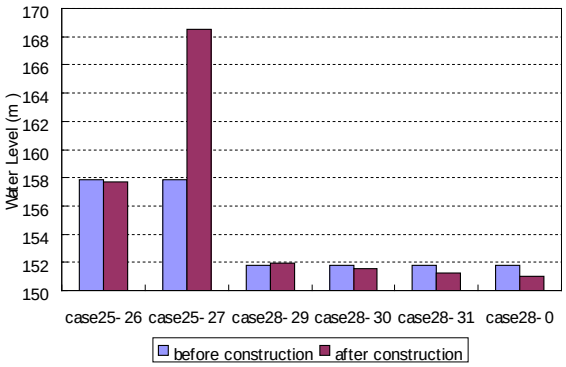
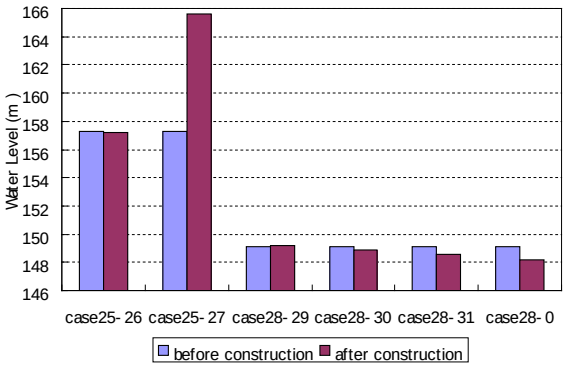


Cross Section No18



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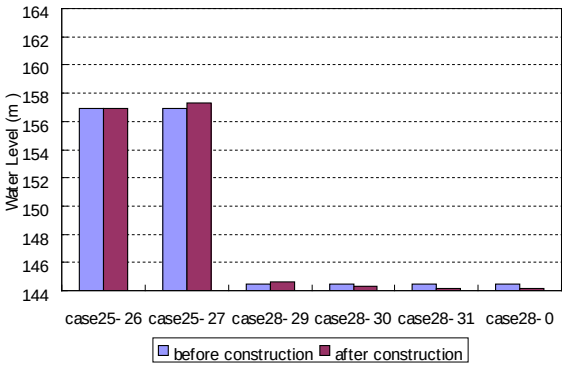


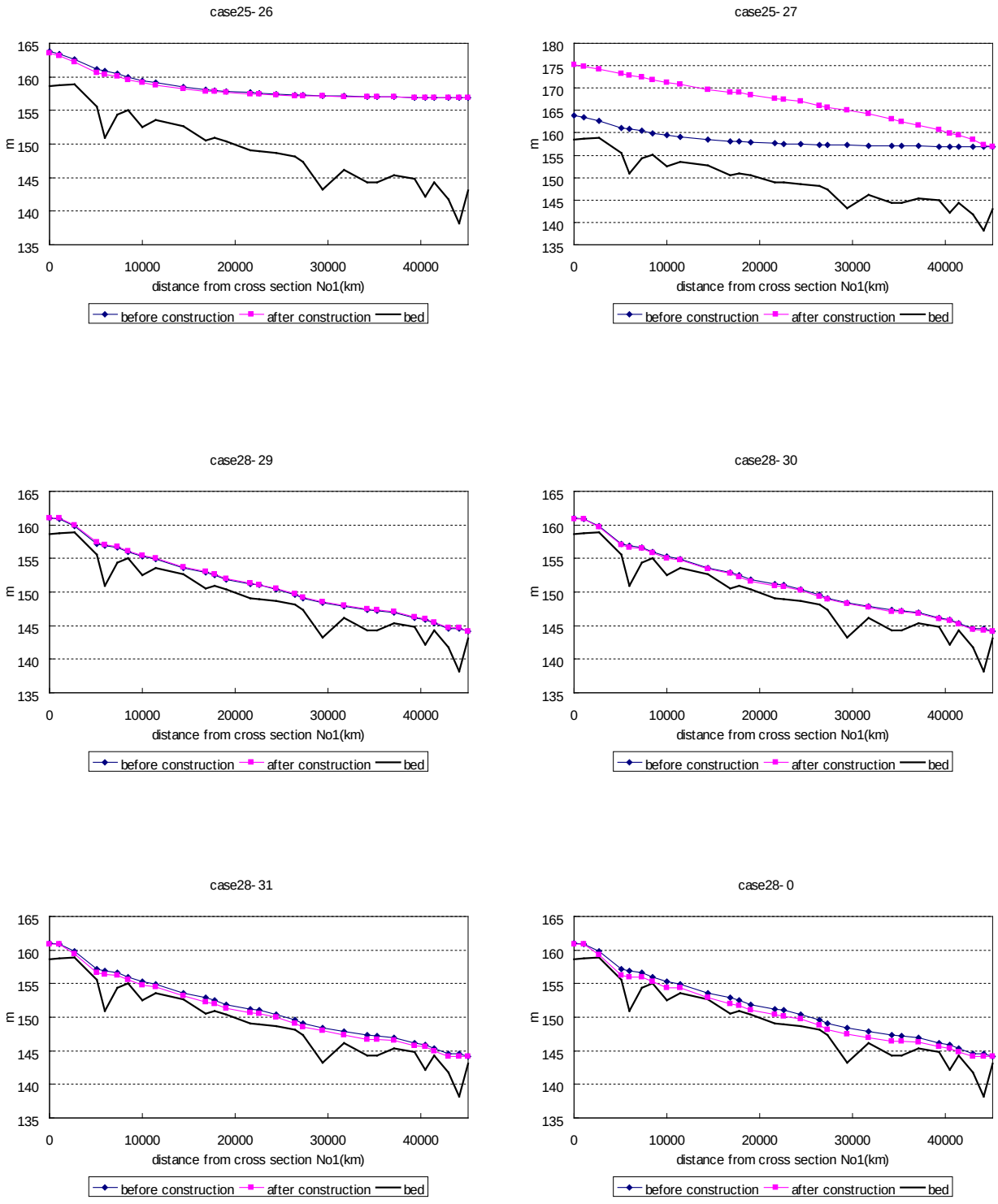


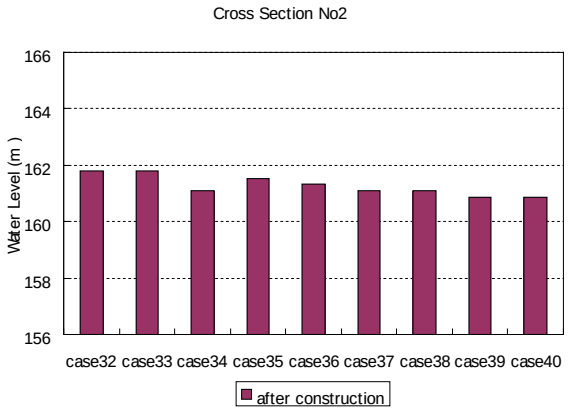
Figure C-3 Prediction of water levels for maximum and minimum flow (longitudinal profile of the river)

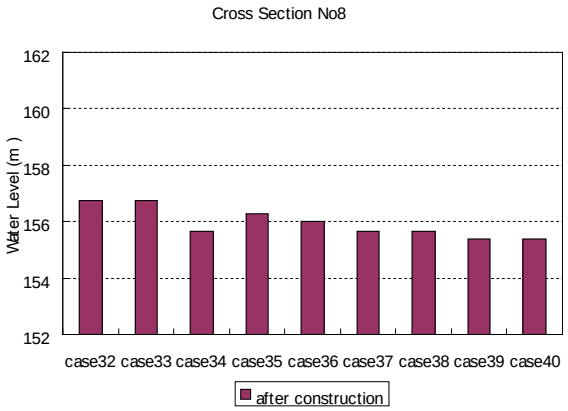
2.1.1.3 Weekly water level

Differences in water level on a weekly basis, as caused by the operation of the re-regulation dam, are computed under both scenarios (i.e., with the dam and without the dam).

Table C-2 Study cases for weekly water level fluctuation

Class-1	Class-2	Class-3	Class-4	Flow	Case
With the dam	Weekly WL	Main P/S 230m3/s	Mon - Fri	153.3 m^3/s	32
			Sat	150.0 m^3/s	33
			Sun	40.0 m^3/s	34
		Main P/S 150m3/s	Mon-Fri	100.0 m^3/s	35
			Sat	70.0 m^3/s	36
			Sun	40.0 m^3/s	37
		Main P/S 60m3/s	Mon - Fri	40.0 m^3/s	38
			Sat	20.0 m^3/s	39
			Sun	20.0 m^3/s	40


Cross Section No2
166
164
162
160
158
156
Water Level (m)
case32 case33 case34 case35 case36 case37 case38 case39 case40
after construction


Cross Section No8
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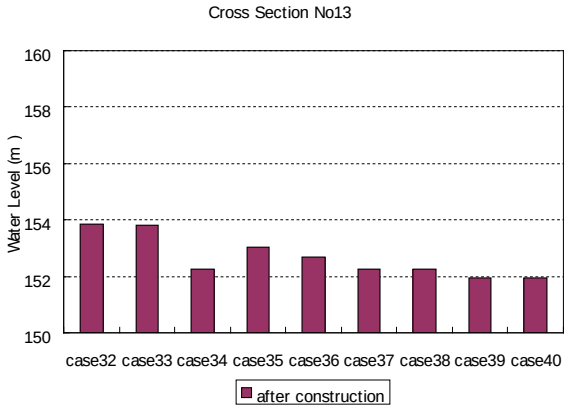
160
158
156
154
152
Water Level (m)
case32 case33 case34 case35 case36 case37 case38 case39 case40
after construction


Cross Section No13
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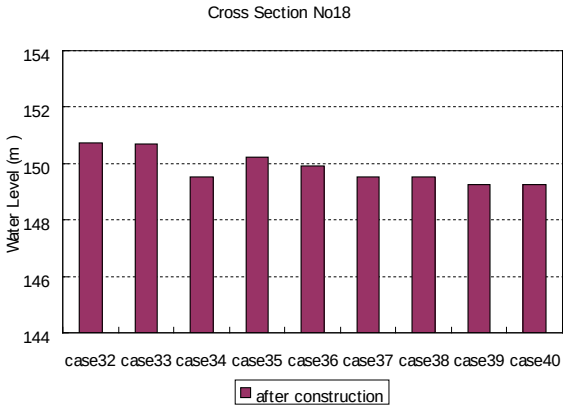
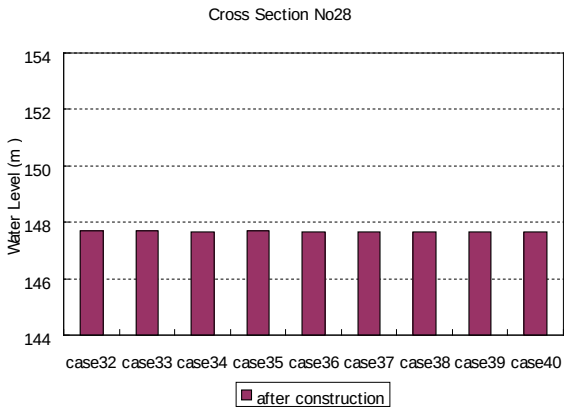
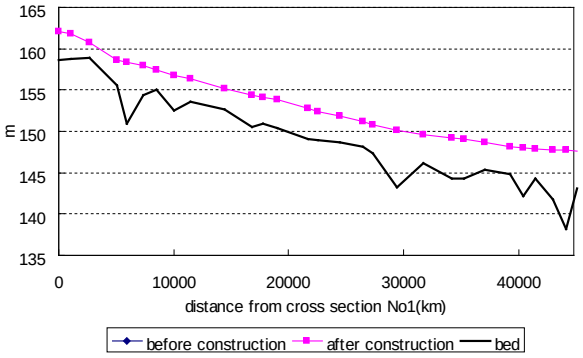
158
156
154
152
150
Water Level (m)
case32 case33 case34 case35 case36 case37 case38 case39 case40
after construction


Cross Section No18
154
152
150
148
146
144
Water Level (m)
case32 case33 case34 case35 case36 case37 case38 case39 case40
after construction


Cross Section No28
154
152
150
148
146
144
Water Level (m)
case32 case33 case34 case35 case36 case37 case38 case39 case40
after construction

case32



case33

case34

case35

case36

case37

case38

case39

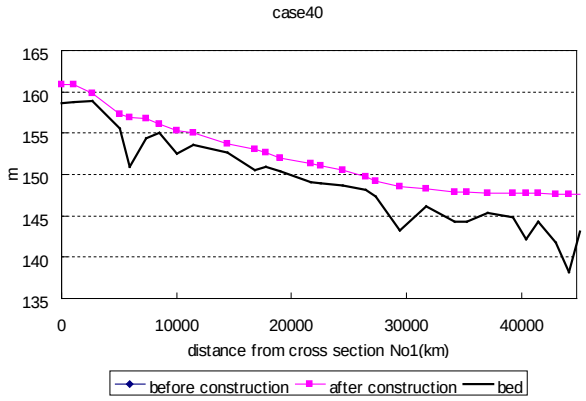


Figure C-4 Prediction of water levels for weekly water level fluctuation (longitudinal profile of the river)

2.1.2 PREDICTION OF DISSOLVED OXYGEN ALONG THE DOWNSTREAM RIVER COURSE

Based on the results of the non-uniform analysis[1], changes of DO concentration downstream from the dam were computed with the following reaeration equation:

$$\frac{dDO}{dt} = K_{air}\left(DOS - DO\right)$$

$$K_{air} = f_{air}\frac{b}{A}$$

DOS = saturated dissolved oxygen concentration (mg/l)

DO = dissolved oxygen concentration (mg/l)

K_{air} = rate constant (hr^{-1})

f_{air} = transfer velocity (m/hr) (= 0.03m/hour)

b = water surface width (m)

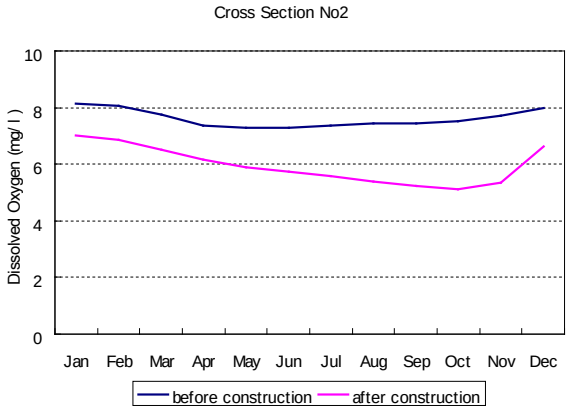
A = cross sectional area of flow (m^2)

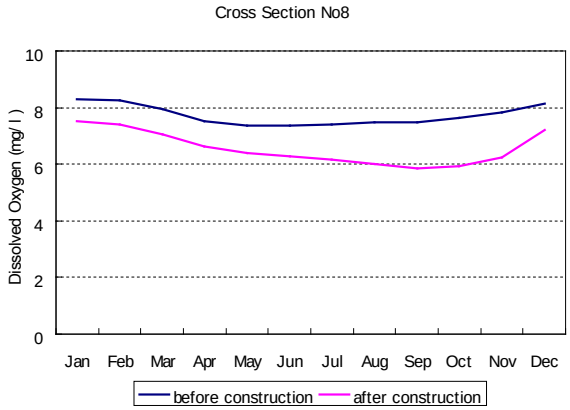
where f_{air} represents the speed at which a front of oxygen penetrates through the water depth. The stronger the mixing processes are, then the higher this value will be. Typical values are in the range 0.03 - 0.1m/hour.

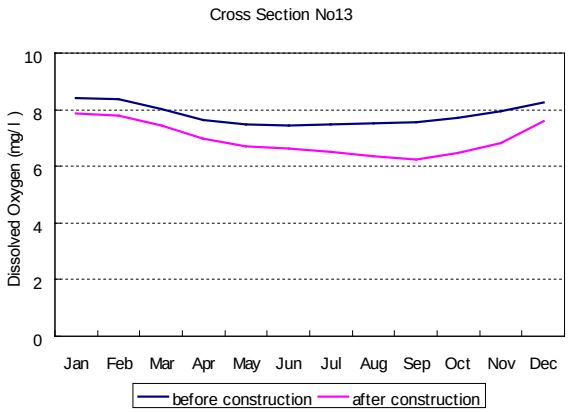
[1] Non-uniform analysis is discussed in section 2.1.1 above.

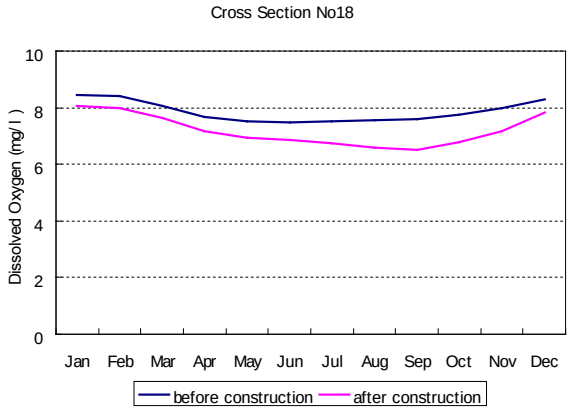
2.1.2.1 Monthly

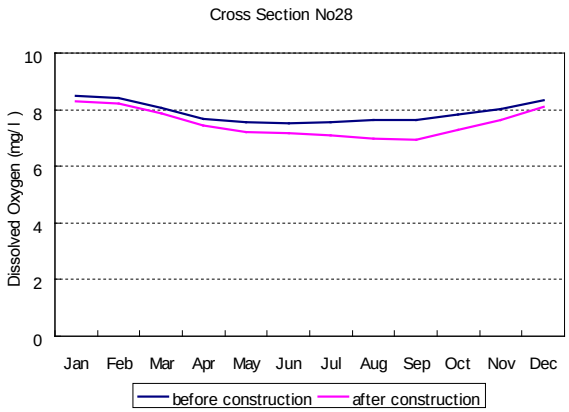
Monthly seasonal changes of DO concentration are shown in the following figures.



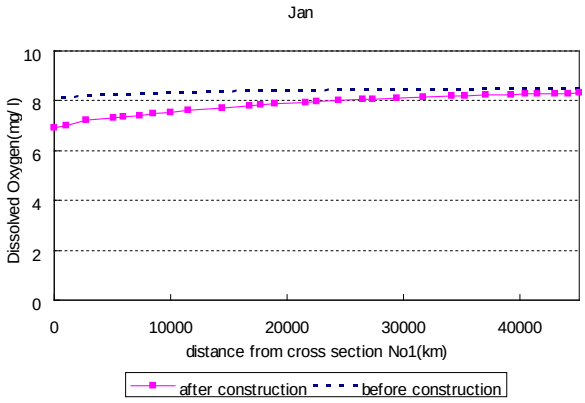


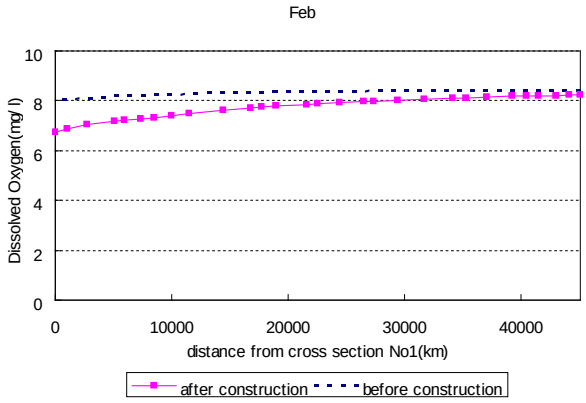


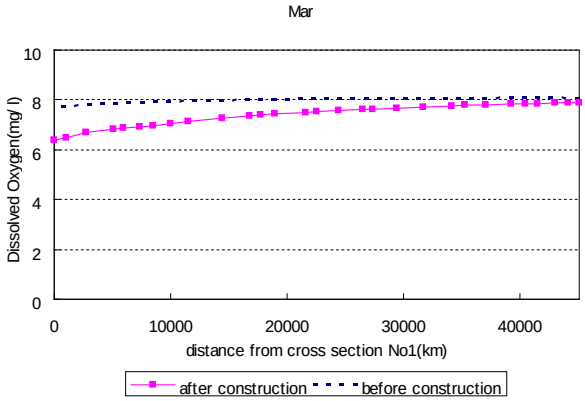


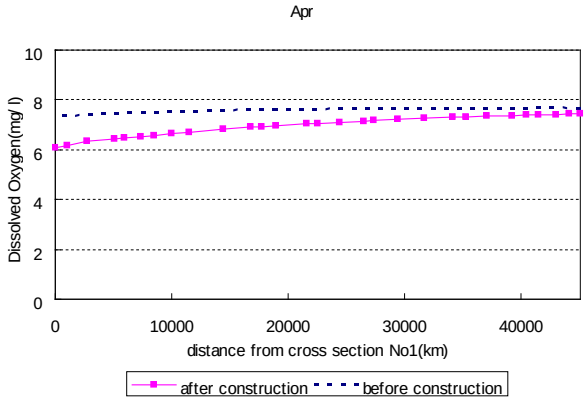


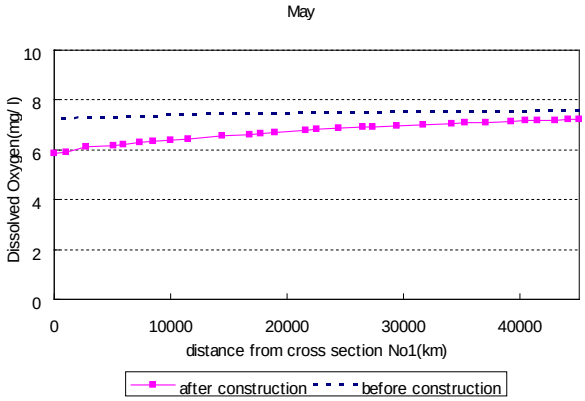
In the following figures, DO concentrations subject to distance from the dam ("after construction") are compared to natural DO concentrations in the river ("before construction").

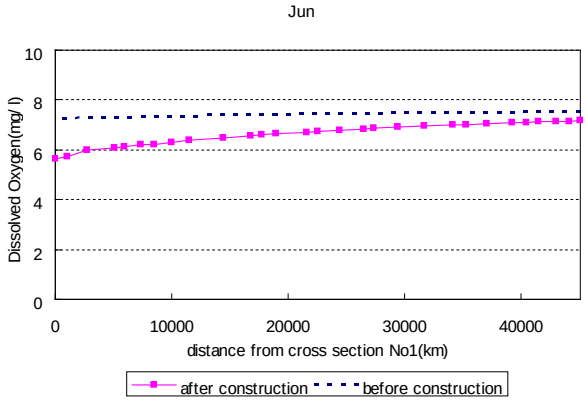












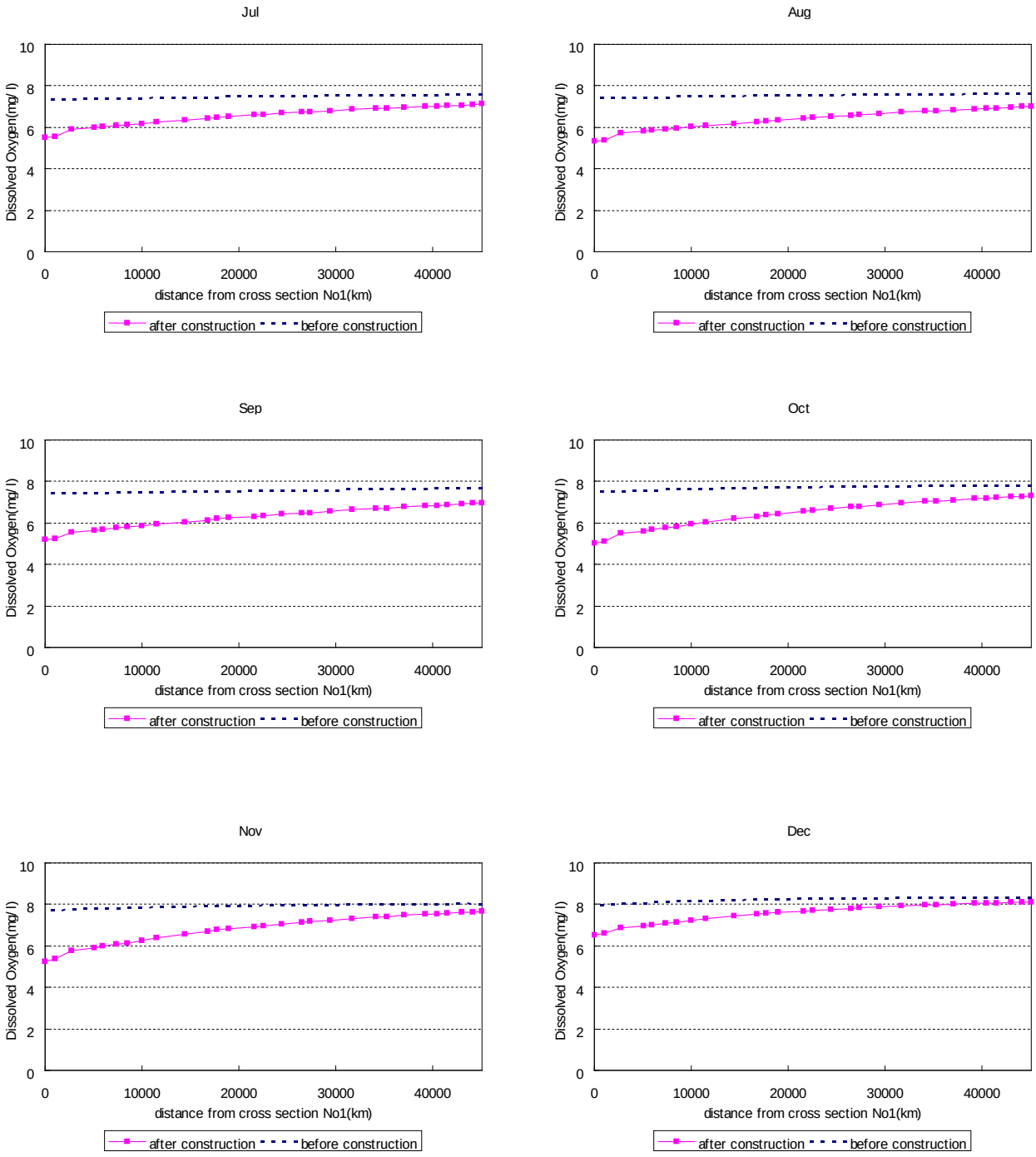


Figure C-5 Prediction of DO changes per month (longitudinal profile of the river)

2.1.3 PREDICTION OF DOWNSTREAM WATER TEMPERATURE

Based on t he results of the non-uniform analysis[2], water temperature change in the downstream river was computed with the following equation:

$$Q_n = Q_0 + \Sigma Q_i$$

$$L_n = T_0 \cdot Q_0 + \Sigma T_i \cdot Q_i + \{ \phi_0 \cdot t_0 / (\rho \cdot C_w \cdot H) \} \cdot Q_n$$

$$T_n = L_n / Q_n$$

where,

Q_n ; flow at a given point Q_0 ; flow from upstream（discharged water from the dam） Q_i ; flow from a tributary

L_n ; heat quantity at a given point T_0 ; water temperature from upstream （water temperature of discharged water from the dam） T_i ; water temperature from a tributary

T_n ; water temperature at a given point t_0 ; time of flow

ϕ ; heat balance on water surface ρ ; density C_w ; specific heat H；average water depth

Heat balance on water surface (φ) can be represented as follows:

$$\phi = \phi_0 - (\phi_e + \phi_c) - \phi_{ra}$$

$$\phi_0 = (1 - 0.06) \phi_s$$

$$\phi_e + \phi_c = (0.000308 + 0.000185W) (E_s - E_a) (595.4 - 0.54t_s + t_s) \times 1000$$

$$\phi_{ra} = 0.97 \times 1.1171 \times 10^{-6} (T_s^4 - 0.937 \times 10\text{-}5T_a^6 (1+0.17C^2))$$

$$E_s = (0.00045t_s^3 + 0.00363t_s^2 + 0.39626t_s + 4.4711) E$$

$$E_a = (0.00045t_a^3 + 0.00363t_a^2 + 0.39626t_a + 4.4711) E$$

ここに、

ϕ_s ; amount of solar radiation (kcal/m²/日) W ; wind velocity (m/s)

t_s ; water temperature on surface (℃) t_a ; temperature (℃)
T_s ; t_s+273.16 (K) T_a ; t_a + 273.16 (K)

[2] Non-uniform analysis is discussed in section 2.1.1 above.

C ; cloud amount (0～1) E ; relative humidity (0～1)

All necessary data for the computation were given on a monthly basis as shown in the following figures.

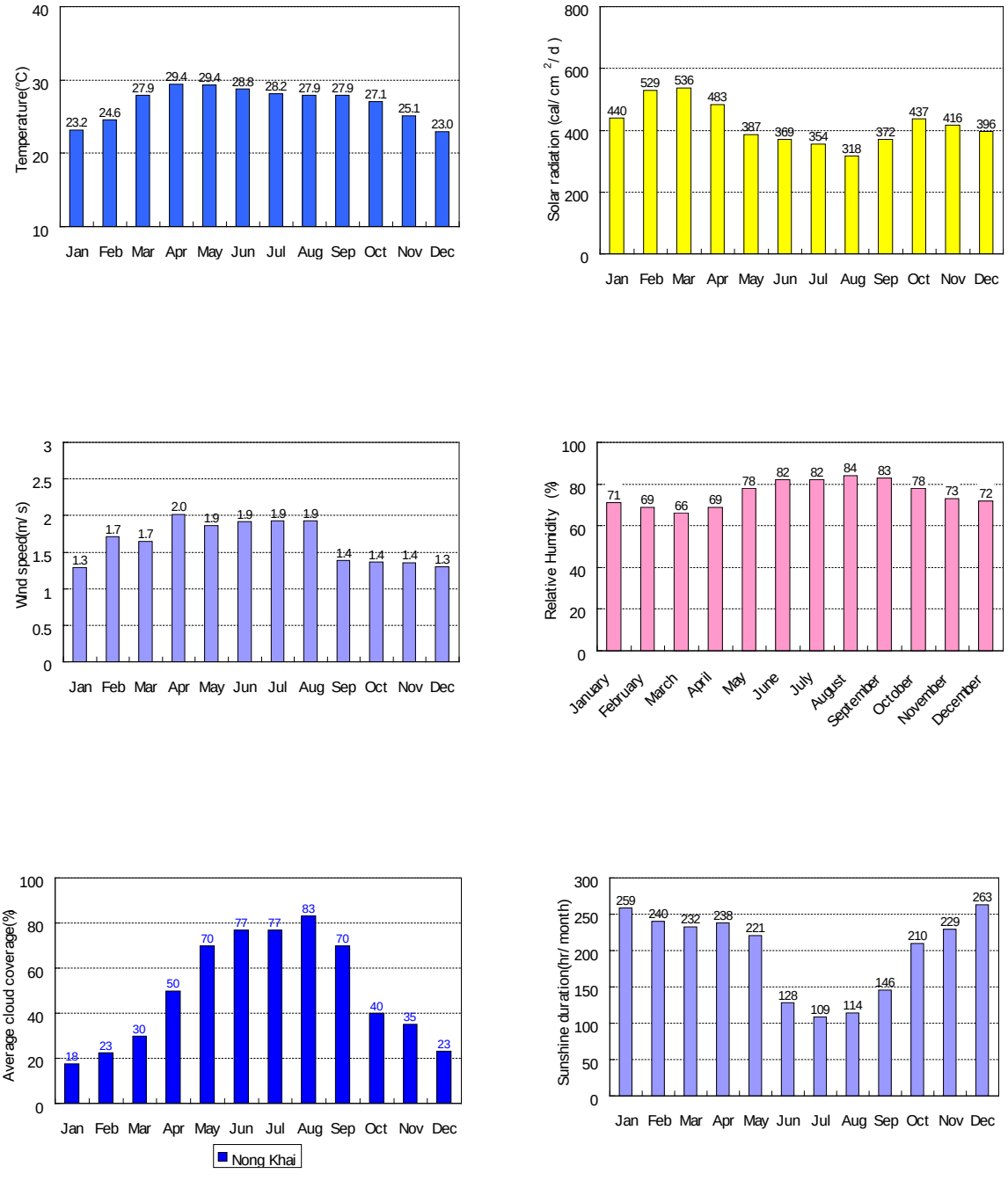
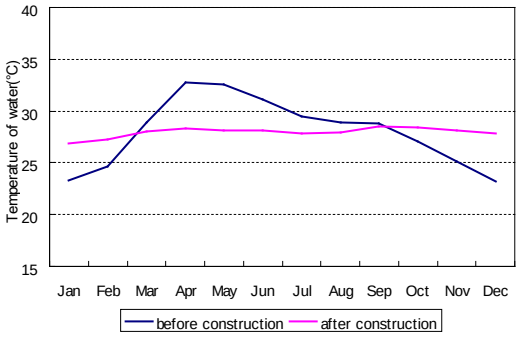
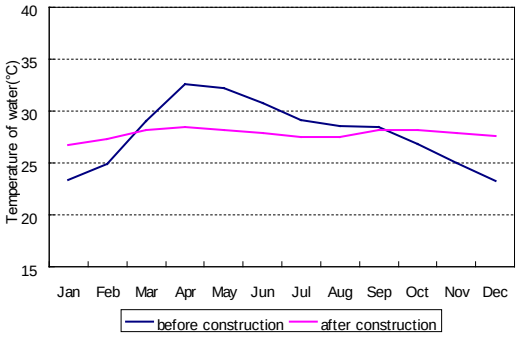


Figure C-6 Meteorological data for the computation

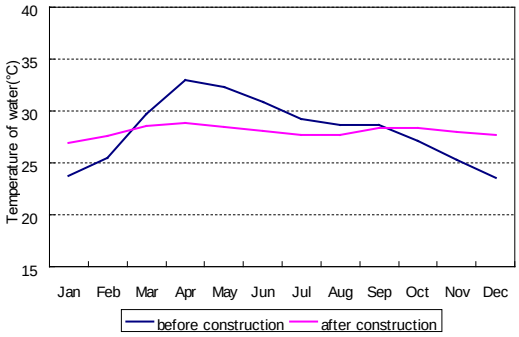
Cross Section No2



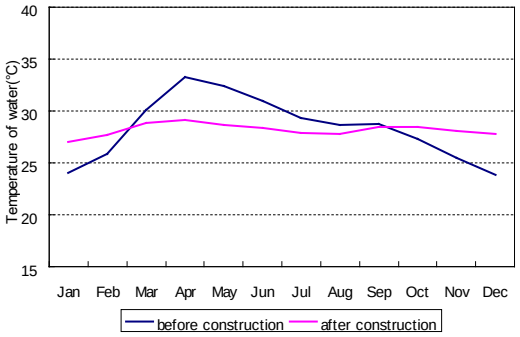
Cross Section No8



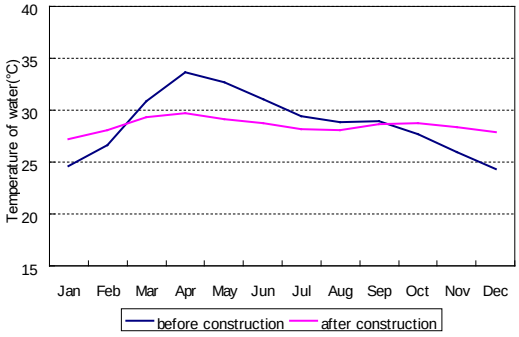
Cross Section No13

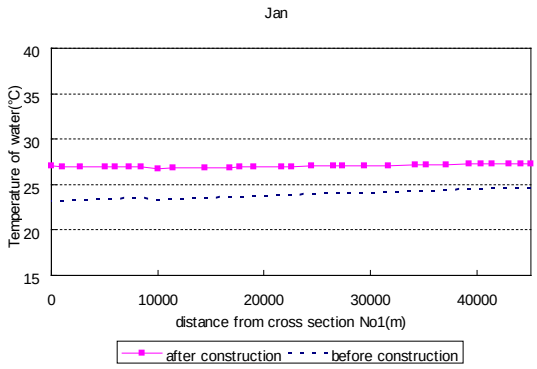


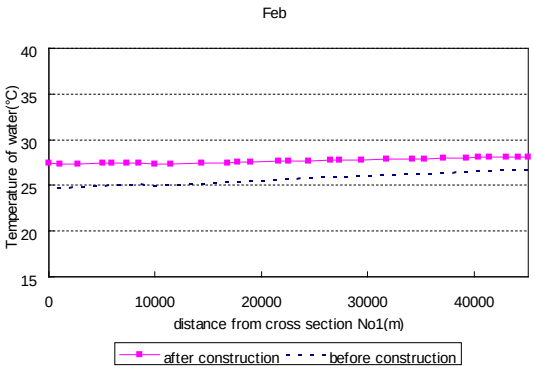
Cross Section No18

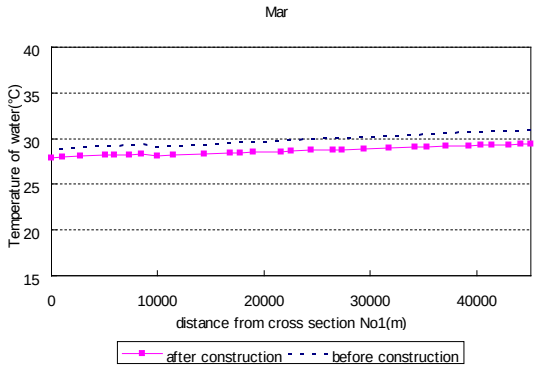


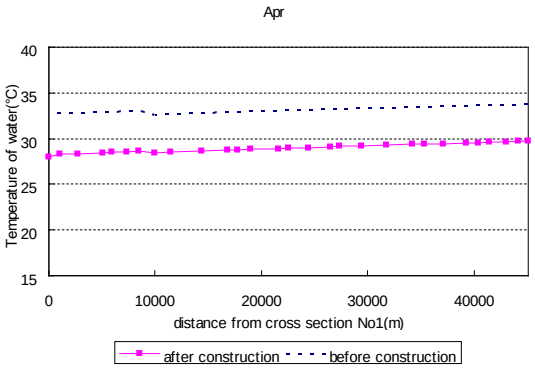
Cross Section No28

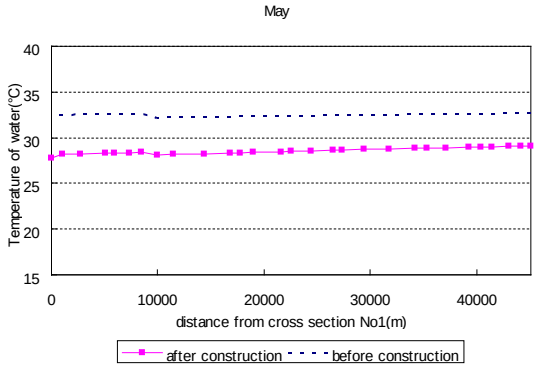


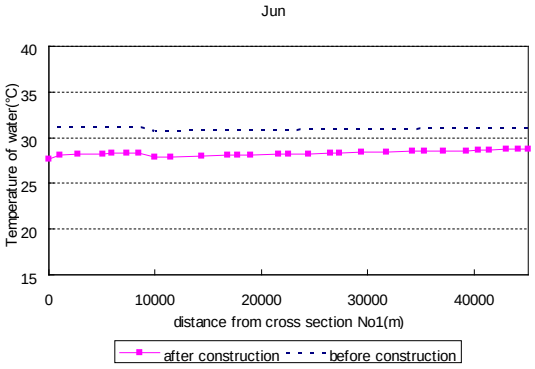

Jan
Temperature of water(℃)
40
35
30
25
20
15
0
10000
20000
30000
40000
distance from cross section No1(m)
after construction
before construction

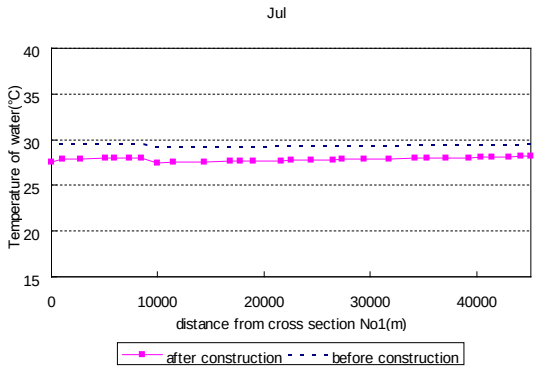

Feb
Temperature of water(℃)
40
35
30
25
20
15
0
10000
20000
30000
40000
distance from cross section No1(m)
after construction
before construction


Mar
Temperature of water(℃)
40
35
30
25
20
15
0
10000
20000
30000
40000
distance from cross section No1(m)
after construction
before construction


Apr
Temperature of water(℃)
40
35
30
25
20
15
0
10000
20000
30000
40000
distance from cross section No1(m)
after construction
before construction


May
Temperature of water(℃)
40
35
30
25
20
15
0
10000
20000
30000
40000
distance from cross section No1(m)
after construction
before construction


Jun
Temperature of water(℃)
40
35
30
25
20
15
0
10000
20000
30000
40000
distance from cross section No1(m)
after construction
before construction


Jul
Temperature of water(℃)
40
35
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0
10000
20000
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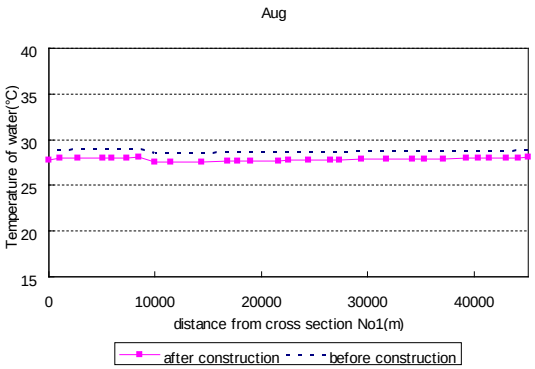
distance from cross section No1(m)
after construction
before construction


Aug
Temperature of water(℃)
40
35
30
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20
15
0
10000
20000
30000
40000
distance from cross section No1(m)
after construction
before construction

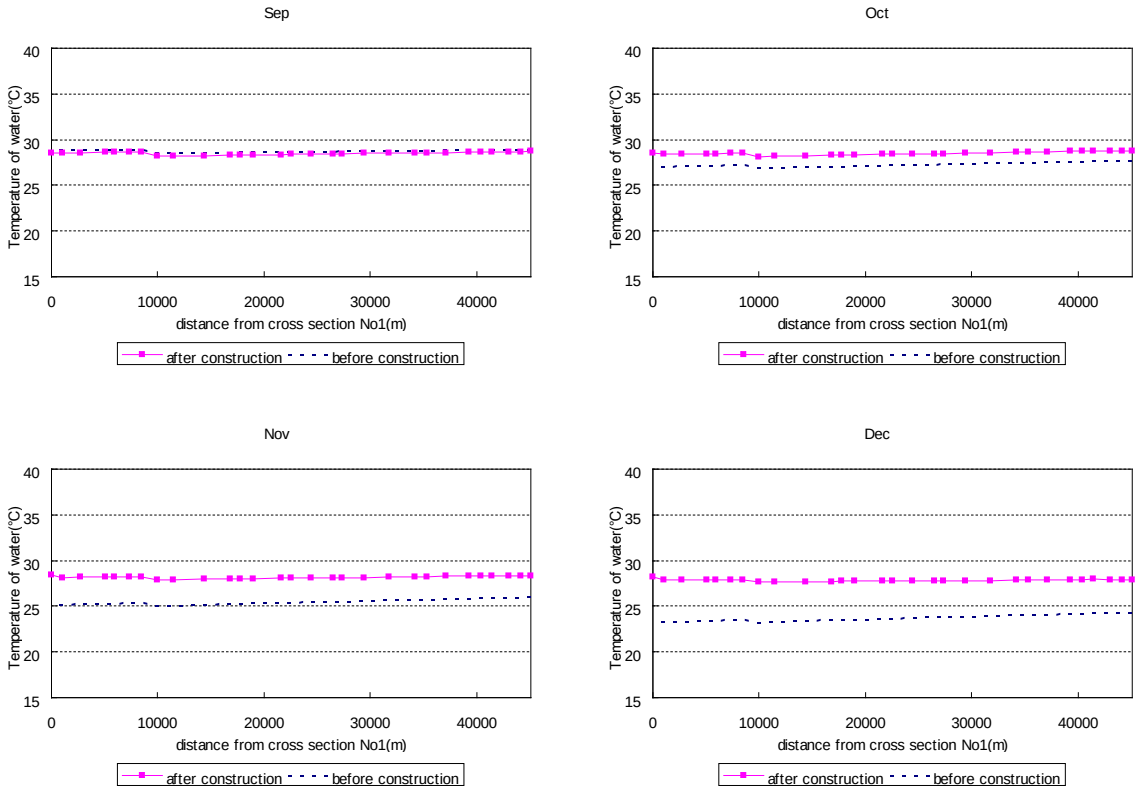


Figure C-7 Prediction of water temperature per month （longitudinal profile of river）

2.2 RECOMPUTATION OF WATER TEMPERATURE

Based on the calculationsin the previous section (2.1.3), most predicted water temperatures of the reservoir surface layer were very high, even reaching upwards of 35 degrees Celsius. Such high temperatures were deemed unrealistic (Condition 1). Thus, the decision was made to revise the input parameters in order to re-calculate the water temperature (Condition 2).

The following parameters were modified:

- Inflow water temperature
- Solar radiation

2.2.1 REVISION OF INFLOW WATER TEMPERATURE

In 1999, the JICA team traveled to the upper reaches of the Nam Ngiep in Tavieng (Ban Dong) in order to make water temperature observations. Using these observations as well as air temperature measurements taken in Vientiane in 1999, the estimated inflow water temperature was calculated on a monthly basis.

The water temperature was estimated using a correlation equation with the air temperature. The correlation to air temperature is necessary because observedwater temperature measurements are too sparse to generate meaningful comparisons.

Actual measurements of water temperature in Tavieng were only conducted three times and in relatively hot months (i.e., March, June and August). Therefore, the estimated water temperature for the other nine months was extrapolated. Upon review, the estimated water temperature in the winter months (October to February) was extremely low and deemed incorrect. To compensate for the inaccuracy in the extrapolation, the assumption was revised such that water temperatures were equal to air temperatures for the months October to February. The resulting monthly estimate of inflow water temperature is shown in Figure C-8.

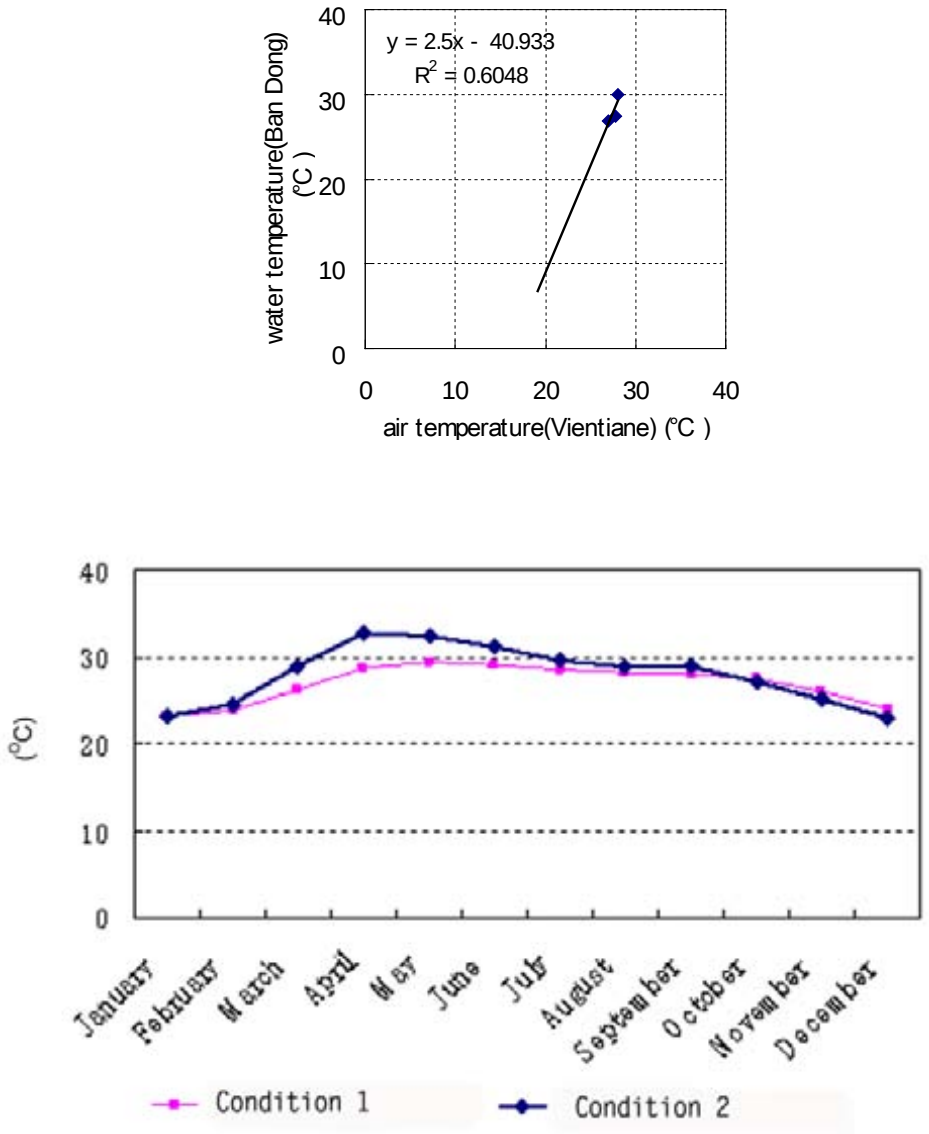


Figure C-8 Estimated inflow water temperature per month

2.2.2 REVISION OF SOLAR RADIATION

The EIA project team could not obtain any observation data for the solar radiation in Laos. Initially, the assumption for vertical quantity of total solar radiation was based on a clear and sunny day (i.e., no cloud cover) at latitude 20 degrees north. However, this assumption for the solar radiation is likely excessive because the weather conditions at the site would not always beclear and sunny year round.

Therefore, the monthly average solar radiation (incorporating monthly average cloud cover) as measured from 2005 to 2008 in Nongkhai,Thailand, was used instead. Average solar radiation was estimated by using the following equation:

$$S_d = S_{df}\{1-(1-k)n\} \qquad \text{(Savinov's equation)}$$

S_{df} = Total solar radiation into horizontal plane on a sunny day without a cloud (cal/cm^2/day)

n= cloud cover (0-1)

k = constant (0.33 at latitude 20 degrees north)

The following figure shows the estimated amount of solar radiation.

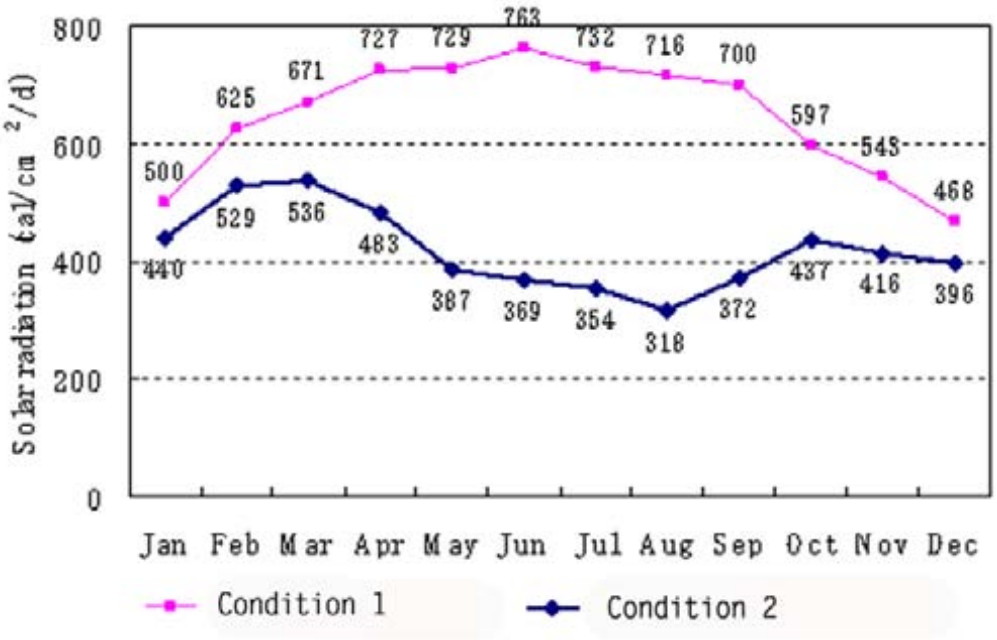


Figure C-9 Estimated solar radiation

2.2.3 RESULT OF RECOMPUTATION OF WATER TEMPERATURE

The simulation modeled the water temperature in the Nam Ngiep reservoir as well as the discharged water for the eight year period extending from 1991 – 1998.

2.2.3.1 Water temperature in the reservoir

Monthly water temperatures at the reservoir and the inflow are shown below in Figure C-10. The following characteristics are noted::

- the average water temperature of reservoir surface at the dam site shows the lowest value (26.4 degrees Celsius) in January and the highest value (31.2 degrees Celsius) in May;
- the difference in water surface temperature at the upper end of the reservoir compared to the dam site is relatively higher from October to February, meaning that water temperature rises mainly due to heat flux by sunlight while the water flows down through the reservoir;
- thermocline would be formed around EL. 250 meters and maintained for eight years.

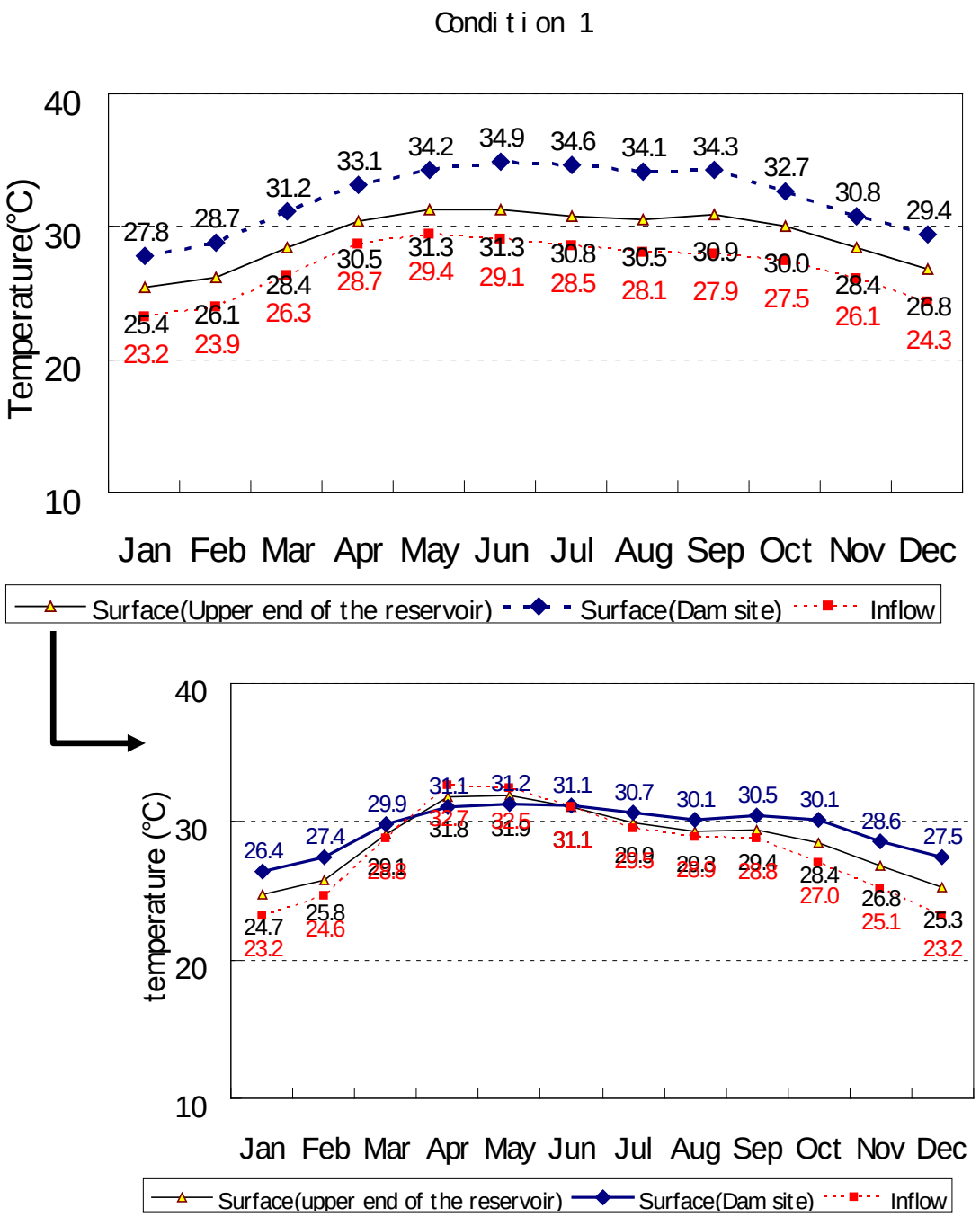


Figure C-10 Computation result of water temperature in the reservoir

2.2.3.2 Water temperature of discharged water

Monthly average water temperatures of natural inflow, discharged water and the surface water just upstream from the dam are shown in Ficure C-11. It is important to note that:

- the temperature of the discharged water from March to September would tend to be lower than that of natural inflow, whereas it has an opposite tendency from November to February;
- the temperature of the discharged water tends to be lower than that of reservoir surface water at the dam site from February to November, and these two temperatures tend to be at the same level in January and December.

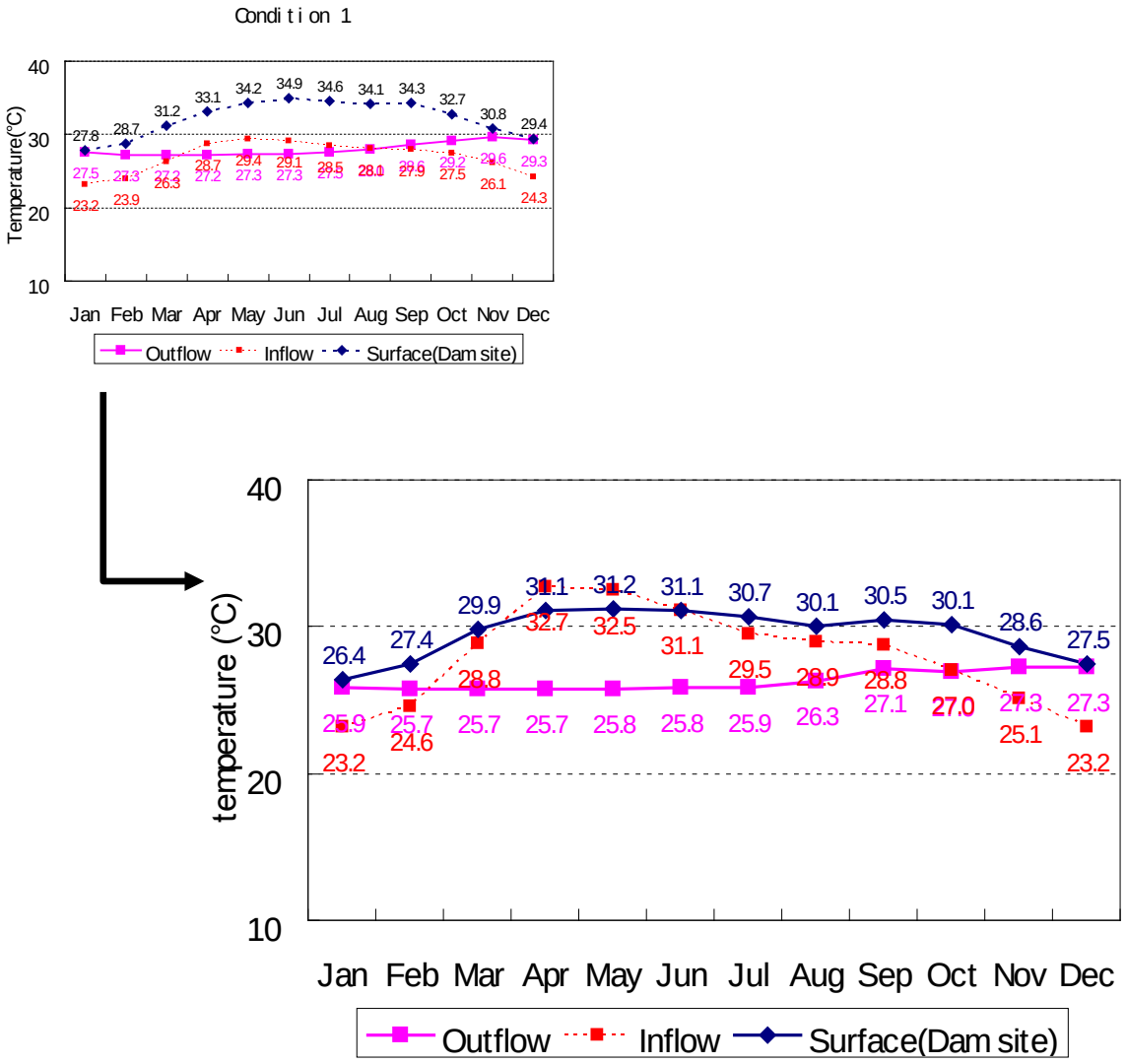


Figure C-11 Comparison of water temperature for inflow and outflow

2.2.3.3 Change of water temperature along the downstream river course

(1) Verification of prediction model

There are observatory data of water temperature in the downstream river (No.1 point: Ban Hajyun, No.15 point: Ban Muong Mai) which were measured in 1999 by the JICA study team. This observed data was used for calibration of the applied model.

In order to check the accuracy of the prediction model for water temperature along the downstream river, the observed water temperature at Ban Hajyun (No. 1) was used as the initial value.The prediction model was deemed to be appropriate by comparing the estimated water temperature with observed temperature at Ban Muong Mai (No. 15).

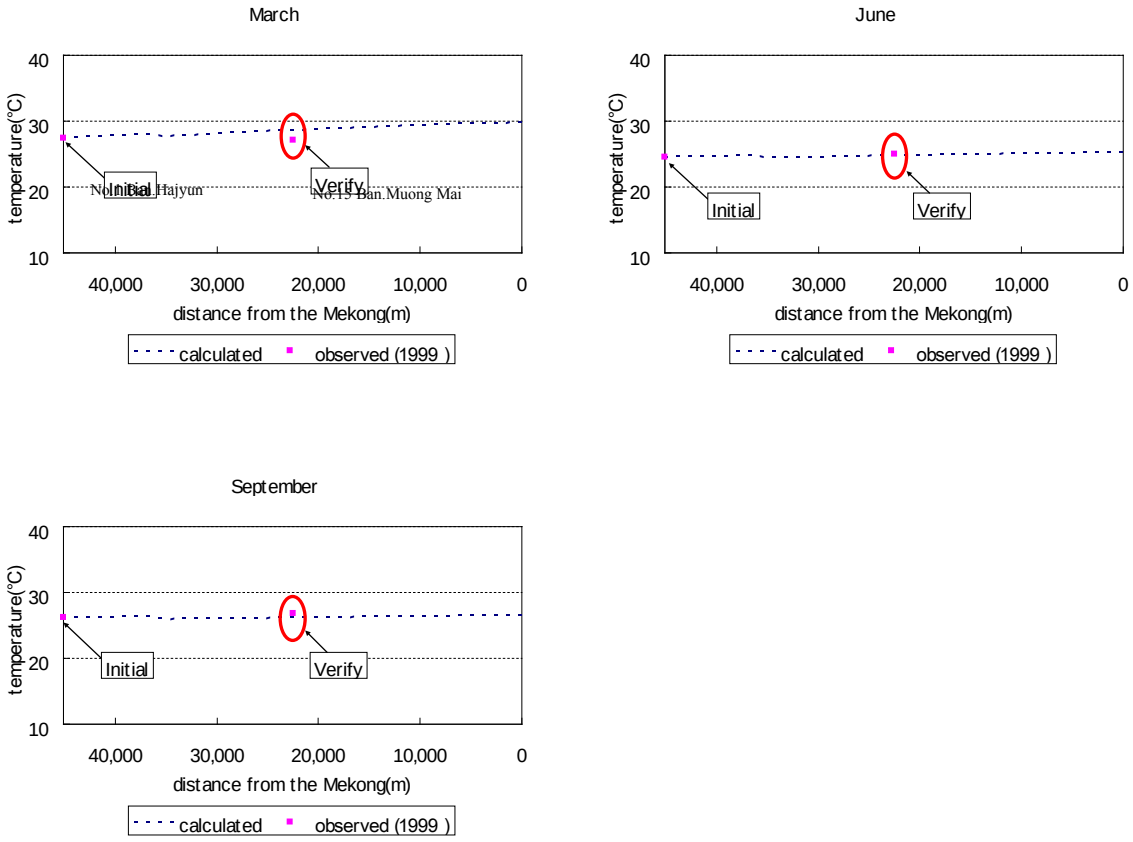
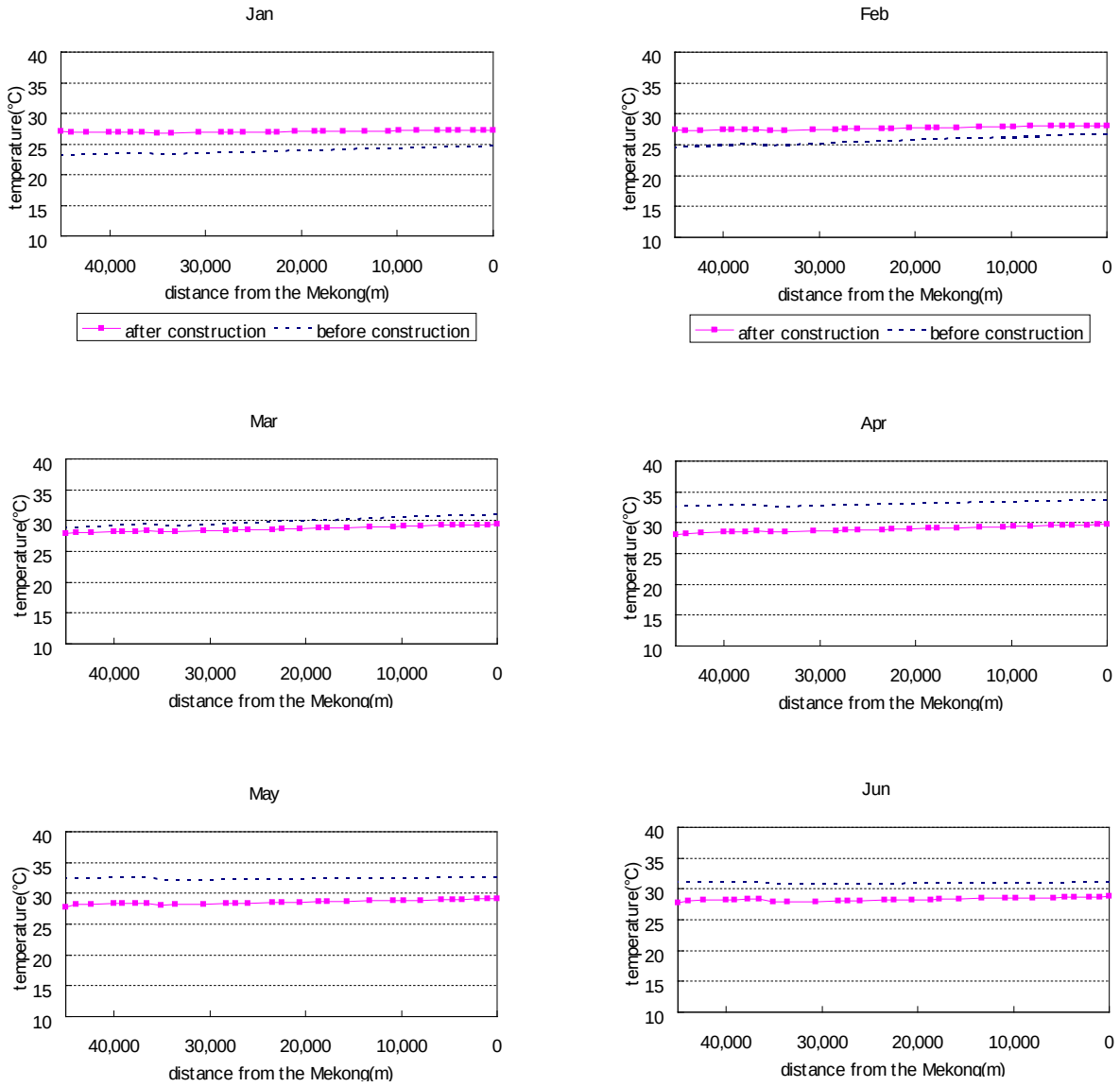


Figure C-12 Water temperature of the downstream river (before dam construction)

(2) Change of water temperature in the downstream river before and after dam construction

Calculation of water temperature in the downstream river for two scenarios – without the dam ("before construction") and with the dam ("after construction") – was – performed using monthly data such as discharged water and solar radiation.

- Water temperature slightly changes as the water flows downstream.
- water temperature in the downstream river displays seasonal variations.
- Due to the change of discharged water temperature, the water temperature in the downstream river is affected under the scenario with the dam



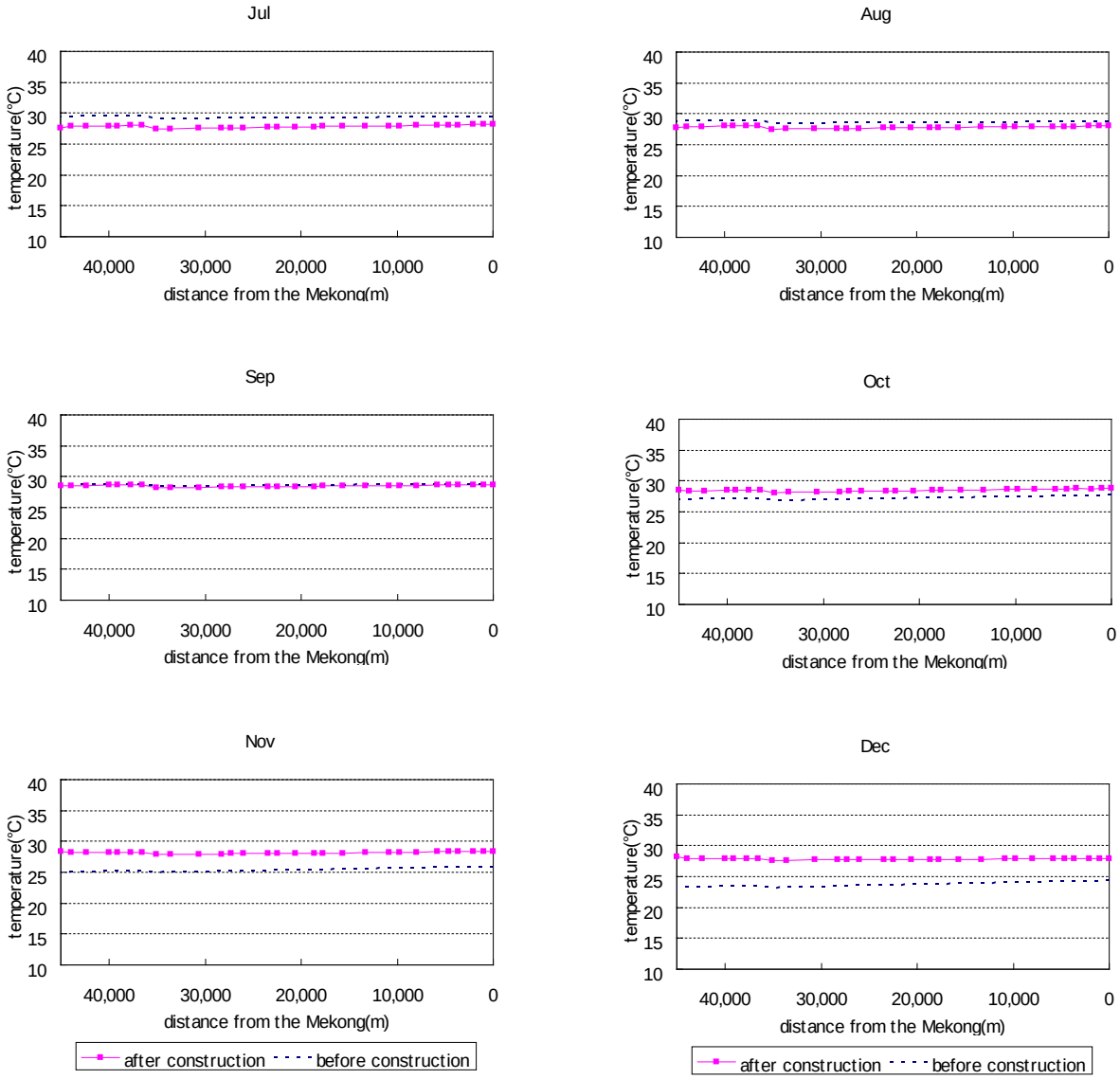


Figure C-13 Prediction of water temperature changes per month (longitudinal profile of river)

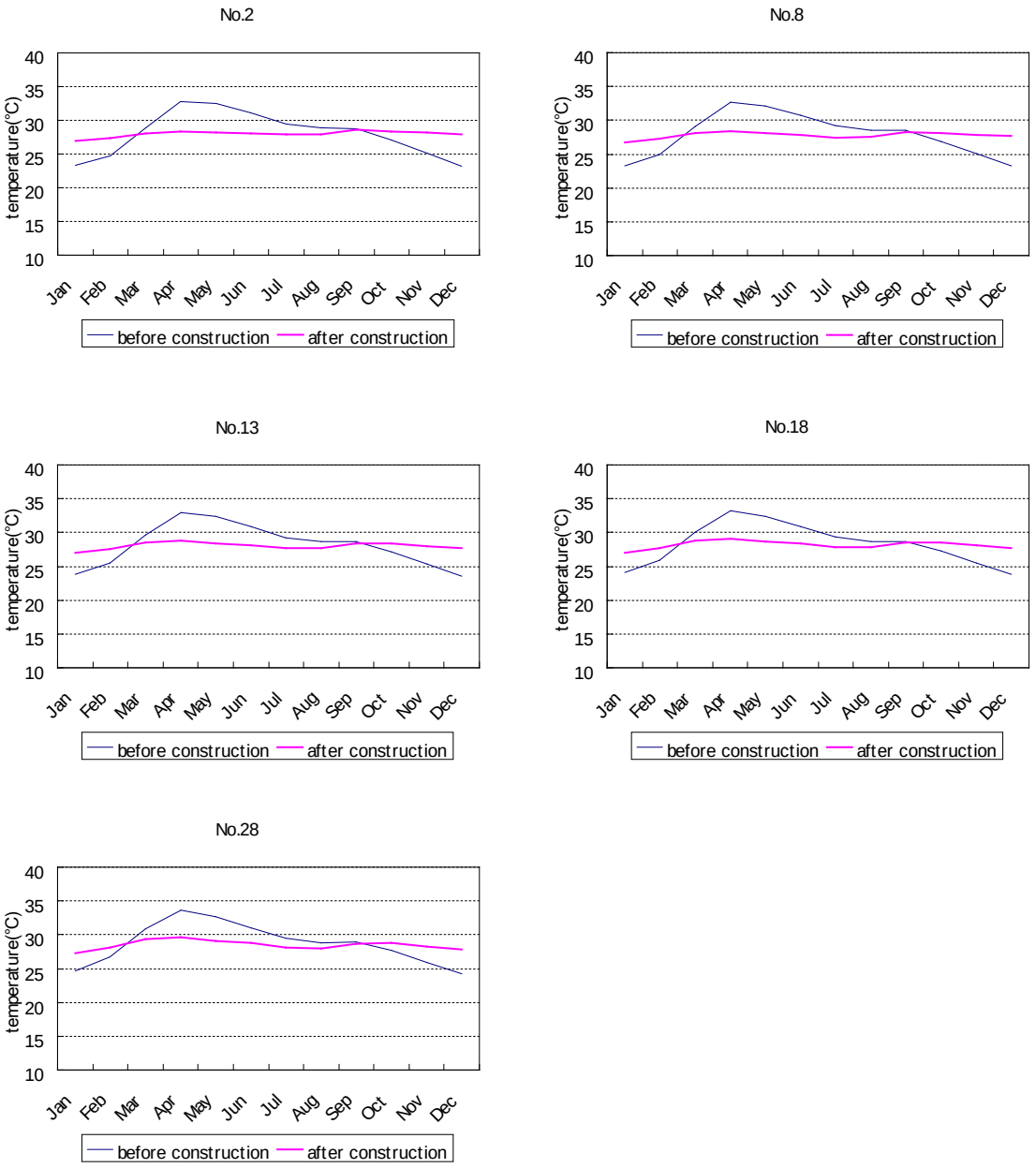


Figure C-14 Prediction of water temperature of downstream river before and after dam construction

2.3 WATER QUALITY OF THE RESERVOIR

2.3.1 WATER TEMPERATURE

By using meteorological data available in and around the site (see Table C-3), the water temperature in the reservoir was modeled over the eight year period from 1991 – 1998. Vertical distribution of the water temperature in the reservoir ("inflow") and temperature of the water that is discharged through the spillway and powerhouse ("outflow") were computed chronologically (see Figure C-15).

Monthly average water temperature of the natural inflow and the discharged water can be seen in Figure C-16, noting that:

- thermocline would be created and maintained in the reservoir for eight years;
- the temperature of the discharged water from March to September would tend to be lower than that of natural inflow, whereas it has an opposite tendency from November to February;
- part of the reason that the discharged water rises to a greater temperature than in the inflow following October is because discharged water around the power intake mixes with the warmer surface waters.

Table C-3 Parameters for the computation of temperature distribution

		Adopted	Range
Solar radiation	Light absorption rate at the surface	0.5	0.3 ~ 0.6
	Light reflection at the surface	0.06	0.03 ~ 0.07
	Light attenuation factor	1.5	0.3 ~ 1.5
		0.01	0.001 ~ 0.01 $(1.50+0.01C_p)$ (C_p ; Chlorophyll-a concentration)
Dispersion coefficient	Longitudinal	C=5.0	Δx ; Size of the longitudinal block $D_x=C\times \Delta x^2 (m^2/day)$ C=1 ~ 10
	Vertical	$a=10^{-5}$ b=0.5 $c=10^{-7}$	$D_z=a\exp(-bR_i)+c$ R_i ; Richardson's number $a=10^{-6} \sim 10^{-3}$ b=0.5 $c=0 \sim 10^{-3}$

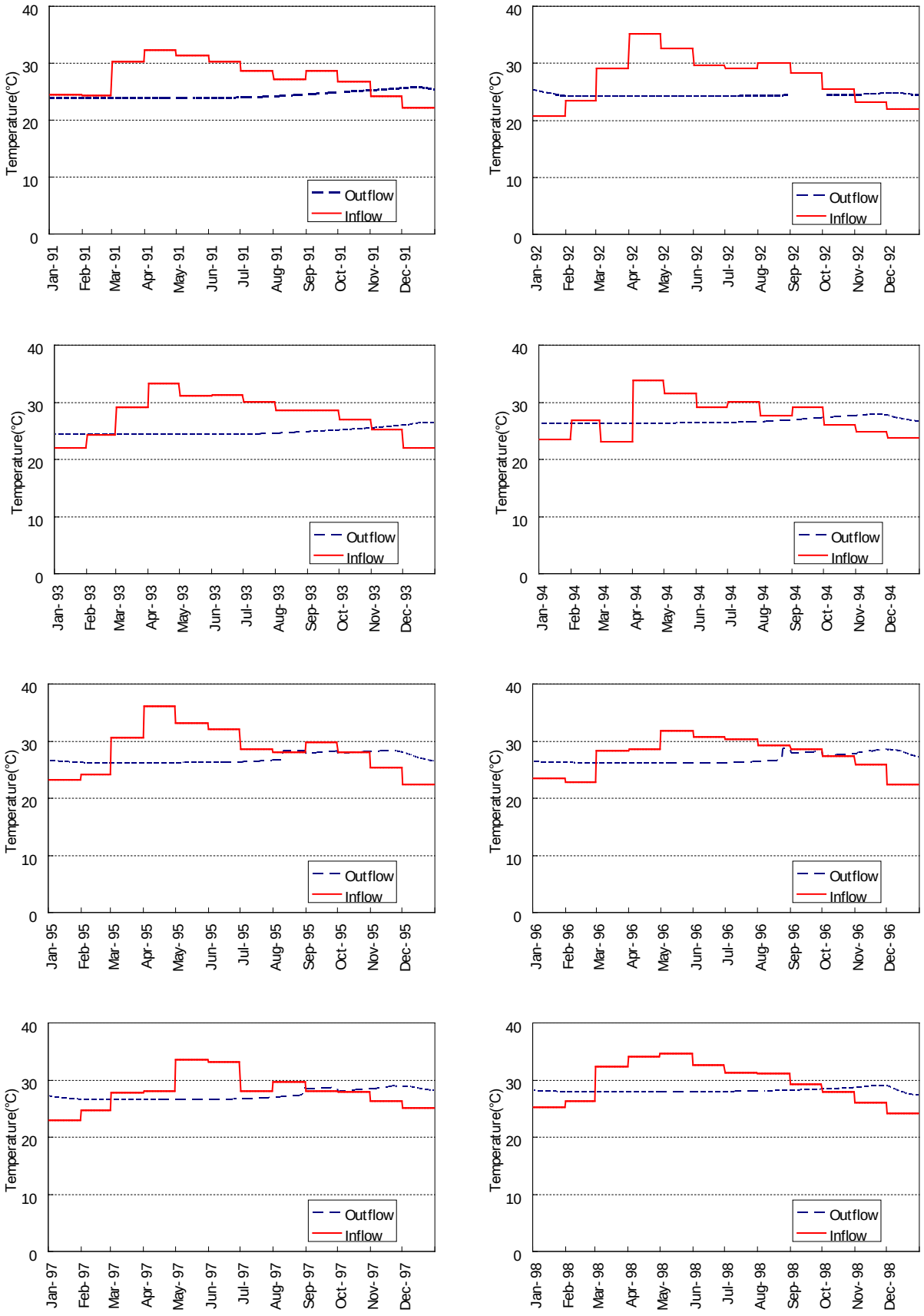


Figure C-15 Comparison of water temperature for inflow and outflow

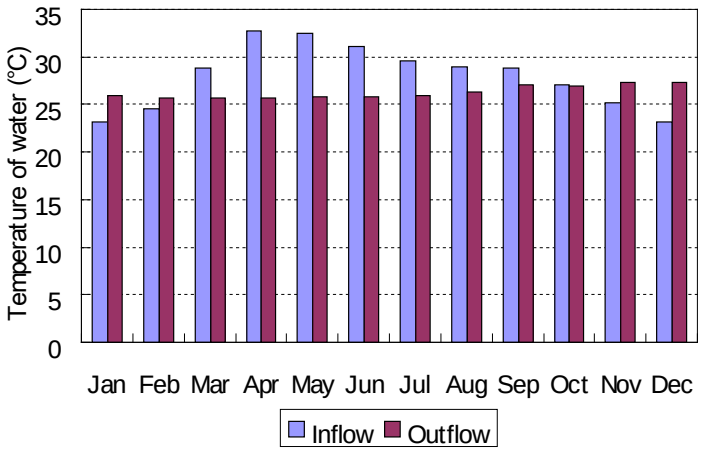
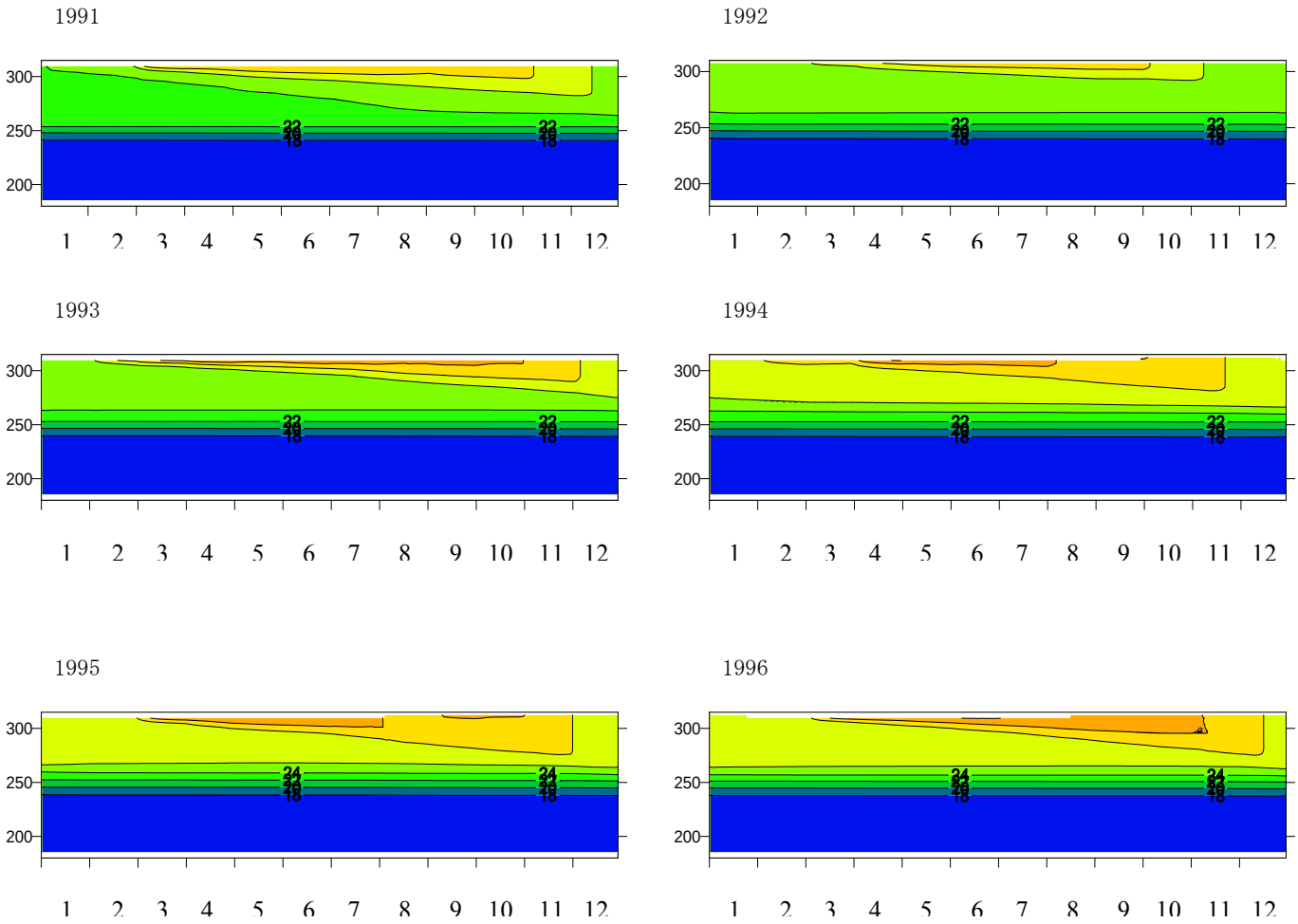


Figure C-16 Water temperature of inflow and outflow per month



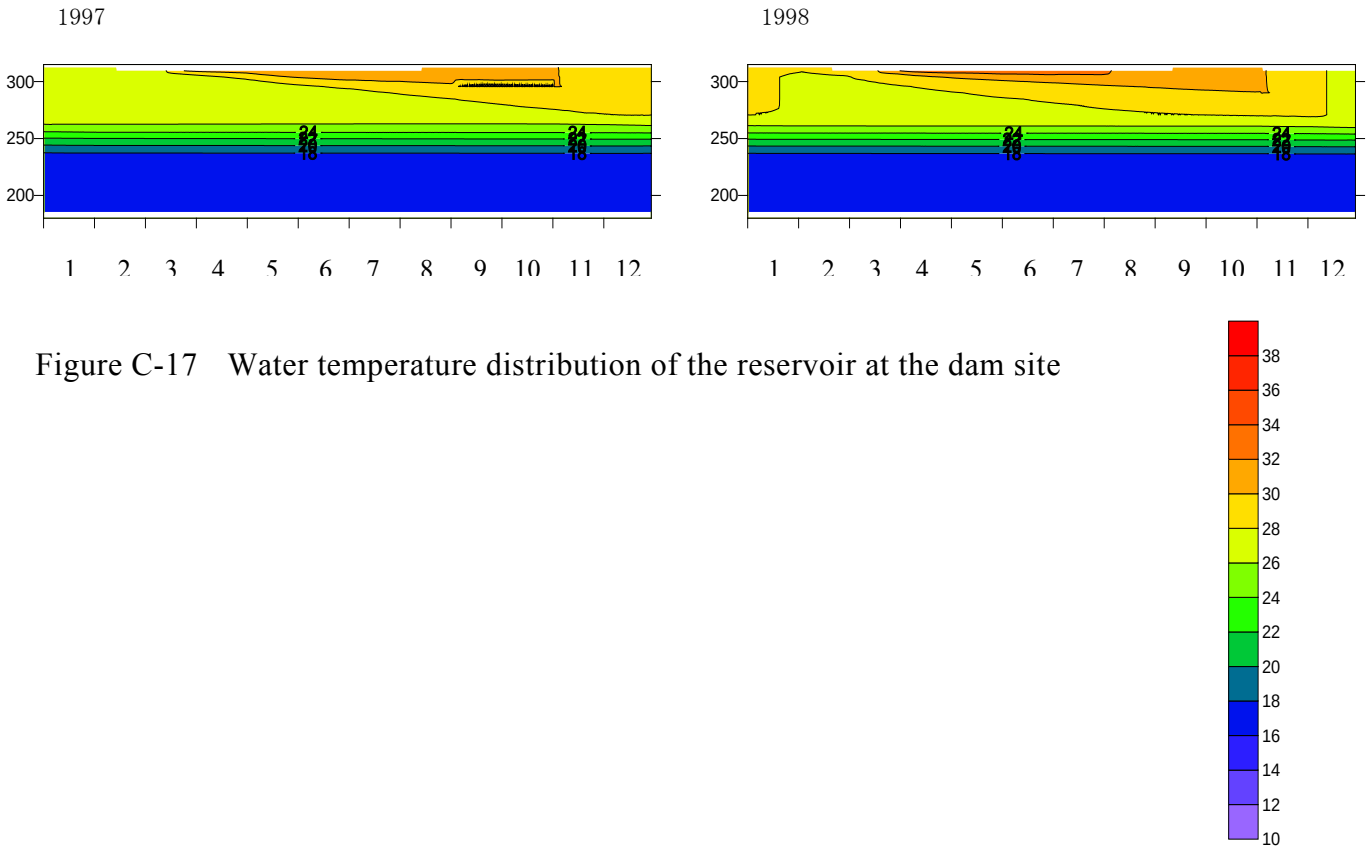


Figure C-17 Water temperature distribution of the reservoir at the dam site

2.3.2 DISSOLVED OXYGEN (DO)

Concentration prediction of DO was performed with the parameters shown in Table C-4. The values are based upon consideration of typical meteorological values from similar dam projects, from adjacent projects such as Nam Theun 2, and from average values widely used in prediction computation.

Table C-4 Parameters of DO prediction

			Range	Adopted	Ref
DO	Reaeration coeffficient	1/day	0.1~1	0.5	
	Photosynthesis by benthic algae	mg O_2/μ g-chl.a	0.063~0.2	0.1	
	Consuming rate by the decay of the organic materials	mg O_2/mg COD · day	0.01~0.1	0.03	Similar meteorological conditions in Japan
	Consuming rate by the decompositions at the bottom	g O_2/m^2 · day	0.01~3.2	0.5	Nam Theun 2

DO concentration in the reservoir's outflow was compared to the DO concentration of natural inflow over theeight year period spanning 1991 – 1998 (see Figure C-19)., These results were averaged across all years; Figure C-18 shows the resulting graph of average monthly DO. Figure C-20 shows how DO concentration varies depending on the water depth at the reservoir site.

The result of the computation provides the following major characteristics.

- Discharged DO has a significant tendency to be lower than inflow DO. The predicted range of discharged DO would vary from 4.8 to 7.4mg/l through the year, and it is not likely that the discharged DO would be less than 2mg/l.
- DO concentration at a level deeper than the sill of the power intake would possibly be less than 2mg/l.

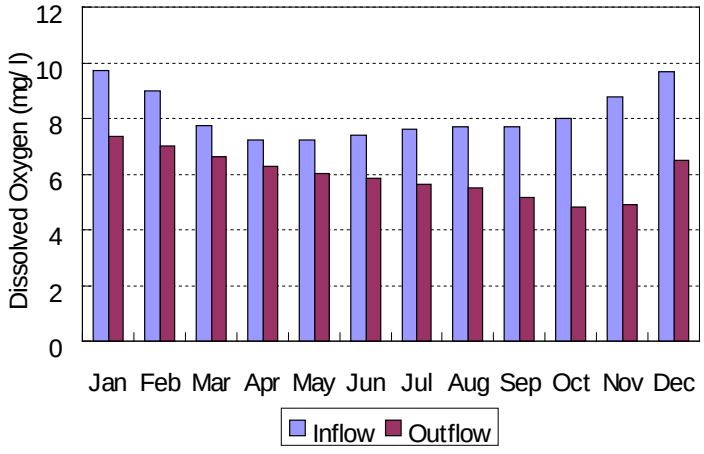


Figure C-18 Comparison of inflow and discharged DO per month

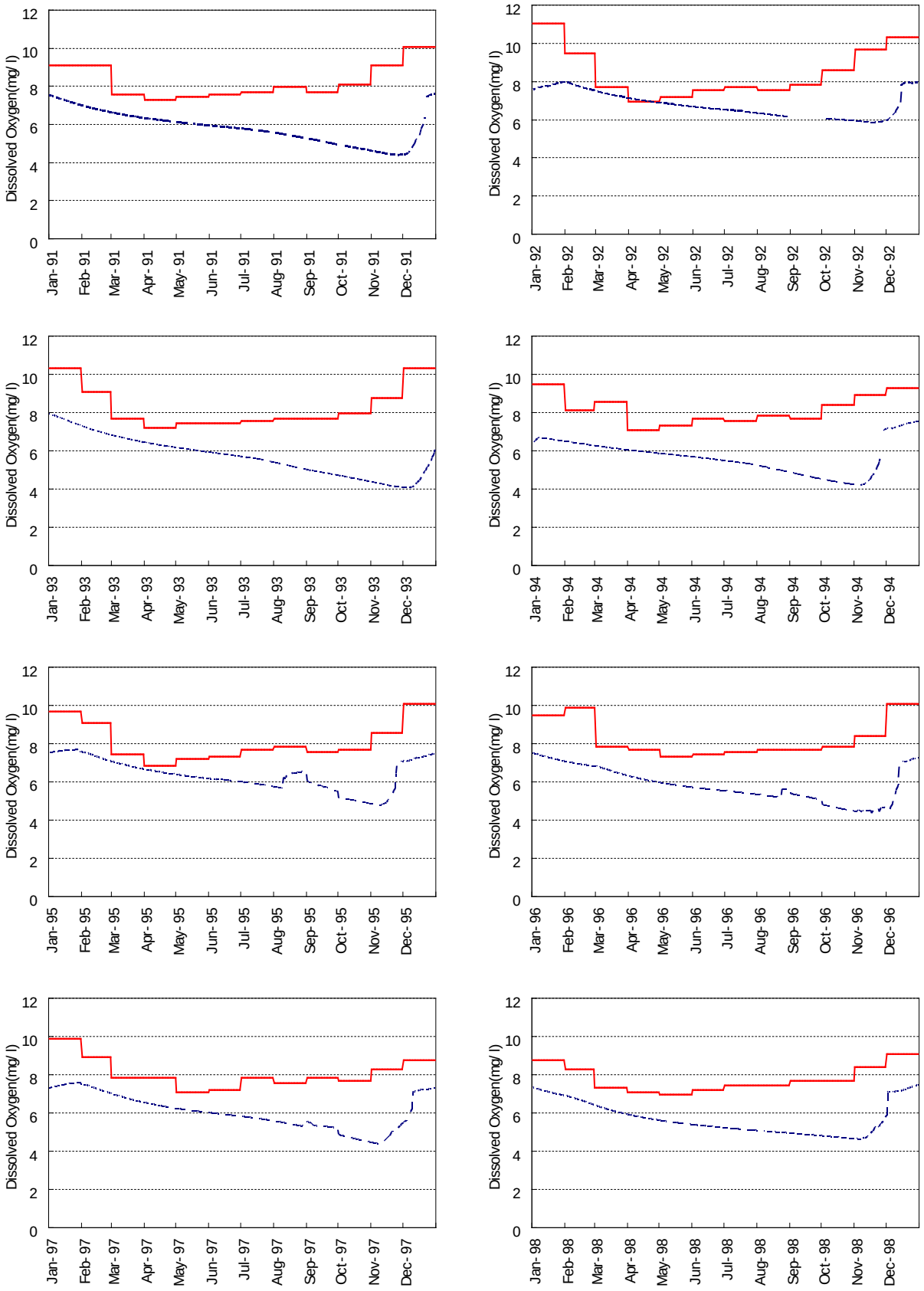


Figure C-19 Comparison of inflow and discharged DO

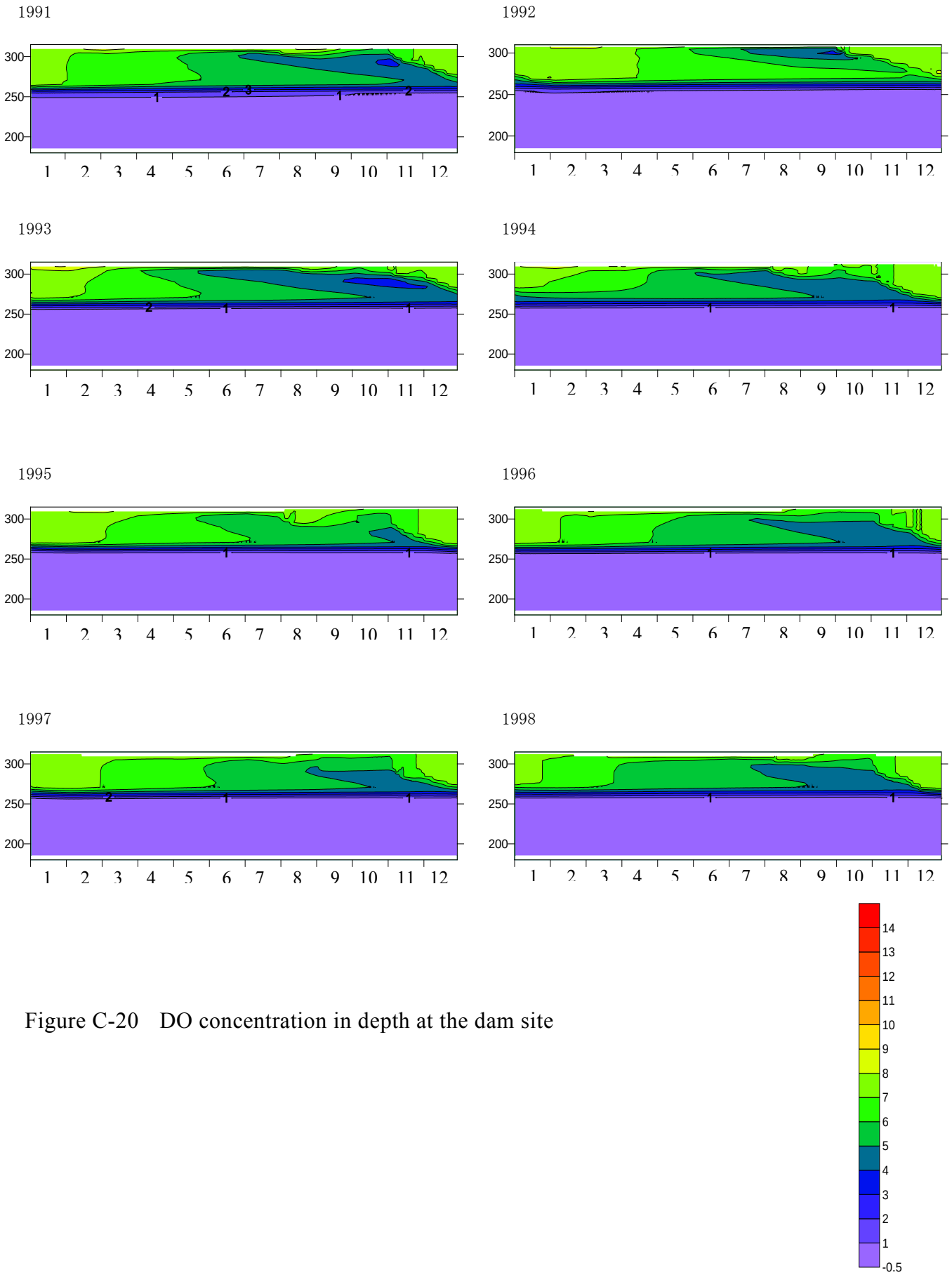


Figure C-20 DO concentration in depth at the dam site

TURBIDITY

SS concentration of the water flowing into the reservoir ("inflow") and the outflow was computed for the eight years spanning 1991-1998, the result of which is shown in Figure C-21. Additionally, Figure C-22 shows how turbidity varies depending on the water depth at the reservoir site.

Results to be noted include:

- discharged SS would be largely lower than inflow SS since most turbidity would be trapped and settled in the reservoir;
- any phenomenon of long-term turbidity was not predicted over the eight years used for computation.

One of the assumptions is that particles with a size of SS less than 10 μm would be suspended and maintained in the reservoir, of which less than a few would causelong-term turbidity over a period of a few months.

In this computation, the fine particle size distribution at the site is assumed as 30% particles which are less than 1μm and 10% which are 1-5μm.

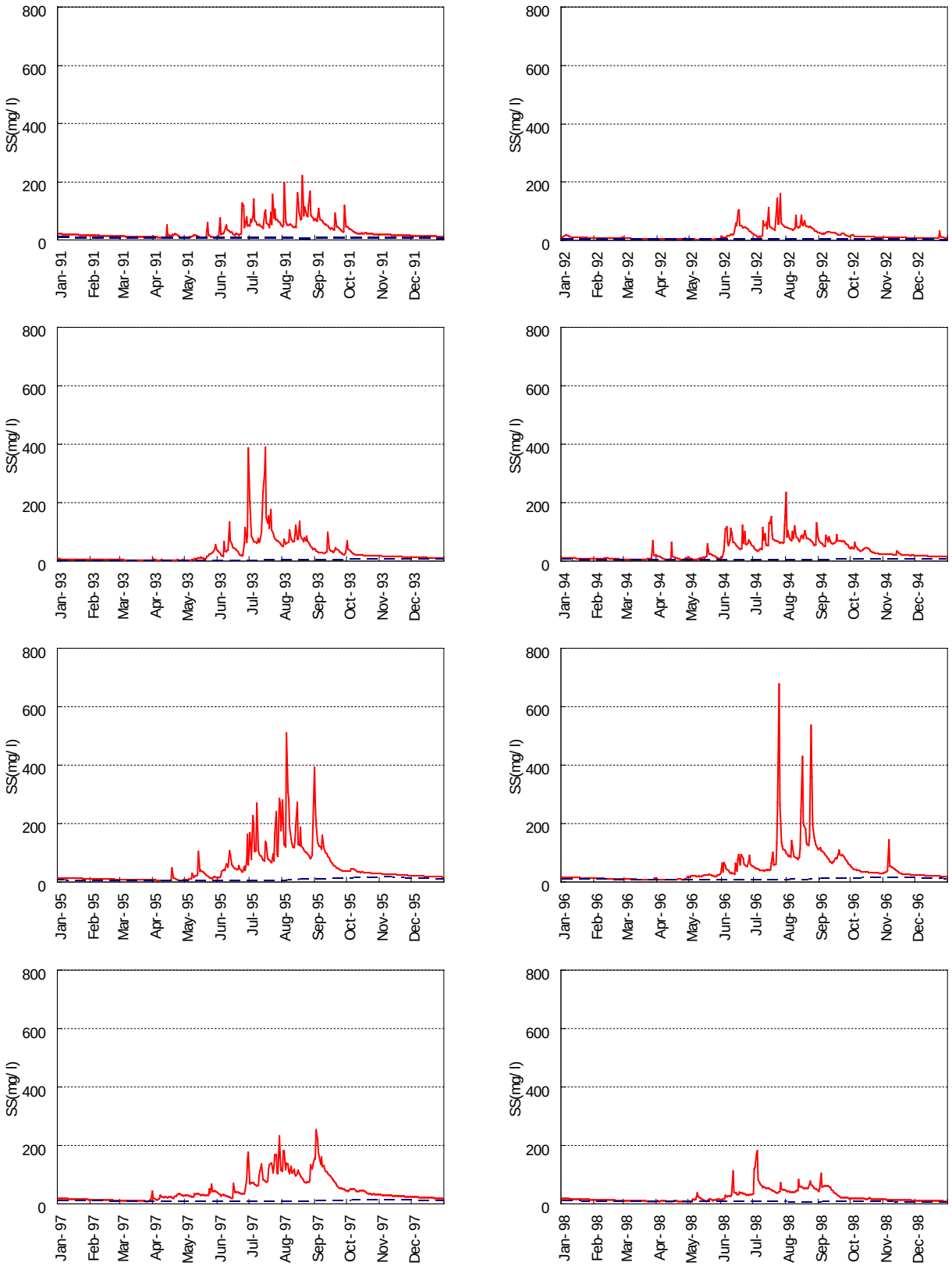


Figure C-21 Comparison of inflow and discharged SS

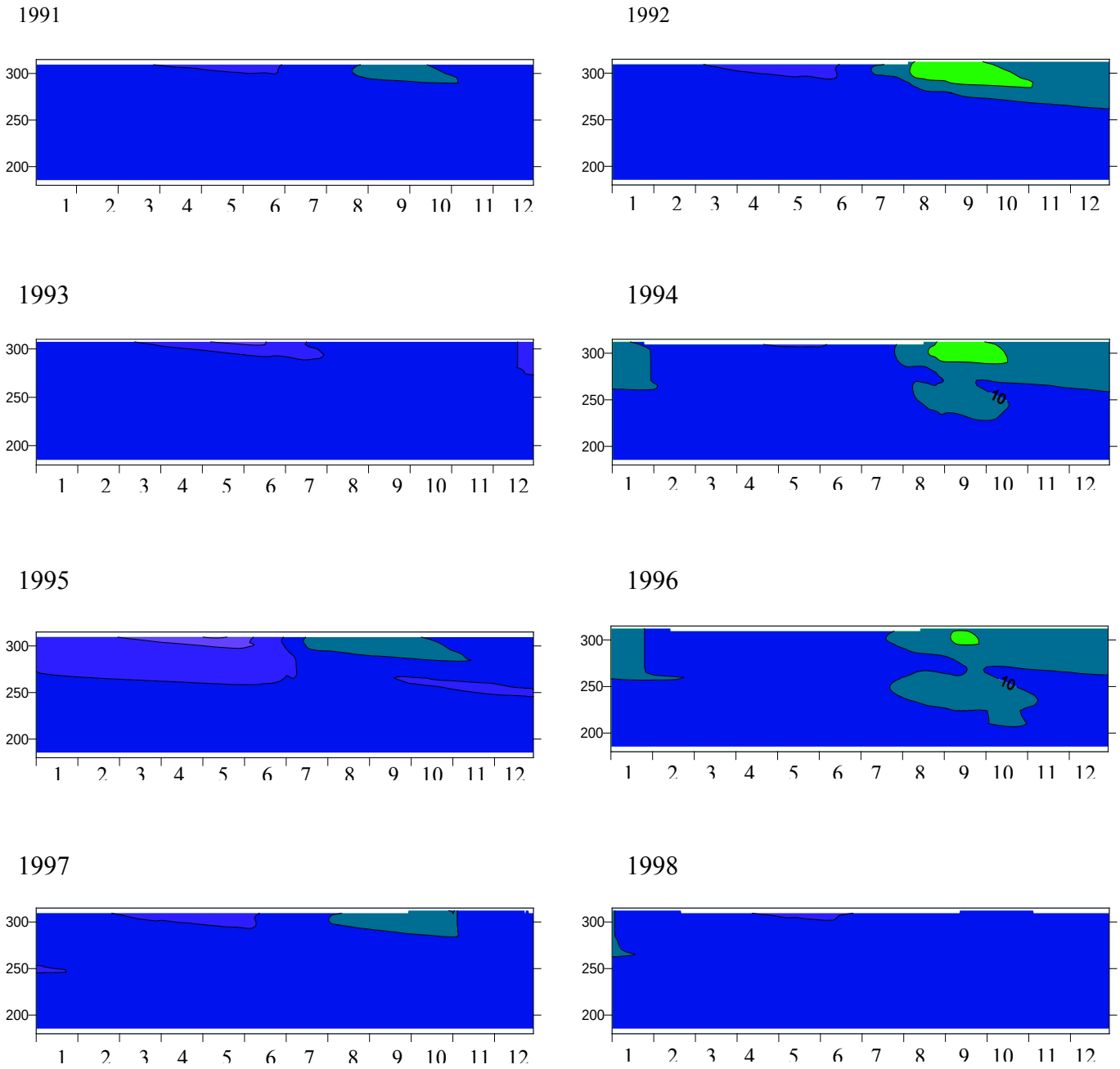


Figure C-22 SS concentration in depth at the dam site

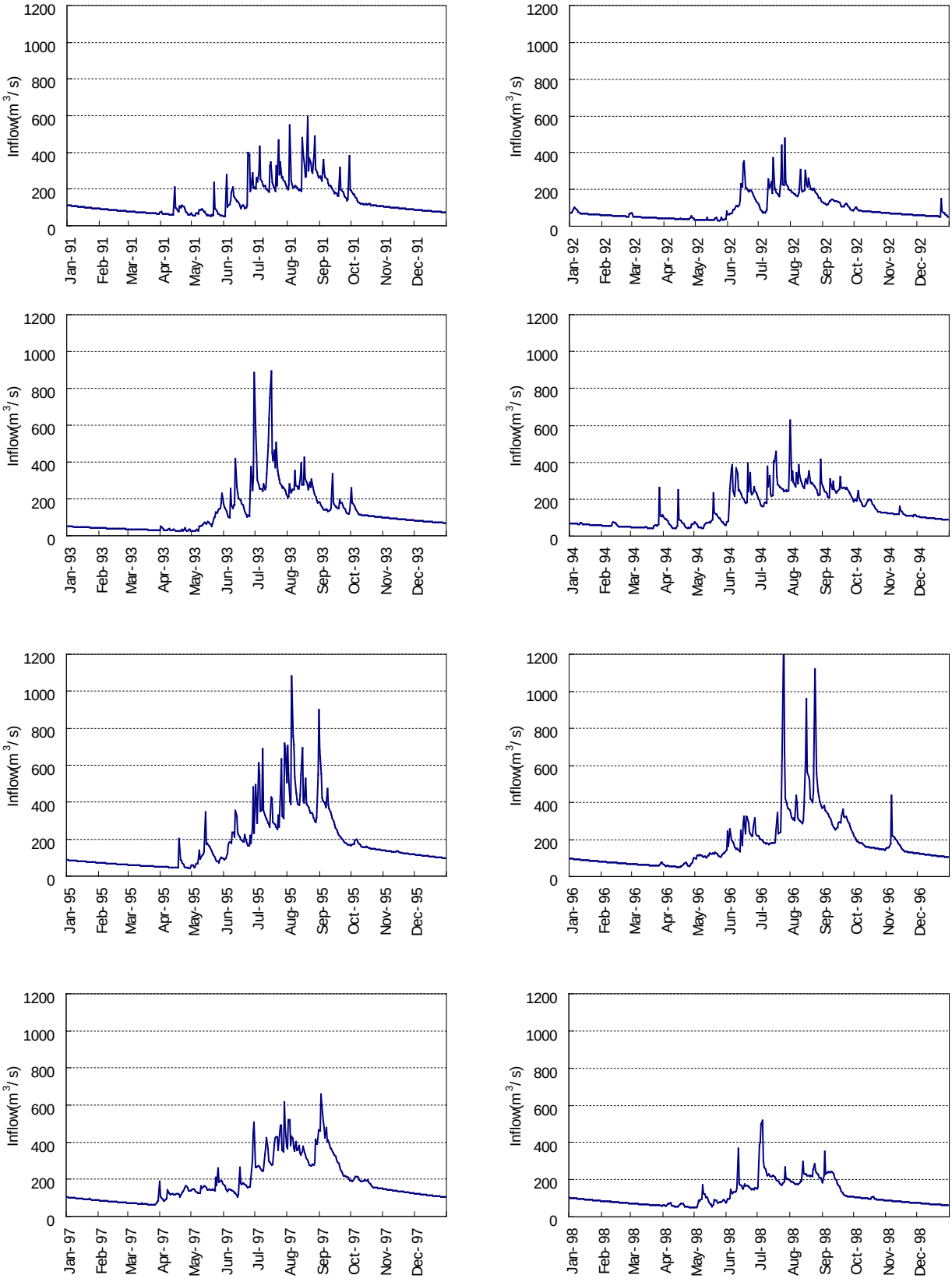


Figure C-23 Inflow data at the dam site

3 CONCLUSION OF THE WATER QUALITY MODEL

3.1 WATER TEMPERATURE

3.1.1 DAYTIME WATER TEMPERATURE IN THE RESERVOIR

The simulation of water temperature in the Nam Ngiep1 reservoir and its discharge was carried out based on the hydraulic data over an eight year period (1991-1998).

The average daytime water temperature at the reservoir surface close the dam was the lowest (26.4 °C) in January while the highest (31.2 °C) in May (Figure 7- 6). The comparative difference in the water surface temperatures at the reservoir's upper-end and at the dam fluctuated throughout the year. It was relatively higher from October to February due to heat flux by sunlight while the water flows down through the reservoir. The thermocline zone was predicted to form around EL. 250 m and it may affect the water quality for an eight year maintenance period.

3.1.2 DAYTIME TEMPERATURE OF DISCHARGED WATER

The temperature of discharged water from March to September tends to be lower than that of natural inflow for the same period, whereas it has an opposite tendency from November to February (Figure 7- 7). The temperature of the discharged water tends to be lower than that of reservoir surface water close the dam from February to November.

3.1.2 DAYTIME WATER TEMPERATURE OF DOWNSTREAM

The water temperatures of the downstream river before and after dam construction were significantly different. The water temperature varied throughout the year. During the summer months of April, May and June, discharged water at the level of the intake was cooler in temperature and caused about 4-5 °C change of the water temperature of the downstream river. An opposite trend was seen over the winter months of November, December, and January; the water temperatures of the downstream river, which were 25.1, 23.2, 23.2 °C respectively before the Project, are risen to 28.6, 27.5, 26.4°C by the discharged water.

The temperature of discharged water changes as the water flows along the downstream river course and gradually approaches the temperature of water before the Project.

3.2 DISSOLVED OXYGEN

Concentration prediction of DO changes based upon whether or not the Project is carried out. The prediction of DO concentration in the reservoir compared to the DO concentration of natural inflow and was based on data from the eight years spanning 1991-1998. The computation results show that the DO in the discharged water has a significant tendency, which was lower than that of inflow. The predicted range of the DO in the discharge varies from 4.8 mg/L to 7.4 mg/L throughout the year (Figure 7-8).

Although the DO concentration at a water depth which is deeper than the sill level of power intake is possibly less than 2mg/L, it is not likely that the DO in the discharged water be less than 2 mg/L. (Figure 7- 9).

DO concentration of discharged water from the re-regulating dam is over 6mg/L throughout most of the year. The DO concentration increases gradually while the water flows downstream due to oxygenation and dilution.

3.3 SUSPENDED SOLIDS

The computation of SS concentration of the reservoir was conducted based on the hydraulic data over an eight year period (1991-1998) The results showed that the SS in the discharged water is lower than the SS of inflow since most SS would be settled in the reservoir.

The SS concentration was computed and the results showed only about 10 mg/L to 20 mg/L of SS in the discharged water headed downstream (Figure 7- 10) which is less than one-tenth of that in the water before the Project.

ANNEX D

INITIAL ENVIRONMENTAL EXAMINATION OF ACCESS ROAD

1 INTRODUCTION

The Initial Environmental Examination (IEE) for the Nam Ngiep1 Access Road Improvement Project in Lao PDR, was carried out between October 2008 and November 2008. The scope of the project is the improvement of the access road between Vientiane to B. Hat Gniun spanning a distance of 202.5 Km.

The IEE has been prepared by the Environmental Research Institute, Chulalongkorn University (ERIC). It was done concurrently with the Resettlement Action Plan (RAP), undertaken by the same specialist.

The IEE is based on site visits; meetings with local representatives from provincial, district and village people's committees; review of available documentation, including district master plans for the urban areas through which the project road passes; regulations and data concerning this project; and the analysis of recent maps, dwelling units, survey data and inputs provided by the Kansai engineering team.

2 PURPOSE OF THE STUDY

The DOE requires official approval by the Science Technology and Environment Agency (STEA) (which has recently been renamed the Water Resources and Environment Agency or WREA) of an environmental assessment (EA) statement for electricity development projects to move forward. As designated in the 1999 environmental protection law known as National Law 02/99, WREA is in charge of the overall coordination and monitoring of local and national environmental affairs and reports directly to the Prime Minister's Office (PMO) of the Lao PDR..

The EA statement must consist of the proposed project's environmental effects on the physical, biological, socio-economic and cultural environments, as well as measures to prevent or mitigate any adverse environmental effects that are expected from the design, construction, operation and closure of the project. According to DOE's regulations as declared in 2001, an investor in a power generation project must apply for the permits to build the hydropower plant before starting any of its activities that may cause impacts to the environment.

Investigation of the access road to the main dam and the re-regulation dam has been designed with sufficient concern for environmental issues. While most previous hydropower projects that consisted of dams and reservoirs were required to carry out an environmental impact assessment (EIA), their associated access roads were generally considered separately for an IEE. Thus, depending on the anticipated environmental impacts, access road improvement could require either an IEE or an EIA. However, given their scope, most access road projects required only the IEE.

This study was prepared as the IEE report for the access road improvement to the Nam Ngiep1 Hydropower Project site. The IEE report aims to make an initial examination of the potential impacts of the project's conceptual designs on the existing environmental components, as well as to clarify whether the project will also require an environmental impact assessment (EIA) of potential adverse impacts. In order to fulfill the main tasks of the IEE, the following objectives were defined:

(1) To identify and describe the main environmental and social resources of the areas in and adjacent to the proposed access road improvement.

(2) To identify the nature of any adverse impacts that could occur from the development of the access road, in the absence of environmental protection measures. Adverse impacts were considered for both the construction and the operation phases of the access road improvement.

(3) To make an initial examination of the magnitude, scale, and significance of these potential adverse impacts.

(4) To recommend preliminary mitigation measures required to avoid and/or minimize such adverse impacts.

(5) If deemed necessary, to identify the scope of work to be carried out for a more detailed EIA for this access road improvement.

3 EXTENT OF THE IEE STUDY

The following steps were implemented in the IEE methodology.

(1) Desktop data collection and review: Secondary data sources were identified and reviewed to allow collation of relevant information on t he project details and environmental and social conditions in the project area.

(2) Field surveys: Field surveys were carried out to observe conditions in the project area and collect primary data for key issues, including social data and land use patterns.

(3) Reporting: the IEE report was prepared to meet the Lao PDR Government's and Asian Development Bank's (ADB's) requirements.

4 SCOPE OF STUDY

The study consists of activities recommended in the Environmental Management Standards issued by the DOE. It consists of four main components:

(1) A description of the existing environment in the project area. This involves review of the alignment of the access road of the Nam Ngiep1 Hydropower Project and compilation of environmental data associated with the proposed alignment. Particular focus is given to the data and description of baseline conditions that are important to the prediction of impacts and to the determination of measures to avoid and/or minimize anticipated adverse impacts.

(2) An evaluation of impact levels and feasible mitigation measures. This study used methods that are standard acceptable EIA procedures for the preliminary evaluation of impact levels for each environmental aspect. Where impacts were quantifiable or had the potential to be observable, measures to prevent or minimize such impacts were identified.

(3) Preparation for the public involvement process. T his study involved a series of meetings with the public and relevant authorities in the project area to disseminate information about the project and to receive comments and suggestions on issues of concern as well as suggestions for mitigation measures.

(4) Preparation and presentation of the IEE report. The study has resulted in the IEE report that complies with the requirements of environmental management standards issued by the DOE, Lao PDR.

5 DESCRIPTION OF ACCESS ROAD

The main construction materials to be brought in from outside the Nam Ngiep1 Hydropower Project are cement and steel bars used for concrete, gates and penstocks for metal-work, turbines and generators for the power station, and other equipment. The main construction equipment at the dam site will include earth transport and construction equipment, as well as an aggregate and concrete plant. A majority of the equipment and materials will be imported from foreign countries. At present, it is expected that the cement and steel bars will be from Thailand, and that construction equipment, transformers, gates, penstocks, and other equipment will be imported mainly from other developed countries.

The most promising transportation route for these imported equipment and materials would be through Thailand. They would first be discharged at either the Bangkok Port or the Laem Chabang Port in Thailand, and then be taken by road to Vientiane, Lao PDR via the Friendship Bridge. From Vientiane, the equipment and materials will be taken by Route 13 South to Pakxan, then to the north on a provincial road to Ban Nonsomboun before turning left to the access road to the dam site.

The transportation distance and road conditions for each section of the route between Vientiane and Ban Hat Gniun are shown in the table below. During the construction period, the stabilizing of the roadbed, the widening of existing roads and the construction of bridges or culverts at stream or marsh area crossings will be necessary since all the equipment and materials are transported through the route mentioned in Table 1. The current road conditions are not always suitable for such transport.

Table 1 Road Conditions between Vientiane–Ban Hat Gniun

No.	Section	Distance (km)	Condition
1	Vientiane–"Friendship Bridge" –Pakxan	161.7	All asphalt paved, width: 6 m, crossing 2 PC bridges on the way (Capacity: 80 tons)
2	Pakxan–Ban Nonsomboun	19.9	Asphalt paved up to Ban Nonsomboun from Pakxan, width: 6 m, crossing a PC bridge on the way (Capacity: 80 t, Width: 6 m, Length: 25 m)
3	Ban Nonsomboun–Ban Thahuea	18.3	Dirt, Width: 3.5 m
4	Ban Thahuea–Ban Hat Gniun	2.6	Dirt, Width 1.5–2.0 m
	Total	202.5	

The asphalt-paved road from Vientiane to Pakxan, or Route 13 South, was developed and used to transport materials and equipment for several big projects in the area in the central and southern region from Vientiane. Hence, there is precedent for undertaking road improvements for this project as well.

Since 2000, Lao PDR has had a program on improving "Roads for Rural Development" which supported by A DB. The Pakxan-Thasi road (79 km.) is one of the roads in the program; it is under construction and almost completed (Figure 1).

Figure 1 Program on improving "Roads for Rural Development"

Of note for the project design and construction phase, a temporary road presently exists along the left bank of the Nam Ngiep River in the section between Ban Hat Gniun and the dame site; this road was built for geological surveys for JICA-F/S. Under the initial plan, this temporary road wouldbe upgraded and used by the contractors for access to the left bank at the dam site during the construction period. But in order to use it as a permanent access road after the construction period, substantial maintenance and repair costs are anticipated due to the steep terrain and complex topography. Therefore, the updated plans call for a permanent access road to be newly built. The new route originates from Ban Hat Gniun, by way of the crest of the re-regulation dam and the two saddle dams, and crosses the Nam Ngiep River near the mouth of the gorge to the left bank, finally reaching the power station, the dam crest and the switch yard (Figure 2). The proposed design of the road, including the width, will be determined so as to allow frequent transportation of construction materials. Each distance of the access road section and the road route are shown in the Figure 2 and Table 2 below.

Table 2 Road Condition between Ban Hat Gniun and Dam Site

No.	Section	Distance (km)	Condition
1	B. Hat Gniun–Re-regulation dam	3.3	Access road–Administration building branch road: 0.2 km
2	Re-regulation dam–Left bank dam crest end	8.5	Access road–Switchyard branch road: 0.3 km
3	Left bank dam (river-crossing point)–Power station	1.4	
4	Re-regulation dam–Saddle dam (left bank)	1.6	
	Permanent road extension	14.8	
5	Saddle dam (left bank)–Left bank access road junction	4.5	
6	Right bank access road junction–Quarry site	1.0	
7	Right bank access road junction–Dam right bank crest end	2.1	
	Construction road extension	7.6	
	Total extension	22.4	

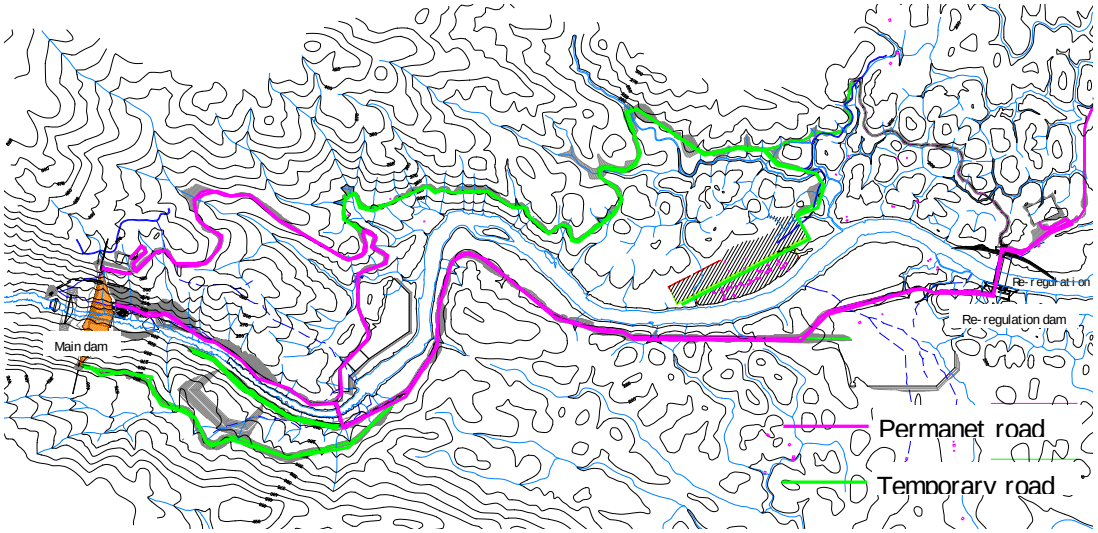


Figure 2 General layout of access road within the Nam Ngiep1 Hydropower Project

The road from Vientiane to Pakxan and from Pakxan to Ban Nonsomboun (Figure 3 and Figure 4) is already paved with a bituminous surface; hence, the present section will only address the access road section from Ban Nonsomboun to Ban Hat Gniun (Figure 5) which is a dirt path.

Figure 3 Road 13 South from Vientiane to Pakxan

Figure 4 Road from Pakxan to Ban Nonsomboun

Figure 5 Road from Ban Nonsomboun to Ban Hat Gniun

Considering the very low traffic volumes on the access road from Ban Nonsomboun to Ban Hat Gniun as well as the need to optimize benefits from the proposed investments, the project team felt that improving all-weather connectivity and accessibility and improving the riding quality of selected roads within the project area should take priority over road widening. Accordingly, improvements will be carried out along the existing route; roads will be upgraded either through structural overlays or complete reconstruction (where the existing asphalt road structure has collapsed or where the road is made of dirt). Work will also include rehabilitating or constructing bridges and culverts and raising road levels where required in flood prone areas.

The improved access road will be constructed with two-lane (5.5 m.) bituminous surface treated (BST) carriageways. The road will have 0.75 m. paved shoulders on each side.

6 NEEDS FOR THE PROJECT

Since the main construction materials must be brought in from outside the project area, the most promising transportation route for the imported equipment and materials would be inland roads. The transportation distance and road conditions for each section of the route leading the Project area must be evaluated for the most effective measures to minimize environmental impact. During the construction period, the stabilizing of the roadbed, the widening of existing roads and the construction of bridges or culverts at streams or low area crossings will be necessary in order to transport all the equipment and materials.

7 LOCATION

The project access road originates at Ban Nonsomboun and extends to the project site at Ban Hat Gniun. The length of the road from Ban Nonsomboun to Ban Hat Gniun is approximately 20.9 km.

It had originally been intended that the improvement works would be contained within the existing Right-of-Way (ROW) of the access road (the base case). During the feasibility study phase by JICA, however, alternatives involving substantial lengths of new alignment

were also investigated because of the low volume of traffic and the type of vehicle use (only farming vehicles use certain sections of the road). During the design phase, base case and realignment alternatives were investigated more thoroughly. Comparisons of each alternative were carried out and discussed with local authorities in order to obtain consensus and agreement for the alignment finally selected. Figure 6 presents a short description of the base case and the recommended alignment.

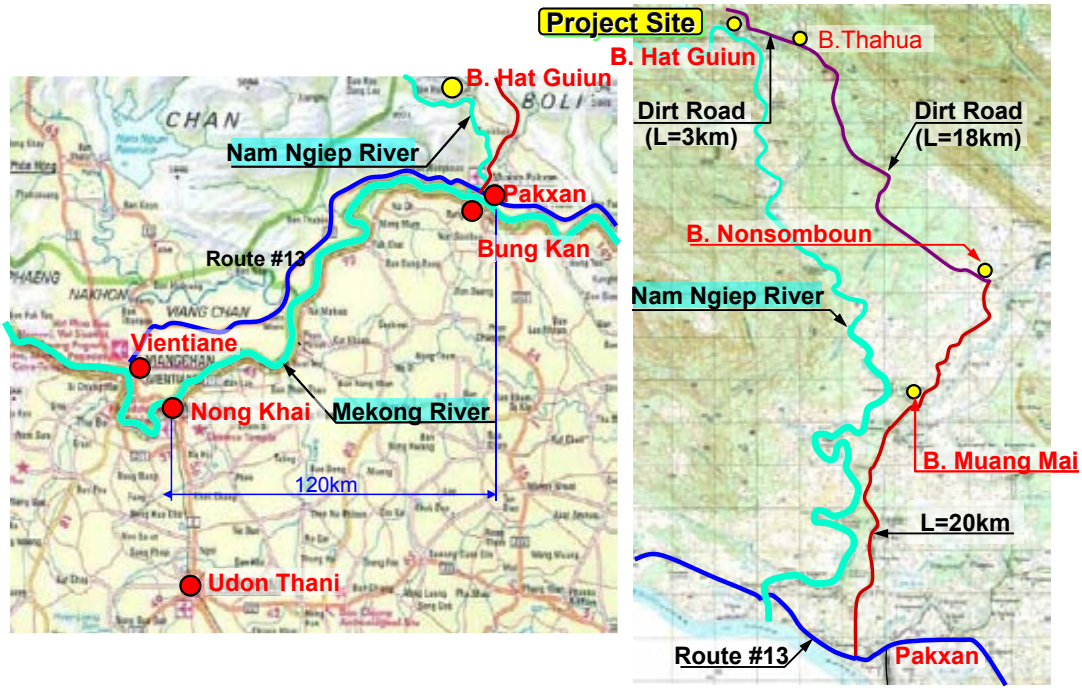
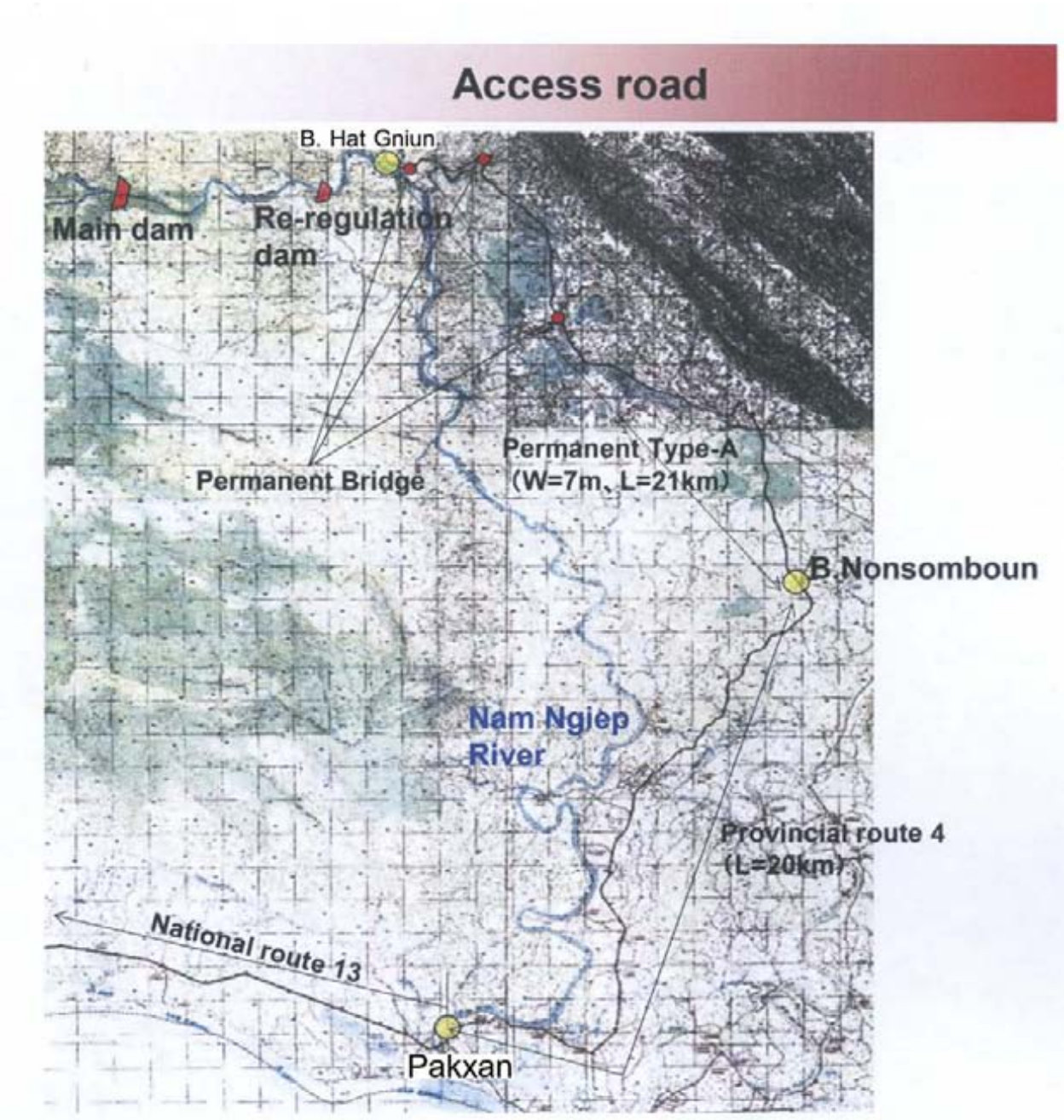


Figure 6 General layout of existing road between Vientiane and Ban Hat Gniun

7.1 BASE CASE

The base case provides for rehabilitation of the project access road. This includes rehabilitation to a two-lane undivided standard on t he existing access road from Ban Nonsomboun to Ban Hat Gniun (unpaved during project construction but paved during project operation) and rehabilitation or replacement of all bridges (of which there are three in the proposal) along the route. Figure 7 maps the proposed access road alignment.



Source: Kansai, 2008

Figure 7 Proposed access road alignment including the three bridges

7.2 ALTERNATIVE TO THE BASE CASE

This alignment consists of the base case plus a number of additional bridges. (Figure 8)

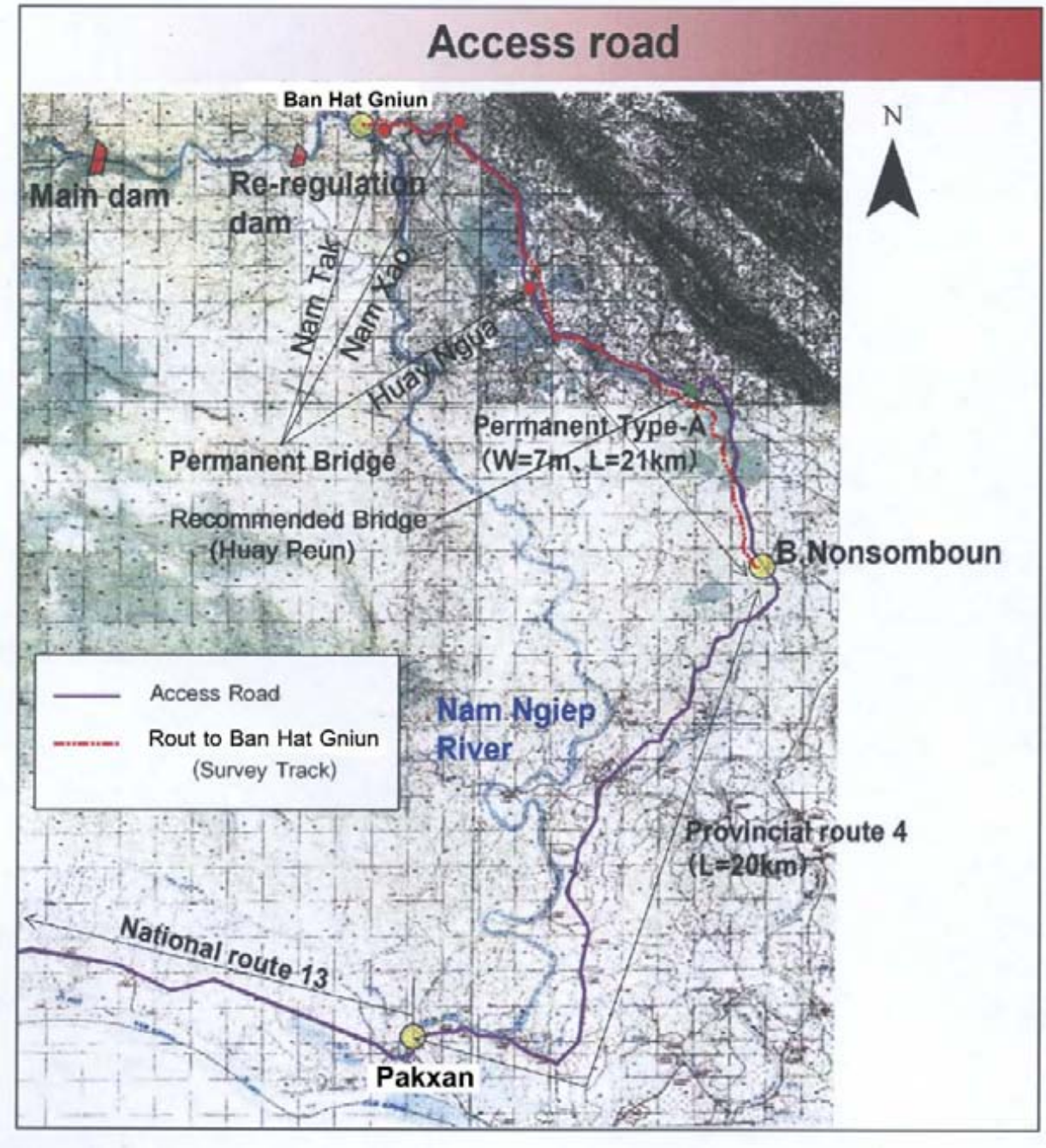


Figure 8 Alternative to the base case including additional bridge work

7.2.1 COMPONENTS

The roads will be constructed in a cut-and-fill method so there will be no particular borrow pits. This access road will be based on the EPC contractor design.

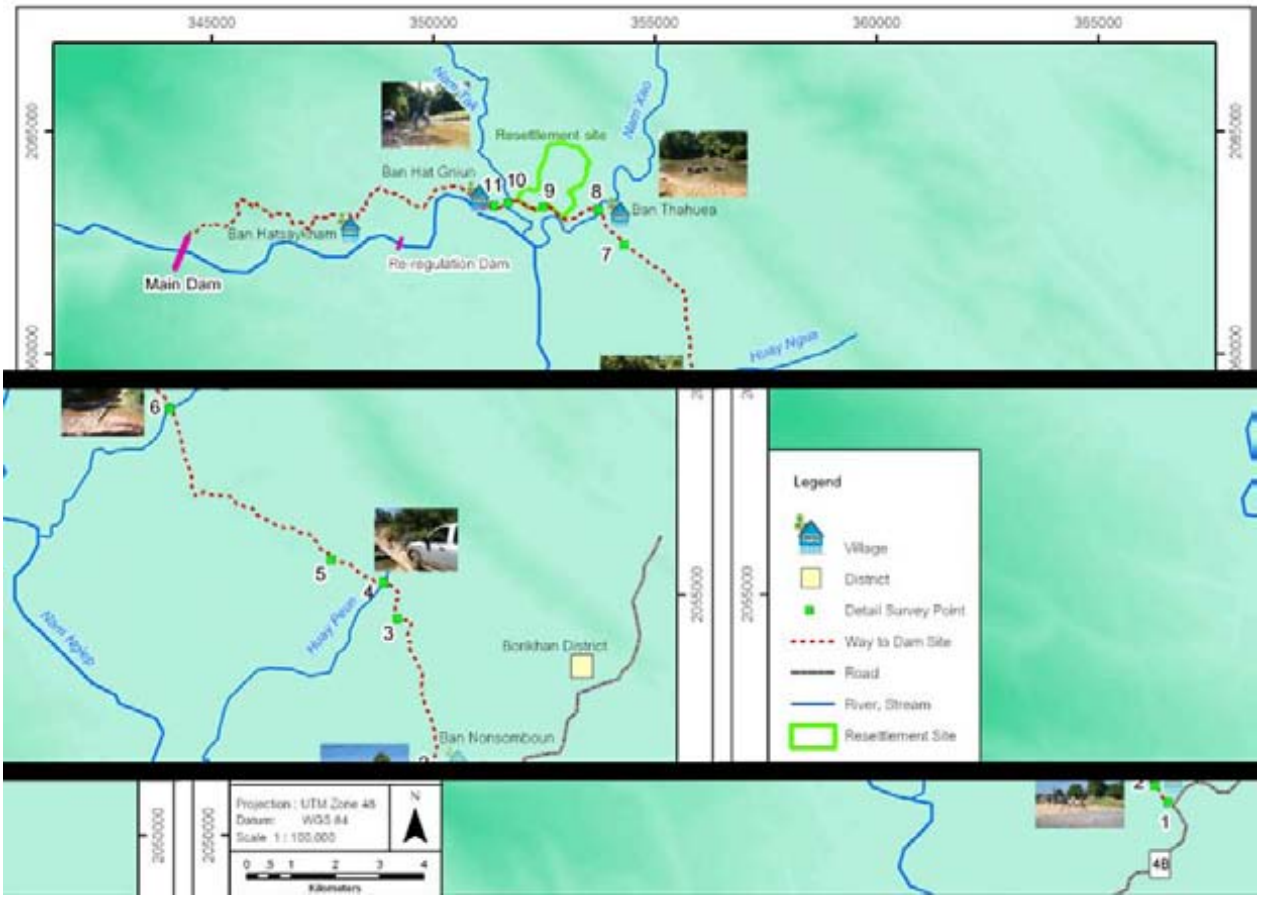


Figure 9 Existing road from Ban Nonsomboun to Ban Hat Gniun

Point 1 Ban Nonsomboun 1

UTM 362590 E 2050740 N

Point 2 Ban Nonsomboun 2

UTM 362300 E 2051110 N

Point 3 Plantation demonstration

UTM 361350 E 2054460 N

Point 4 Huay Peun 1

UTM 361030 E 2055280 N

Point 5 Huay Peun 2

UTM 359840 E 2055790 N

Point 6 Huay Ngua

UTM 356220 E 2059180 N

Point 7 Ban Thahuea

UTM 354300 E 2062450 N

Point 8 Nam Xao

UTM 353715 E 2063245 N

Point 9 Resettlement

UTM 352515 E 2063325 N

Point 9 Resettlement (Cont.)

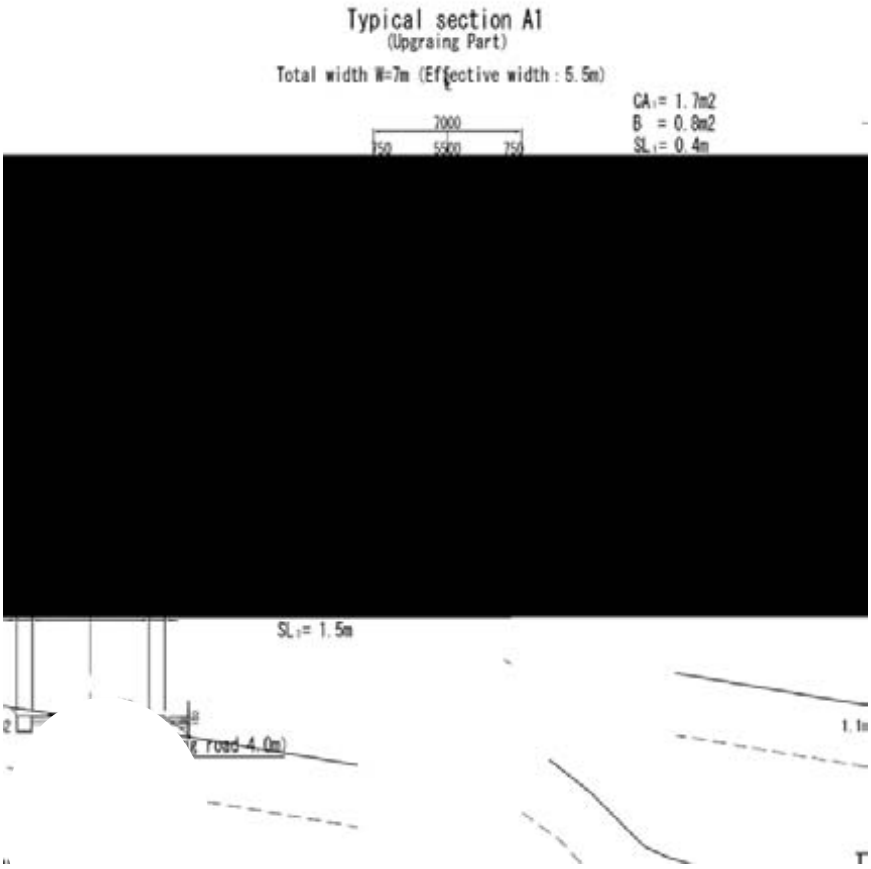
UTM 352515 E 2063325 N

Point 10 Nam Tak

UTM 351665 E 2063385 N

Point 11 Ban Hat Gniun

UTM 351375 E 2063325 N



Source: Kansai, 2008

Figure 10 Typical section of permanent and temporary access road

All the construction access roads (from Ban Nonsomboun to Ban Hat Gniun and from Ban Hat Gniun to the project site) are designed as non-paved during construction period. Part of the construction roads will be converted to the paved permanent road after the construction work ends. A 22 kV electric line will be placed within the ROW alongside the road, between Ban Nonsomboun, where it will connect to the grid, and the construction site. Since the entire line will be within the ROW of the access road, there will be no additional need for land for the electric line and no additional environmental impacts caused by the line.

8 ENVIRONMENTAL CONDITION OF PROJECT AREA

8.1 PHYSICAL RESOURCES

8.1.1 ATMOSPHERE

The access road is located in the Bolikhamxay Province, Lao PDR, which is influenced by a Southwestern monsoon climate regime. The project area is located in a tropical climate. Weather is dominated by monsoons, which divides the year into clearly defined wet and dry periods. The wet season begins from May and extends until October, while the dry season runs from November to April.

The area around the project site experiences good weather conditions in comparison to the rest of the Lao PDR. The IEE study found that for the months of March to the end of May, temperatures ranged from 17 ^{o}C to 38 ^{o}C (Department of Meteorology and Hydrology, 2005). In the wet season from the beginning of June to the end of September, emperature ranged from about 19^{o} C to 36^{o} C, and from December to February (considered to be the dry season) temperatures ranged from about 11^{o} C to 29 ^{o} C.

The rainfall records were reviewed for the hydrological study and dam designs. The records of hydrological gauging locations in areas peripheral to the planned basin were evaluated.

Average annual rainfall in Lao PDR in select locations in the country is:

- In Vientiane – about 1,600 mm
- In Luang Prabang Province – about 1,200 mm
- In Savanakhet – ranging from about 1,500 mm to 2,000 mm
- In mountainous areas and in the western highlands of Anamit Mountain about 2,000 to 3,000 mm

Rainfall data were collected from three gauging stations within the basin and another eleven stations from the peripheral areas. Other meteorological data such as air temperature, relative humidity, barometric pressure, solar radiation, sunshine hours, evaporation, and wind velocity were not conducted at the gauging stations. According to Kansai's Technical Report from 2007, the mean basin rainfall from 1971 to 2000 was assumed to be 1,870 mm/year after comparing to the isohyetal map.

The mean rainfall in the Nam Ngiep River basin was lower than that of Pakxan because of the topographical characteristics of the region. According to the meteorological data of Pakxan District (DMH, 2005), the seasonal variation of monthly rainfall follows the general pattern of the Southeast Asia monsoon, with about 90% of rainfall during the six month wet season from May to October. In the dry season from November to April, the monthly precipitation levels are quite low, ranging from 3.7 mm to 67.5 mm, or about 10% of the annual precipitation for this region.

8.1.2 TOPOGRAPHY

The Nam Ngiep River, which originates in the Phonsavan Basin, takes its course as a whole to a south-south-east direction, alternating the sections of southward and southeast-wards, and passes through the mountainous regions before reaching to the outlet of the gorge at about 7.7 km from Ban Hat Gniun village. After that, it runs down the hilly region and finally joins to the Mekong River at Pakxan. Note that the access road (Pakxan to Bolikhan) runs along the Nam Ngiep River to Ban Nonsomboun.

Most parts of the project area have a relief elevation of less than 180 meters. The re-regulated dam (which is within the project area) is located about 6 km from the main dam along the river which is running from west to east. The areas on both sides of the river are widening and consequently constructing more flat plains.

The study area is rather flat and tilted towards the Mekong River. There are tributaries from Phu Keng, Phu Ngou to Phu Pha Mela merging in this section of the Nam Ngiep. The major tributaries are the Nam Pa and the Nam Tak.

8.1.3 SOIL

The following types of soils are likely to be represented in the Project area:

(1) Alisols (AL)

Soil having an argic B horizon which has a cation exchange capacity equal to or greater than 24 cmol (+) kg^{-1} clay and a base saturation (by NH_4OAc) of less than 50 percent in at least some part of the B horizon within 125 cm of the surface; lacking the E horizon abruptly overlying a slowly permeable horizon, the distribution pattern of the clay and the tonguing which are diagnostic for planosols, nitisols and podzoluvisols respectively.

(2) Acrisols (AC)

Soil having an argic B horizon which has a cation exchange capacity of less than 24 cmol (+) kg^{-1} clay and a base saturation (by NH_4OAc) of less than 50 percent in at least some part of the B horizon within 125 cm of the surface; lacking the E horizon abruptly overlying a slowly permeable horizon, the distribution pattern of the clay and the tonguing which are diagnostic for planosols, nitisols and podzoluvisols respectively.

- Haplic Acrisols (ACh)

  Acrisols which are not strongly humic; lacking ferric properties; lacking plinthite within 125 cm of the surface; lacking gleyic and stagnic properties within 100 cm of the surface.

- Ferric Acrisols (ACf)

  Acrisols which are not strongly humic, showing ferric properties; within 125 cm of the surface; lacking plinthite within 125 cm of the surface; lacking gleyic properties within 100 cm of the surface.

(3) Luvisols (LV)

Soil having an argic B horizon which has a cation exchange capacity equal to or greater than 24 cmol (+) kg^{-1} clay and a base saturation (by NH_4OAc) of 50 percent or more throughout the B horizon; lacking a mollic A horizon; lacking the E horizon abruptly overlying a slowly permeable horizon, the distribution pattern of the clay and the tonguing which are diagnostic for planosols, nitisols and podzoluvisols respectively.

- Haplic Luvisols (LVh)

  Luvisols having an argic B horizon with coloration which is not strong brown to red[1]; lacking an albic E horizon; lacking a calcic horizon and concentrations of soft, powdery lime within 125 cm of the surface; lacking vertic properties; lacking ferric properties; lacking gleyic and stagnic properties within 100 cm of the surface.

- Ferric Luvisols (LVf)

  Luvisols showing ferric properties within 125 cm of the surface; lacking albic

E horizon; lacking plinthite within 125 cm of the surface.

(4) Lixisols (LX)

Soil having an argic B horizon which has a cation exchange capacity of less than 24 cmol (+) kg^{-1} clay at least in some part of B horizon, and a base saturation (by NH_4OAc) of 50 percent or more throughout the B horizon; lacking a mollic A horizon; lacking the E horizon abruptly overlying a slowly permeable horizon, the distribution pattern of the clay and the tonguing which are diagnostic for planosols, nitisols and podzoluvisols respectively.

- Haplic Lixisols (LXh)

  Lixisols lacking an albic E horizon; lacking ferric properties and plinthite within 125 cm of the surface; lacking gleyic and stagnic properties within 100 cm of the surface.

- Ferric Lixisols (LXf)

  Lixisols showing ferric properties within 125 cm of the surface; lacking an albic E horizon; lacking plinthite within 125 cm of the surface; lacking gleyic and stagnic properties within 100 cm of the surface.

(5) Cambisols (CM)

Soil having a cambic B horizon and no diagnostic horizons other than an ochric or an umbric A horizon or a mollic A horizon overlying a cambric B horizon with a base saturation (by NH_4OAc) of less than 50 percent; lacking salic properties; lacking the characteristics diagnostic for vertisols or andosols; lacking gleyic properties within 50 cm of the surface.

- Dystric Cambisols (CMd)

  Cambisols having an ochric A horizon and a base saturation (by NH_4OAc) of less than 50 percent at least between 20 and 50 cm from the surface; lacking vertic properties; lacking ferralic properties in the cambic B horizon; lacking gleyic properties within 100 cm of the surface; lacking permafrost within 200 cm of the surface.

Soils in the project area reflect variations in parent material and can be divided into fluvial environments (subject to river processes) or colluvial environments (subject to *in situ* weathering of bedrock initiated by rainfall). Small-scale spatial variation in soil depth is large for all soil types, with soil depths varying from less than 25 cm to over 1 m, but seldom exceeding 2 m over short distances. A deep solum (material between the effective root growth layer and bedrock) can exist up to a depth of 2 to 3 m in the highly weathered (but not easily eroded) material.

The skeletal soils (lithosoils), in more shallow horizons, are soils with a lithic or paralithic contact within 25 cm of the surface or with more than 50 percent rock fragments within this depth. Such shallow soils are susceptible to erosion after vegetation is removed. The structure of red-yellow podzolic soils ranges from massive to weakly coarse or medium blocks. They are acidic (i.e., pH < 5) and have low base saturation. The small percent of soils that are not podzolic are most often lateritic. These soils are well drained, still shallow

(less than 2 m), and consist of yellow to red clay-loam material. They are also acidic (pH < 5.5), and have a high sesquioxide (Fe-Al) content, but a low base content; thus, they are poor in nutrients. One difference between the two is lateritic soils are more highly permeable when undisturbed, thus making these soils less susceptible to erosion (Whitmore, 1984).

Preservation of surface soil, with its all-important organic matter, is imperative. Low input farming on acrisols, in their present leached condition, is not very successful. Mechanical clearing of the natural forest by extraction of root balls and filling of holes with surrounding surface soil produces land that is largely sterile because toxic levels of aluminium in the former subsoil kill off new growth. All exposed soils erode at a faster rate, increasing the risk and adverse impact of greater sediment discharge rates into local waterways.

Adapted cropping systems with complete fertilization and careful management are required if sedentary farming is to be taken up on acrisols. Recent agricultural production research (Lao-IRRI, 1995) and shifting cultivation studies (UNDP, 1994) confirm the statements made here, and show soils in Lao lack sufficient mineral content. The studies indicate that soils are acutely deficient in phosphate, which is needed to help plants use nitrogen.

Studies regarding the paddy areas around the project area in 2000 showed there is a consistent yield response to an incremental increase in P (phosphate) application rate (Lao-IRRI, 2000). There is also a need for K (potassium) in the fertilizer recommendations for this site. The application of limestone to correct soil acidity will also improve availability of phosphorus and potassium. Commonly used slash-and-burn agriculture (otherwise known as shifting cultivation), such as garden plots may utilize large areas of marginal lands, but can represent a well adapted type of land use. The proven practice has been developed over centuries of trial and error. If occupation periods are short (one or two years) and followed by a sufficiently long regeneration period (up to 15 to 20 years), this system probably makes the best use of limited possibilities of acrisols (Driessen and Dudal, 1991). Due to access limitations to new land and government regulations, coupled with a growing food demand, the length of fallow is being shortened. This results in reduced yields, not higher production rates.

Gravel for stabilizing roads is available from the lateritic red soils. Presently, existing erosion is limited due to the protective forest cover. Erosion increases with road construction, particularly with roads built with steep grades, with the removal of such protective forest cover. Soils around the proposed construction sites and camps are also prone to wind and water erosion. Therefore, care must be taken as construction starts to implement appropriate measures to control erosion in work areas and camps. Appropriate measures vary by soil type exposed, and monitoring will be necessary to determine the effectiveness of mitigation measures.

8.1.4 SURFACE WATER AND GROUNDWATER QUALITY

The Nam Ngiep River originates in mountainous areas of Xieng Khouang province and runs through lowlands to the Mekong River in Bolikhamxay province. Its tributaries (Huay Peun, Huay Ngua, Nam Xao and Nam Tak) within the access road project area are small compared to Nam Ngiep River. The quality of water sources is normally affected by residential and agricultural activities; within the project area, density of houses and agricultural activities in the upstream of the tributaries was very low. The villages are located mostly on the

riverbanks of the Nam Ngiep River since the local people use the river to commute to other places, to transport agricultural products and for washing, bathing and waste dumping.

There was a well at Ban Hat Gniun, but the villagers of Ban Hat Gniun did not use it for water supply; instead, they disposed of substantial amounts trash in it. Spring water (water from mountain fed to the village which the project supported by Action Contre la Faim, ACF) and Nam Ngiep River were the main water sources that supplied water to the village.

	
Nam Xao	Huay Ngua

8.1.5 GEOLOGY

The geology of Laos is, in general, composed of old formations which are divided into three belts or zones (as illustrated in Figure 11): the Kontung Belt, the Truongson Belt and the Louangphabang Belt.

(1) Kontung Belt

Centered around the Korat Highland of Thailand is the stable Central Indochina Continent or Kontung Belt, which is roughly a triangular shape with its north end at the Vientiane Plain. This belt, which covers significant portions of Cambodia and southern Vietnam, as well as northeast Thailand and Lao PDR, consists of Precambrian metamorphic rocks.

(2) Truongson Belt

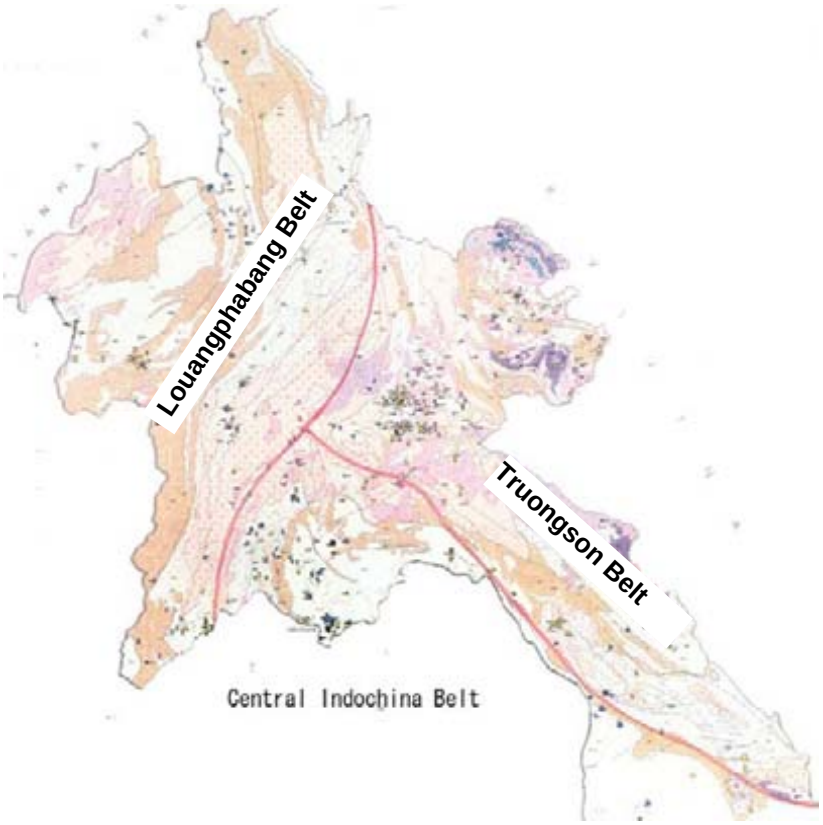
The Truongson Belt was formed from a deep-water basin that lies in a NW-SE direction along the east side of the Kontung Belt. It consists of marine volcano-sedimentary rocks that were deposited in the early Cambrian to Ordovician periods on top of a Pre-Cambrian base.

(3) Luangphabang Belt

The Luangphabang Belt was formed from a sedimentary basin and a volcanic arc during the Silurian period (430-395Ma). It lies in a NNE-SSW direction to the northwest of the Kontung and Truongson Belts.

During the mid-Triassic (225-190Ma) age, shallow shelf sea conditions prevailed to the south in both the Truongson and Luangphabang Belts, with deposits of limestone and a gradual increase in the proportion of clay and sand. Deposits of continental red sands continued from the mid-Jurassic (190-136Ma) to Cretaceous (136-65Ma) ages over the stable continental area, with clay-rich sediments dominating the upper part of the sequences. These

Jurassic shallow-sea deposits are the formations that are distributed in the Nam Ngiep project area.

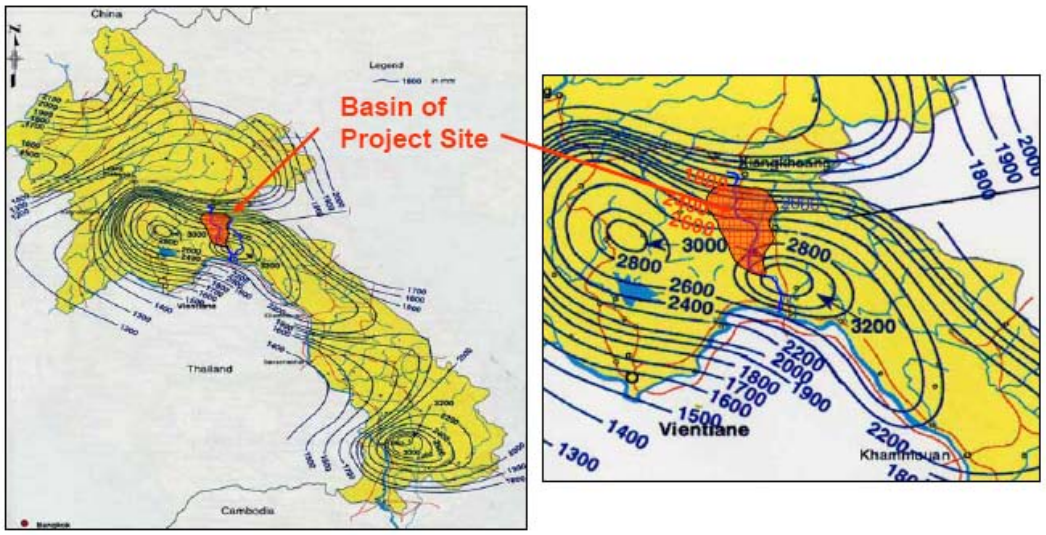


Source: Kansai and EGAT, Technical Report, 2007

Figure 11 Geological belts of Lao PDR.

8.1.6 HYDROLOGY

The mean rainfall of the basin of 1,870 mm/year was finally selected after considering the isohyetal map (Figure 12). The mean rainfall of Nam Ngiep River basin was assumed at 1,870 mm/year which was substantially less than the annual rainfall in Pakxan (3,000 mm). The tropical low pressure system, developed in the China Sea and moving along the Mekong Valley, is blocked by high mountains and steep cliffs of the northwestern region. Because of this formation of peaks and high elevation, there is a tendency for storm formations to stall there until the low pressure dissipates.



Source: Ministry of Mines and Energy, Lao PDR

Figure 12 Isohyetal map

Based on actual measurements of discharge at the Moung Mai station over a fourteen year period, the estimated discharge for Nam Ngiep River at Ban Hat Gniun was calculated. The difference between measured discharge and calculated discharge was minimized through a trial-and-error method. This "tank model" methodology and low flow analsysis resulted in annual average discharge (1971 to 2000) of 148.4 m^3/s.

8.2 BIOLOGICAL RESOURCES

Ecology is the study of the relationships between living organisms, their including their energy flows, and their interactions with their physical environment and surroundings. Thus, the ecological view of the natural environment includes ecosystems, habitats and the richness of species of flora and fauna – the full range of biological diversity.

8.2.1 TERRESTRIAL ECOLOGY

Most of the existing vegetation within the project site is not indigenous to the area; human activity is likely responsible for most of the identified flora. Most of the corridor along the access road is lined with forests and brush. The term "forest" as used in this report refers to degraded or secondary forest, most of which consists of low, dry scrub(the aftermath of many years of slash-and-burn agriculture as practiced by indigenous and tribal people).

The land cover of the project site in dominated by shifting cultivation; the majority of wildlife takes shelter in the forests. There are several different forest types. These generally consist of significant areas of unstocked forest; and mixed forest. The mixed forest is either located either on areas of steep elevation (where virgin forest is not found) or on poor soils unsuitable for agricultural production. It should be noted that it is sometimes difficult to distinguish the virgin forest from the unstocked forest, especially from aerial surveys. Shifting cultivation is practiced near the Nam Ngiep River and the project site.

Based on field observations within the project area, four streams (Huay Peun, Huay Ngua, Nam Xao and Nam Tak) with a minimal to moderate level of flow discharge (suspended matter) flow in to the river. Additionally, human activities take place in the river and are not conducive to the healthy development of aquatic life. Much of the sediment discharge is a direct result of the slash-and-burn induced deforestation.

Wildlife is defined herein as undomesticated animals (excluding humans) and plants found in the natural environment. The diversity of wildlife is extensive and includes species of mammals, birds, reptiles, amphibians, fishes, insects and all type of plants.

Lao PDR enjoys a biodiverse and species-rich environment with many fauna populations and habitats remaining relatively stable compared to other countries in the region. At least 166 species of reptiles and amphibians, 700 bird species, and 100 mammal species are found in Lao PDR. However, most of them are found only in the existing national biodiversity conservation areas (NBCAs).

Based on data from the World Conservation Monitoring Centre (WCMC), threatened species recorded in Lao PDR as of November 1998 included 220 plants and 150 animals.

Within and around the project area, wildlife conditions were surveyed and assessed by visual inspection as well as interviews of villagers; secondary data and information was gathered from available sources including the local authorities. Based on a review of all collected data, the only remaining habitats with significant wildlife are on the steep inaccessible slopes that house undisturbed forest (outside the project area). Wildlife in Lao has been and is still indiscriminately and extensively hunted. In the project area, the majority of wildlife species have disappeared, mainly due to the loss of habitat from the expanding agriculture and land use change (inclusive of slash-and-burn cultivation). As noted earlier, unsustainable hunting practices – which have been a significant part of the livelihood of local people for generations – has also contributed to loss of species.

Wildlife along the route of the access road is limited due to the intense human activity. No wildlife was observed during the field surveys.

The original forests of the Northern-central Highlands were predominantly dry evergreen and mixed deciduous forests. However, shifting cultivation has removed much of the original forest; large areas of grassland, bamboo and other secondary vegetation are now present. Non-timber forest products (NTFPs) such as leaves, shoots, flowers, fruits and bark are used extensively by the Lao people and are of great importance both as a food source and also medicinally and culturally.

Figure 13 Forest along the existing access road

Based on a review of the 2002 Land Use and Forest Cover maps for the regions in which the Nam Ngiep 1 Hydropower will be constructed, and from the villager's interviews as well as observations made during the field survey, map was generated which depicts the conditions of forest and land use within the project area (Figure 14).

Forest products especially NTFPs play a important role in the rural economy, as they provide: 1) animal protein (from wild meat, fish, frogs, shrimp, soft-shelled turtles, crabs and molluscs), 2) calories, vitamins and dietary fiber (from mushrooms, bamboo shoots, honey, wild fruits and vegetables), 3) materials for house construction and handicraft production (bamboo, rattan, pandanus, bloom-grass, paper mulberry), 4) traditional medicines and 5) cash income (from the sale of NTFP species). However, most villagers within the project area collect NTFP mostly for food and household use, and not for sale, because the area is distant from the town and market.

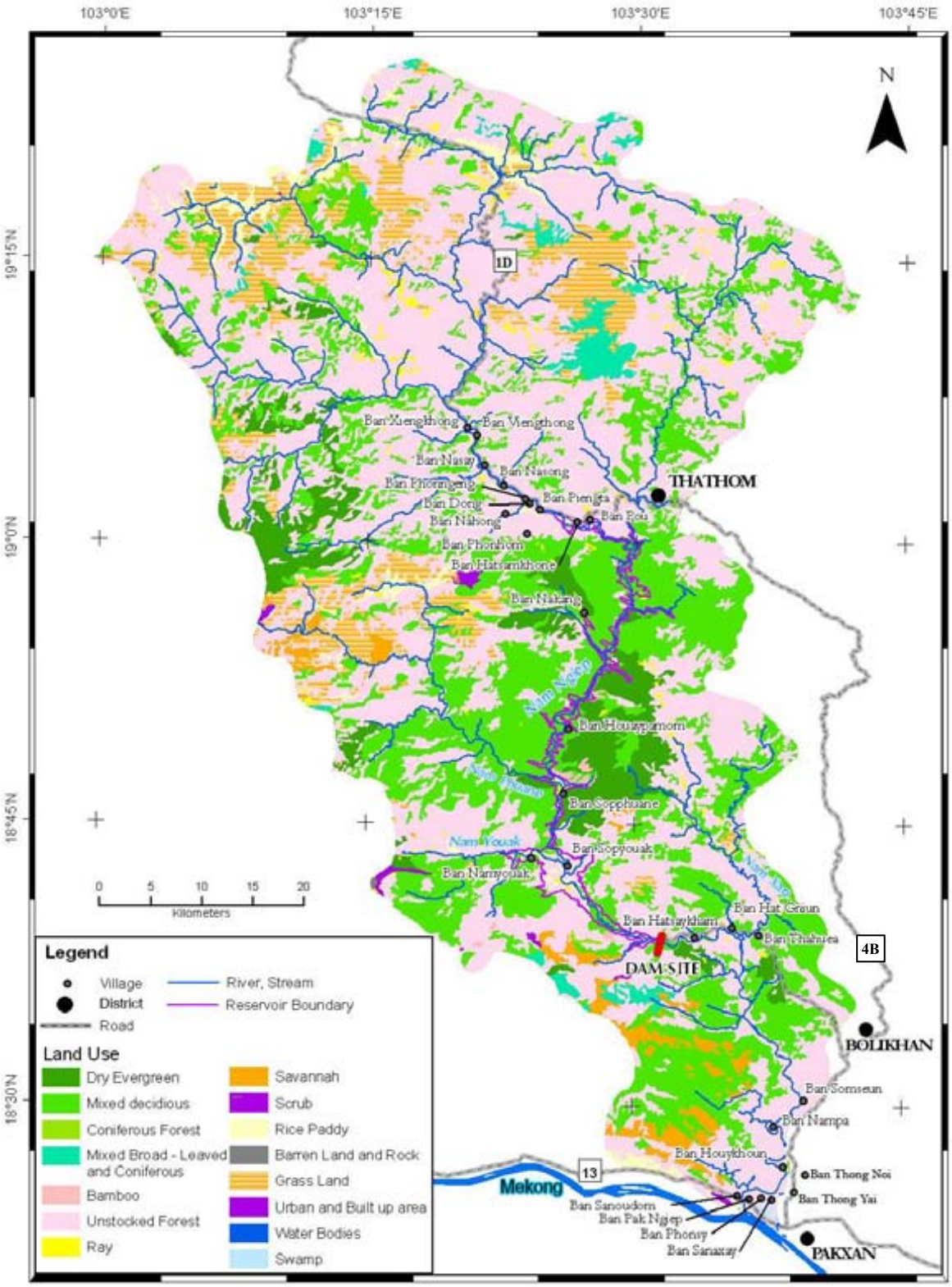


Figure 14 Map of land use and forest types in the Nam Ngiep watershed

8.2.2 AQUATIC BIOLOGY

Among the Mekong tributaries in Lao PDR, the Nam Ngiep was the eleventh longest river (Phanthaba et al., 2005). The Nam Ngiep's source lies in Xiengkhouang province and it drains into the Mekong mainstream in Borikhamxay province. The total flow contributed by the rivers to the Mekong River Basin was about 35%, of which 1.5% of flow was contributed by the Nam Ngiep River (Hori 2000).

The river courses through different types of habitats with elevation ranging from 1,300 m to 200 m above the mean sea level (MSL). Forty-two fish species were found inhabiting ten survey habitats in the Nam Ngiep (NCC, 2007). Cyprinidae was the most abundant. There were twenty-four species of Cyprinidae, three species of Bagridae and one species in each of various other group.

Figure 15 Fishing in the river

The Nam Ngiep River, like other tributaries of the Mekong River, plays an important role not only in supporting different kinds of habitats for the many hundreds of fish species and other aquatic animals, but also in providing a route for them during the migration seasons, which occur mainly in the wet and dry seasons.

8.3 ECONOMIC DEVELOPMENT

8.3.1 POPULATION AND COMMUNITIES

This zone covers the catchment area downstream of Nam Ngiep taken from the re-regulating dam. Possible impacts to the area include the changing of water level of the Nam Ngiep; possible erosion of the riverbank; and changing of water quality.

Several villages are under governance of Bolikhan District, Bolikhamxay Province, including the main village at Ban Hat Gnium; Ban Somseun; Ban Thahuea; and Ban Nampa.

The following villages are under governance of Pakxan District, Bolikhamxay Province.

- Ban Houykhoun
- Ban Thong Noi
- Ban Thong Yai
- Ban Sanaxay
- Ban Phonsy

- Ban Pak Ngiep
- Ban Sanoudom

The primary data collected in eleven downstream villages indicates that there is some diversity in the nature and development among these villages. For instance, the annual incomes in Thahuea are low, with an average annual income of 69,000,000 Kip per year. In Hat Gniun village, the average annual income is the highest (1,178,530,200 Kip per year). In these villages, income from fisheries accounts for only a small portion of the villager's total income. The largest source of income came from livestock.

The socio-economic survey for the Nam Ngiep 1 P roject encompassed twenty-nine villages and one sub-village. Eight villages are located in the upstream area; four villages are located along the upper section of the reservoir; four villages are located along the lower section of the reservoir; one sub-village is located between the main dam and the re-regulating dam; eleven villages are located in the downstream area; and two villages are located in the resettlement area. For this study, only three villages will be presented for environmental assessment.

The population and number of households in the villages in the access road project area are shown in Table 3. Images of the villages are seen in Figure 16 (Ban Hat Gniun), Figure 17 (Ban Thahuea) and Figure 18 (Ban Nonsomboun).

Table 3 Population and Number of Households in the Access Road Project Area

	Village	No. of HH	No. of Population		Lao Loum		Lao Soung	
			Total	Female	Total	Female	Total	Female
1	Hat Gniun	91	560	278	395	195	165	83
2	Thahuea	48	273	126	273	126	-	-
3	Nonsomboun	62	313	151	313	151	-	-

Source: Data from field survey 2007 and 2008

Figure 16 Ban Hat Gniun

Figure 17 Ban Thahuea

Figure 18 Ban Nonsomboun

8.3.2 INFRASTRUCTURE FACILITIES

For this study, a variety of infrastructure, public buildings and services were considered in terms of the associated conditions for each village, including the presence or absence of the following:

- Meeting hall
- Road(s)
- Well water
- School
- Dispensary
- Market place
- Cemetery

Most people in the project area are of Lao Loum, Lao Soung or Hmong descent. These ethnic groups have a strong tradition of paying respect to their ancestors and the dead. As part of their belief, residents have built small cottages in the cemeteries for deceased

relatives. There is one Buddhist temple found in the area at Ban Hat Gniun, where most of the families are practicing Buddhism.


Figure 19 A Buddhist temple at Ban Hat Gniun

Other than a small band of homes along the access road and in some areas near the existing access road, communities in the two villages along project area are remote and difficult to access. This is especially the case during the wet season from June to October. Often villagers can only be accessed by four-wheel drive vehicles or on foot.


Figure 20 The existing access road

In addition, the infrastructure for the local educational system poses a major challenge. In many of the villages, the schools were built during the late 1990s for children at the elementary school level. Children from Ban Thahuea village attend a joint school operated with the village of Ban Hat Gniun. The condition of the schools is described to be good at these two villages.


Figure 21 A school at Ban Hat Gniun

There is a public water supply which originates from the Nam Tak stream in Ban Hat Gniun. However, the lack of a suitable water supply system in Ban Thahuea is one of main complaints from the local people. The lack of a suitable supply system has forced residents to have to carry water from the Nam Xao River for all their domestic usage.




Figure 22 Nam Xao

One of the main challenges for villagers in this area results from a lack of adequate health care facilities. People in this area typically use traditional medicine or treatments when they get ill or when they incur injury because there are no pharmacies, dispensaries, or other health care facilities nearby.

For the Ban Hat Gniun and Ban Thahuea is located far away from Ban Nonsomboun and Ban Somseun about eighteen km. This village is particularly hard to access from these other villages during the rainy season; small boats are the only means for transportation in such case.

Figure 23 Nam Ngiep

8.3.3 LAND USE

Land use along the project road's recommended alignment is mainly forest or scrub area; approximately 19 km of the alignment, out of 21.10 (20.9 + 0.20 to project office) km, passes through forest and scrub areas. The area around the access road and right-of-way (15 m from the center line) comprises 63.3 hectares (ha). The land area inside the right-of-way (ROW) which is recommended for alignment incorporates 633,000 m^2 of predominantly open and shrub areas.

Figure 24 shows the land use and forest cover maps for the study area below the Nam Ngiep1 Hydropower Project area, including a 1.5 km buffer zone along the riverbank. The forest cover and land use map was generated by the Forest Inventory and Planning Division as a result of its surveying efforts. The percentage of land area occupied by a particular vegetation type is listed in Table 4.

Table 4 Land Use and Vegetation Types in the Downstream Area

Land Use and Vegetation Type	Code	Area	
		%	ha
Evergreen Forest	DE	1.44	211.47
Mixed Deciduous Forest	MD	25.02	3,649.46
Unstock Forest	T	72.20	10,530.69
Ray	RA	0.19	27.28
Rice Paddy	RP	0.62	90.25
Savannah	SH	0.01	1.03
Swamp	SW	0.33	48.91
Water bodies	W	0.19	26.85
Total		100.00	14,585.94

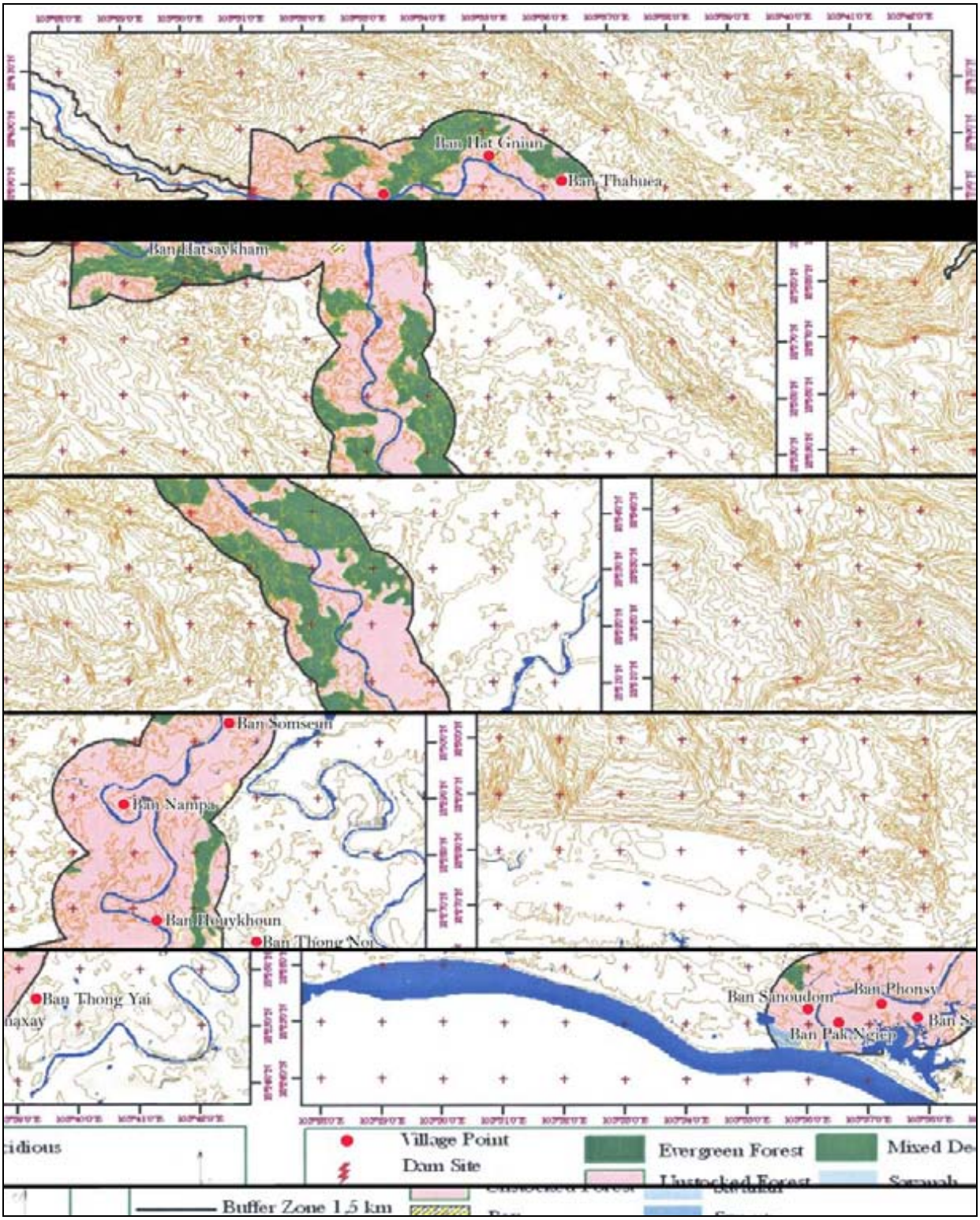


Figure 24 Map of land use and forest types in the downstream area

8.3.4 ENERGY AND TRANSMISSION

Around the project area, almost all of the villages have access to electricity, particularly the villages that are located near the main road, district centers, or towns. However, the remote villages within the project area – which are situated quite some distance from the Main Road – currently have no access to electricity; this includes villages such as Ban Thahuea and Ban Hat Gniun.

Lao PDR is endowed with significant natural energy resources. Energy use within the study area is still dominated by the use of fuel wood which accounts for more than 90% of total energy requirements. Only some locals who live along the Nam Ngiep River are using small generators powered from river flow for electricity, which results in very small amounts of energy produced.

8.3.5 AGRICULTURE

Most Lao people, especially in rural areas, rely primarily on agricultural production such as paddy rice cultivation, swidden cultivation, upland cultivation, vegetable cultivation, animal production, harvesting of fish, and harvesting of Non-Timber Forest Products (NTFPs).

Agricultural households comprise primarily of subsistence farmers, with 95% of households producing mainly for their own consumption. In Laos, about 70% of employed persons are involved in subsistence agriculture, including 30% working in urban areas and 70% working in rural areas (Source: Laos statistics from 2003 to 2005).

Bolikhamxay Province is located in the central part of Lao People's Democratic Republic. According to the initial result of the survey of the forest/vegetation cover in Bolikhamxay Province which was conducted by Department of Forestry's Forest Inventory and Planning Division in 2002, , 61.39% of the total land area is covered by the current forest; 30.72% is covered by potential forest; approximately 2.28% is other wooded area; 1.90% is permanent agricultural land; and other land use types (other non-forest area) comprise about 3.71% of the land.

It has been noted that the use of fuel-wood by communities in the study area does not pose a threat to the environment in terms of forest destruction. However, slash-and-burn cultivation undoubtedly does pose a serious threat to the environment, particularly in terms of inappropriate land clearing practices and subsequent erosion problems. Therefore, the Laos PDR government policy for abolishing slash-and-burn cultivation should be continued, if possible, with mitigation measures to improve social and economic conditions.

Slash and burn cultivation is the traditional way of promoting agricultural production in tropical forests in many parts of the world. It is based on the fact that in most areas covered with tropical forests, the major part of plant nutrients is actually stored in the vegetation (unlike in temperate zones). In fact, the soils themselves are rather low in nutrient content and the soil levels are quite thin compared to soils in temperate areas. Cutting and burning the vegetation in such soils makes these nutrients available for plant growth. However, organic material decomposes very quickly under moist tropical conditions, and nutrients that are not quickly absorbed are washed away. This leads to a rapid decline in soil fertility.

In most cases, after clearing and burning a plot, it is planted with dry-land rice. Other crops are then planted within the next one to two years. However, the soil fertility in such areas rapidly declines as a result of the nutrients being rapidly washed away. This factor is

combined with increasing weed production, which soon makes the land unsuitable for further agricultural use. It is then abandoned and left to fallow. In about 10 to 20 years, depending on local conditions, the vegetation has recovered sufficiently with sufficient re-establishment of soil fertility such that the plot can be used again.

Slash-and-burn cultivation can be a sustainable way for using tropical forests, provided the population density is low enough to allow for sufficiently long fallow periods, thereby enabling regeneration of soil fertility and maintenance of sufficiently large areas of intact forest that are not subject to cultivation. These intact forests are important for ensuring suitable regeneration of vegetation in the fallow areas; they also offer a variety of products which can be used as complementary food to the agricultural products or as alternatives in times of food shortages. However, increased population and greater pressure on agricultural production can turn slash-and-burn cultivation into an unsustainable and detrimental land use practice.

Slash-and-burn agriculture of two villages (Ban Thahuea and Ban Hat Gniun) in the project area is one of the most important methods for rice cultivation.

Figure 25 Slash-and-burn agriculture

8.4 SOCIAL AND CULTURE RESOURCES

8.4.1 SOCIO-ECONOMY

Because the access road will be constructed in the form of cut-and-fill work and will remain unpaved during Nam Ngiep1 Hydropower Project construction, the economic analysis of the project consider a base case as well as an alternative case that considered alignment recommendations. The analysis takes into account three types of economic benefits: vehicle operating cost savings, maintenance cost savings, and benefits from generated traffic. But for this project, the economic costs were based upon an adjustment of the following financial costs only (which together total about 210,000 USD or about 10,000 USD per km.): detailed engineering costs (estimated at 3 percent of the construction cost per kilometer), construction supervision costs (estimated at 6 pe rcent of the construction cost), civil works costs and maintenance costs.

To calculate economic costs, financial costs were reduced about four percent to reflect elimination of taxes. Maintenance costs without the project are based on MOT's estimate of the average cost of maintenance for the access road. The estimated economic useful life for

each of the sections is eight years during construction of the project. After completion of the hydropower project, the construction of a single bituminous surface treatment in the fifth and fifteenth years and an asphaltic concrete overlay in the tenth year after opening.

The construction cost of this section of the access road, which did not demonstrate economic feasibility under all of the sensitivity tests applied, is very small compared to the cost of the whole project. Furthermore, there is an existing dirt road already in place which alleviates some of the start-up cost of creating a new road through natural terrain.

8.4.2 ARCHAEOLOGY

(1) Ban Hat Gniun (Bolikhan District, Bolikhamxay Province)

The village is situated on the left bank of the Nam Ngiep River. During the Indochinese war time (1960s), the village was destroyed by the Royalist troupes and was thus abandoned as the inhabitants went to live in the forest. It was resettled again in 1970. Ban Hat Gniun was a stronghold of Pathet Lao forces because it was the gate from the Xiengkhuang Plateau (under Pathet Lao control) to the plain of the Mekong River. In 1975, Ban Hat Gniun played an important role for the Pathet Lao when they overthrew the Royalist administration and seized the power at Pakxan, the capital city of the Bolikhamxay province.

Buddhist temple of Ban Hat Gniun. Many big planted trees demonstrate that the village was founded over a century ago.

Artifacts

There were not any artifacts displayed in this village.

(2) Ban Thahuea (Bolikhan District, Bolikhamxay Province)

Ban Thahuea is located on the left bank of Nam Xao, a tributary of Nam Ngiep. The inhabitants migrated from inland areas such as Nakhata and Vang when they founded the village during the 1980s. There is a Buddhist temple at the village but it lacks a permanent monk. “Thahuea” means “river port”. In old times when tracks were not constructed, this area could only be reached from the Mekong valley by boats coming upstream on the Nam Ngiep

River. The boat trip ended at Thahuea because the river was no longer navigable beyond this port due to cascades and rapids. From the north, a land route connected Thahuea to the Plateau of Xiengkhuang. Caravans ensured transportation of goods between these two centres. Some caravans descending from the Xiengkhuang Plateau prolonged their journey beyond Thahuea as far as to Bolikhamxay city because the land route was shorter than that on the river. Nowadays, in parallel with the land transportation, the fluvial traffic remains important because it inter-connects the villages that are on the riverine network which includes the Nam Ngiep and its tributaries. A regular navigation service is operational from Thahuea down to Bolikhamxay and includes the villages along the Nam Xao, an important tributary of Nam Ngiep.

Thahuea is also referred to in local oral traditions.The story goes that, once upon the time, a golden boat sank in the Nam Xao, nearby its confluence with the Nam Ngiep. In reverence to the spirit of this mythical boat, the boatmen still to this very day give offerings of flowers, candles and cigarettes when they pass the wreck site.

The history of the village was told to the project consulting team by Mr. Bounhieng Sayalath, aged 47, deputy headman of the village. Mr. Sombat Chaleunsay, aged 31, village security, guided us to three historic sites of ruins that probably were brick Buddhist temples at one point. These sites are located on the opposite bank of the river.

Ban Thahuea.

The actual Buddhist temple of Ban Thahuea.

Artifacts

	Dimensions (cm) height: - width: - thick: -	Provenance: This bronze Buddha image was found in the ruins of an old temple (site no.1) located on the opposite bank of the actual Ban Thahuea village in 2006, now kept in the new temple. Significance: Date: Late Lane Xang Period, (c. 19 A.D)
Inventory No.20: Bronze Buddha image (meditation)		

Ban Thahuea, location of the ancient Buddhist temples, sites number 1, 2 and 3.

Ancient Buddhist temple of Ban Thahuea, Site No. 1

The site Number 1 is located on the right bank of a flat terrace of Nam Xao River, which is now transformed to a farm land of the village. This land parcel is fenced around and belonging to private property. The brick structure is situated at the central part of this land parcel, about 20 m from the river bank. Its actual state of preservation is very poor. It was suffered from weathering and vandalism, only a mound of bricks about 2.50 metres high without any precise shape can be survived. According to the limit of the mound, its shape seems to be rectangular about 8 x 16 m, oriented east-west. Because of the thick brush, it was difficult to generate a detailed description of this temple. The survey team did observe a looting hole in the middle of the mound and the remains of some fragmented Buddha statues which were made of stone and mortar. The size of bricks is 5 x 11 x 23 a nd 5 x 12 x 24. The supporting beams of this temple were probably made of wood, with the roof covered in tiles. The remains of any wooden structure cannot be seen but the evidence of roof tiles can still be found *in situ*.


1


2


3


4


5

Site No. 1: Remains of a Buddhist temple in Ban Thahuea. The brick structure of the altar and sanctuary, along with fragmented Buddha statues, are still visible at the site.
Figures1 and 3: A mound of ruins covered by vegetation.
Figure 2: Stone image of Buddha seated on Naga, from Maravijaya period.
Figures 4and 5: Fragment of arm and body of the main Buddha statue made of mortar and bricks.

Ancient Buddhist temple of Ban Thahuea, Site No.2

Site No.2 is located approximately 100 m south of Site No. 1. Only a platform of bricks about 1 m high remains visible at the site. A big hole about 2 x 2 m and 1.50 m deep indicates recent vandalism at this site.

Potsherds of historic significance were also observed by the survey team in the vicinity of these ruins; this may indicate the presence of important historic settlements in this area. According to Mr. Sombat Chaleunsay, similar but smaller ruins once existed in the village; this might also support the idea of dense populations having once settled in this area.

Site No. 2:

remains of Buddhist temple.

Ancient Buddhist temple of Ban Thahuea, Site No. 3

This site is located about 400 metres south-west of Site No.2. Its size is approximately 12 x 18 m, oriented NE-SW. The remaining brick platform is about 2 m high. Brick size: 6 x 12 x 24.

Site No. 3: remains of Buddhist temple. This brick structure seems to be three largest among the three temple ruins. It is located on a naturally elevated platform about six metres above the surrounding surface.

8.3.6 PUBLIC HEALTH

In 2006, the provincial health office (PHO) collected data to assess the public health situation in Bolikhanxay Province. The ten most common diseases and causes of illness and death in Bolikhamxay Province are summarized in Table 5 below.

Table 5 Top Ten Diseases and Causes of Illness in Bolikhamxay Province

No	Disease – causes of illness in 2005-2006	Number of Cases
1	Dengue Fever	246
2	Diarrhea	142
3	Dysentery	90
4	Malaria	74
5	Food Poisoning	65
6	Meningitis	38
7	Typhoid	36 (01 death)
8	Hepatitis B	11
9	Measles	02
10	Tetanus in babies	09

Source: Bolikhamxay Provincial Health Office

Based on similar data collection by the district health office (DHO) in Bolikhan and Pakxan districts, the diseases and illnesses present included malaria, dengue fever, diarrhea, dysentery, acute respiratory infection (ARI), bronchitis, influenza, measles and stomachache. Public health concerns in the Bolikhan District mainly focus on endemic or seasonal epidemic diseases. For children under the age of five, the leading causes of death reported by the health services throughout the district in the last three years include malaria, acute respiratory infection (ARI), and severe diarrhea. For adults, the leading cause of death includes hypertensions and accidental circumstances.

Table 6 Mother and Child Health Condition

No	Mother and Child Health in 2005	Bolikhan District	Pakxan District
1	Mortality rate – under 1 year of age	18/1,000	14/1000
2	Mortality rate – under 5 year of age	16/1,000	16/1000
3	Maternal Mortality rate	402/100,000	100/100,000
	Children Vaccinated		
1	BCG	95%	99%
2	DPT 3	82%	88%
3	Measles	72%	73%
4	TT	32%	33%

(1) Bolikhan District

There is one district hospital with fifteen beds and five health centers (HC) with a total of ten beds. Within the project area, there is one HC located at Houykhoun village; this HC treats residents from seven villages. There are a total of 57 district health staff working in different sectors in the Bolikhan healthcare services. The staff can be classified as follows: seven medical doctors; ten assistant doctors; thirty-five nurses; and four other technical staff. Six staff members are working in the DHO, thirty-one in the district hospital and nineteen at the

health centers. At the village level there are a total of 65 village health volunteers (VHV) with limited training. A total of 73% of the villages have a revolving drug fund.

Figure 26 Bolikhan district hospital

Figure 27 Moung Mai health center

(2) Pakxan District

In Pakxan District, which is the provincial capital of Bolikhamxay Province, there is one district health office but no district hospital. Public health services consist of five health centers with fourteen staff, plus an additional twenty-nine staff at the district level; there are five medical doctors, Fourteen assistant doctors and twenty-four nurses. Approximately 79% of villages have revolving drug funds and there are a total of 101 village health volunteers.

Figure 28 Sanoudom health center

9 ENVIRONMENTAL IMPACT STUDY

9.1 PHYSICAL RESOURCE

The project access road passes through one type of land form. The road alignment generally follows the existing dirt road which is oriented in a east-west direction. Agricultural activity is largely limited to traditional slash-and-burn methods, practiced by the largely tribal population of the area.

9.1.1 ATMOSPHERE

9.1.1.1 Impact Assessment

The impact of the project on climate is uncertain and not expected to be significant. Climate, however, can have considerable impact on the construction and operation of the project.

The number of available and effective meteorology stations, the monitored parameters, and the period of monitoring will limit the precision of weather forecasts. Standardization of available records from peripheral stations and by Thiessen and Isohyetal methods were the most practical means for the project hydrological study. However, they may be not appropriate for certain activities or purposes, such as the scheduling of the clearing plan. Therefore, more local monitoring of meteorological and climate data should be done during pre-construction, construction and operation, so that work plans can be adjusted to fit the meteorological conditions.

(1) Pre-construction and construction

The available days to transport heavy machinery and to work at the construction site will be limited by heavy rain.

Local winds will distribute dust from the construction site. After vegetative covering has been removed at the construction sites, the large bare areas will create dust that is dispersed downwind.

(2) Operation

The magnitude of the changes will be small, localized and not particularly noticeable because of the comparatively small size of the project. Due to the importance of the forested lands in the catchment and in the project area, it will be important to monitor localized climatic conditions and minimize human impact to the local climate from the project development.

9.1.1.2 Mitigation Measures

Mitigation measures may be needed during construction, to control the dispersion of dust created by clearing lands at the construction sites. If the clearing of the reservoir area is done in part by burning, meteorological conditions also need to be taken into account. Both rains and wind would have effect on clearing.

9.1.2 TOPOGRAPHY

Landform around the project area would not be changed significantly. However, the project may modify the scenery and also cause changing of height and slope along the access road. Consideration of such impacts will not obviously change in the large area.

9.1.2.1 Mitigation Measures

No mitigation measures are needed that relate solely to changes in topography. Possible impacts that are related to changes in topography, such as erosion or sedimentation, are considered separately.

9.1.3 SURFACE WATER AND GROUNDWATER QUALITY

The changes of the existing environmental condition due to construction of access road and clearance of the areas along the ROW especially cut and fill activities could consequently affect water quality parameters in the river downstream water. Alternative of the parameters are an increase of water nutrient load, turbidity, suspended solids and concentration of dissolved elements. Furthermore, an increase of sediment load downstream can cause the water body change by the construction activities.

Even though the study of soil erosion from the whole Nam Ngiep1 Hydropower project indicated that the average sediment yield was 451 tons/km^2/year, which could be higher during the raining period. During the raining period, the suspended solid could rise up to about 200 mg/L while it was quite low to about 20 mg/L in dry season. The erosion rate would be very high on the uncovered lands that were developed for agricultures.

But for access road construction phase, the erosion rates will a lot less than the whole project erosion rate. Around the construction area, cutting wood and land clearing must be conducted during pre-construction phase. During the cutting and clearing period, top soil could be eroded by rains and high sediment could affect downstream. The bare topsoil and excavated debris rocks caused by the construction activities at the construction site also enhance the high sediment in downstream. Uncovered soil will be a major source of

sediment by r unoff. T he soil erosion during rainy season that cause sedimentation in downstream could occur for the whole access road construction period.

During operation phase, activities will not affecting water quality much because the cutting, filling and clearing the project area has been finished.

9.1.3.1 Mitigation Measures

There are three major practices concerned for remediate the impact which are engineering designs, the application of water quality standards and monitoring programs.

The engineering practices could be indirect impacts on w ater quality during access road construction and operation phase such as land development accounted as a non-point source to the water quality on s urrounding the project area should be taken into consideration the environmental study program.

Compliance with water quality standards: Engineering works will be designed to comply with the agreed water quality standards at various points in the purpose-built system, including the point of release into the Nam Ngiep River below the regulating dam site, and downstream into any natural watercourse or location of use. The water quality standards are set in order to assure that beneficial uses of the water are maintained. The Ownership Company (OC) will be responsible to mitigate direct and indirect impacts on pe ople and aquatic/terrestrial species through alternative means if water quality standards are not met.

Monitoring water quality: Water quality monitoring will begin as soon as possible after the project begins. The OC will also conduct water quality monitoring, especially during the construction and operation phase, in order to control the quality of discharge of water to the Nam Ngiep River.

Construction phase: Surface water pollutants that can deteriorate water quality downstream will be by the soil surface eroded by runoff. Although the impact of waste water from the worker camp sites was predicted to be insignificant, but proper measures should be considered.

9.1.3.2 Monitoring Plan

Water quality monitoring plans are proposed for observing the impacts caused by activities during the construction and operation phases. The water monitoring programs will be conducted periodically or seasonally depending on the project activities that cause the impacts on the receiving water. The monitoring parameters of interest should include physical and chemical water qualities and should adopt the same parameters and monitoring station of the Nam Ngiep1 Hydropower Project .

9.1.4 GEOLOGY

Most of the geological information available for review was at the regional scale, so some of the major geological impacts such as seismic events can also be assessed at the same scale. Some geological ground surveys were conducted around the construction sites. The data obtained from these surveys was used for project design and can also used to assess the impact of geological patterns on riverbank erosion, landslide and ground leakages of the reservoir.

In assessing the pre-construction and construction periods, geological conditions had a direct impact on risk assessment, construction design and project cost. The basic geological information was used for preliminary assessments of geological hazards. Regional geology of the project area was initially reviewed from JICA-F/S whereas the more localized geological data obtained for the Technical Report was analyzed for geological setting and earthquake potential in the project area is determined to be low.

Since the risk of seismic activity seemed low, the assessment for the Nam Ngiep1 Hydropower Project was focused on the area of Zone 3 (construction area) during the construction. Some impacts on access road improvement could occur due to the existing landform as shown below.

- Landslide and rock movement may be induced, particularly along steep slopes around the construction site. This seems likely to be the most crucial impact that needs to be approached with great care.
- Rock fractures may partly impact the construction process.
- Mineral resources appear to have no impact.

After completion of the access road construction, some impacts may occur in the surrounding area during the operational phase:

- Landslides and rock movements may occur along steep slopes.
- Mineral resources and seismic impact would unlikely be affected.

9.1.4.1 Mitigation Measures

In the pre-construction and construction phases, the data obtained from the geological tests around the project area would be used for project design and safety planning. To prevent impacts as previously mentioned, the following mitigation measures were recommended.

- The potential for and monitoring of landslides and rock movements around the project site should be investigated during construction.
- If there are any sections along the access road that may have landslide and rock movement problems, the construction contractor must address the problem before further construction.

During the operation phase, periodic inspections of the access road and bridges are recommended.

9.1.4.2 Monitoring Plan

Routine inspection of the access road and bridges are recommended.

9.1.5 HYDROLOGY

9.1.5.1 Impact Assessment

- The study of the construction process must analyze the actual situation – especially on actual hydrological phenomena –because the available hydrological information is very limited and not sufficient for evaluation or

simulation of present conditions. The proposed construction schedule was a draft plan. There was some uncertainty surrounding potential interruptions (i.e., flood events) to the construction schedule due of lack of long-term hydrologic data in the project area and vicinity.

- Construction materials and equipment must be in place and secured during flooding season. Since the flood flow is fast and high volume, loose materials and equipment might get swept downstream and potentially cause some damage to structures and harm local people.
- In case of temporary structural failure from the construction site, flood waters and construction materials might cause damage to boats or other downstream infrastructure, possibly threatening peoples' safety.

9.1.5.2 Mitigation Measures

(1) Construction phase

- During the construction period, the flow from each tributary leading into the Nam Ngiep River must not be significantly changed so as to maintain a consistent water level. The suitable period for construction is during low flow season.
- During access road construction, at least the normal flow in the stream must be considered and controlled. In case of flood period, the construction contractor must prepare the emergency programs such as increased waterway capacity in order to release the excess volume of water.
- Flash floods during the rainy season should be including in safety plans provided for the construction site. Construction materials must be secured and locked down during flooding season.
- Flood diversion channels must be built before bridge construction is started, especially at the recommended bridge across the major stream tributaries site.
- The local people must be warned of changes to the river which could affect water transport and navigation so they can be prepared for alternative routes.
- In case of flooding in the agricultural areas during dry season, the project developer should be prepared to compensate the financial losses to the local people who were affected by the proposed project.

(2) Operation phase

- In case of flooding as a result of dam operation in the agricultural areas located downstream from the proposed dam site, the project developer has to compensate the losses to the local people who were affected by the proposed project.

9.2 BIOLOGICAL RESOURCES

9.2.1 TERRESTRIAL ECOLOGY

9.2.1.1 Impact Assessment

Based on the completed survey and the local villagers' interviews, the only significant wildlife habitats which remain are located on the steep upper slopes of forested areas and the rich forests outside the project area. Wildlife is missing from the other more accessible areas and the lower and less steep slopes due of deforestation, slash-and-burn activities for shifting cultivation, bush fires, and indiscriminant logging.

Most of the project components – especially the access road – are located on the lower slopes of mountains which are well below the main wildlife habitats. However, the survey results and local villagers' interviews indicated that some of the wildlife which live mainly on the upper slopes may move down into the lower area around the project site where water is readily available, especially at night time. These animals may return back to the comparative safety of the upper slope areas in the day time. Therefore, throughout the project design and implementation, it is of prime importance that the encroachment and habitat destruction is kept to a minimum. For example, access roads to the construction sites should be permanently closed and rehabilitated to the original condition of the natural landscape after the completion of the construction works.

As previously mentioned above, the project area is largely devoid of wildlife because the virgin forest has been converted into unstocked forest. The notable exception is the upper regions of the proposed reservoir and dam site where there is still rich, mixed deciduous forest where a significant number and quantity of species are still found.; The extent of construction activities in building the access road will only fractionally enter the surrounding forest; impacts on wildlife will be limited to the construction phase and may include noise disturbances from heavy machinery and potential hunting of animals at the hands of construction workers. Some of the NTFPs in the surrounding project area have a high value including medicinal plants or herbs such as cardamom (Amomum Xathioides Wallich), beberin (Coscinium fenestratum-Gagnepain), Neolourya pierrei Rod, and Ziziphus attopoensus Pierre. Still other NTFPs are seen as main sources of nutrition or daily food for local people: mushrooms, bamboo shoots, wild vegetable, wild fruits and so on.

The access road and ROW area does not enter into any conservation forest or protected area; hence the impact of tree removal in a few forested areas is relatively minor and not in violation of national environmental law.

9.2.1.2 Mitigation Measures

In order to reduce intrusions on natural habitats and wildlife, strict rules will be implemented to prohibit logging outside of the approved construction areas and wildlife hunting and poaching. These rules will apply to all project staff, workers, and contractors involved in the project, with penalties levied against anyone caught carrying and using fire arms or using animal snares and traps. The project owner shall be directly responsible for dissemination of all regulations and information concerned to its staff and/or employees as well as for any misconduct made by its staff and workers.

In terms of noise and vibration that can cause impacts on wildlife, noise suppression systems will need to be fitted to equipment and working hours must be only from 6.00 am to 6.00 pm. Noise levels must also be limited to reduce the disturbance of wildlife. Nighttime construction or project work should be prohibited.

A monitoring program will be implemented that involves the District Agriculture and Forestry Office (DAFO), the village forest association (VFA), other concerned authorities and an independent third party, who will audit the clearing operation and compensatory replanting operations.

9.2.2 AQUATIC BIOLOGY

9.2.2.1 Impact Assessment

An investigation found that all fishes found in Nam Ngiep River and its tributaries are mixed species from the Mekong and mountainous rivers. All are potamodromous in their migration patterns. A fishery enhancement program should be considered as a first priority measure.

9.2.2.2 Mitigation Measures

A stock enhancement plan in the streams and tributaries leading to the Nam Ngiep River is also necessary. Downstream from the project, aquaculture should be promoted at the appropriate area in each of the villages. More detailed information is needed to support this plan.

9.3 ECONOMIC DEVELOPMENT

9.3.1 POPULATION AND COMMUNITIES

9.3.1.1 Impact Assessment

Public consultation and participation for Nam Ngiep 1 Hydropower Project has played and will continue to play a key role in the planning of the Nam Ngiep 1 Hydropower Project. This study has involved a comprehensive public consultation and disclosure process in accordance with the GOL and EIA guidelines.

The project has been invariably constructed in river basins where people have lived since the old days. A householdsurvey of the impacts on popul ation, communities and the environment was carried out by c onducting interviews. Results showed that most of the villagers along the access road are of Lao Loum descent, with some Hmong people or Lao Soung found in Ban Hat Ngiun.

9.3.1.2 Mitigation Measures

This study has involved a comprehensive public consultation and disclosure process in accordance with the GOL and EIA guidelines. The construction of the access road should note take too long to complete. The developer should carefully monitor the quality of life of the affected people in the project area and mitigate disturbances.

During construction period, the local people will still use the access road. It is the duty of the construction contractor to make temporary pathways or detours for the local people in order to ensure their convenience and safety. At the same time, warning signs must be placed along the construction access road for accident protection.

Since the construction vehicles will be very large compared to the local vehicles used by the community, strict regulations on traffic control must be set to avoid accidents and to minimize nuisance to the local people who are using the access road.

9.3.2 INFRASTRUCTURE FACILITIES

9.3.2.1 Impact Assessment

Infrastructure facilities such as schools, roads, hospitals and water distribution are needed for every community in the study area. Although the national government plans to eventually provide these facilities to all major villages, many communities are still lacking these developments.

Hand pump wells or dug wells should be built to lessen the impact upon pos sible changing of water quality.

The access road to the project site needs to be renovated and developed. D uring the construction period, the maximum gross weight (payload plus vehicle weight) is estimated to be about 80 tons; this payload will be present when the transformer is transported to the site. Therefore, this maximum gross weight will be considered in evaluating the bearing performance of existing roads.

The road entering the site is unpaved and muddy during a rainy season. It is necessary for the developer to construct a more suitable access road and replace this unpaved dirt road in order to accommodate the heavy vehicles carrying construction materials with the maximum gross weight (payload plus vehicle weight) of 80 tons.

9.3.3 LAND USE

9.3.3.1 Impact Assessment

The impacts on changes in land and resource use as related to the resident populations in the project area and the resultant indirect effects these changes will have on i ndividuals and communities vary greatly among the project zones. T he proposed changes to resource utilization patterns are integral to the project's main management plans, which will likely enable more stable and sustainable resource utilization. In some areas changes to natural resources as a result of the project will likely lead to new opportunities for resource and land use. Some effects may be difficult to predict and are less known at this stage of planning. Such effects will be closely observed and monitored to ensure the health, well-being and lifestyle of individuals and their surroundings are not compromised by the project.

9.3.3.2 Mitigation Measures

There will be no significant losses of vegetation or land use that will impact on the social conditions of the surrounding communities. While some of the surrounding areas are being used for swidden areas the impact assessment shows that the losses are minor; when

compared to the extent of the surrounding unstocked forest, the losses can be more than easily absorbed by such unstocked forest. There will be no exacerbated impact on the already existing dry evergreen or dry deciduous forests, which are the two most important forest resources in the area in terms of forest use for NTFPs and as wildlife habitats.

In case of a delay in access road construction, the local people might use the ROW along some section of the road for their agriculture activities. T he developer must take consideration of compensation actions in regards to those who are using the ROW before starting the construction.

After approval of the Nam Ngiep1 hydropower project by the Lao PDR government, the developer must recheck the access road alignment and place signs along the road in order to inform the public and to limit the extent of land intrusion for agriculture purposes.

At Ban Hat Gniun and Ban Thahuea, the developer has to reach agreement with the chief of the community and the villagers for the access road alignment. At present the villagers are willing to have the access road passing through the village they do not know exactly where the road will be. It is good for the developer to have public consultations at both villages before starting road construction.

9.3.4 ENERGY AND TRANSMISSION

9.3.4.1 Impact Assessment

At present, Ban Hat Gniun and Ban Thahuea have no electricity available to the public. Ban Hat Gniun has produced a limited amount of electricity by using a small generator which is powered by the flow of the Nam Ngiep River. and the power generated is not enough for electric appliances so it certainly does not meet the needs of the entire Ban Hat Gnium community. Most of the local people need electricity to improve their quality of life. After completion of the Nam Ngiep1 hydropower project, locals will benefit as follows:

(1) At the project site of the Nam Ngiep 1 hydropower project, the developer is planning to supply electricity to every village site including the resettlement site

(2) During the construction phase, temporary electric power will be installed and managed for common areas and some specific areas of the villages.

(3) During the operation phase, some of the electricity produced from the project must be supplied to the project site. It is a must for the developer to supply electricity to the affected village sites to enhance the quality of life. Electricity should be installed for each house. Additionally, the project developer must install the electric power at the public areas such as markets, hospitals and schools.

9.3.4.2 Mitigation Measures

(1) The local people must be educated about electricity and how to properly use electricity, and the costs of use. They must also receive safety training to prevent electric shock and so on. T hey should also be educated about emergency preparedness, what to do if the electricity shuts off unexpectedly, and other related events.

(2) An energy saving system must be prepared for local people.

(3) Alternate energy sources such as fire wood must be prepared at each household in case of no electricity supply.

9.3.5 AGRICULTURE

9.3.5.1 Impact Assessment

This agriculture in the project areas are swidden, paddy, sugar cane, and beans. These crops must be relocated to another area with suitable land which is far from the effects of project construction. Livestock in affected areas should be relocated to the newly provided agricultural land, where stables can be set up.

9.3.5.2 Mitigation Measures

Agriculture is a major source of income for the people in the project-affected area; it has an important role in the local subsistence economy. For this reason, it is very important to restore agriculture productivity in the project area as timely and efficiently as possible. With this in mind, the following improvement activities in the project area should be taken into account.

(1) In case the agricultural techniques are to be changed due to the characteristics of the site (i.e., different elevation, steeper plainer slopes, etc.), the farmers should be provided with necessary inputs such as seeds, fertilizer and mulch (for increasing soil organic matter).

(2) Since the transportation infrastructure will improve after the construction, the farmer's agricultural products can be transported to nearby towns easier; with enhanced market trading, quality control of the agricultural products must be applied. The local government, with support from the project developer, has to establish a training process for agricultural product quality control.

(3) Support for the establishment of agricultural cooperatives in the area should be provided. Cooperative work in the areas of organic crop production, product storage and transportation, and marketing are all covered in this support.

(4) With regard to livestock, necessary training and inputs should be provided in animal husbandry, fodder seeds, fertilizers, and pasturelands.

(5) Livestock management must be prepared and implemented. At present the livestock can wander everywhere because of the lack of traffic in the area. During construction and operation periods, there will be a marked increase in traffic using the access road to get in and out of the construction site. All of the livestock must secured in pens or stables in order to prevent traffic accidents and ensure the animal's welfare.

9.3.6 PUBLIC HEALTH

9.3.6.1 Impact Assessment

The negative effects on public health are expected to include the following possibilities.

- Possible increase of some relevant diseases and illnesses in people living around the project area (i.e., malaria, dengue fever, diarrhea, HIV/AIDs and STDs, and other endemic diseases). This impact should be minor and most

cases prevented if the necessary mitigation and monitoring measures are carried out as detailed in the assessment.

- Possible decrease in the availability of food sources resulting in malnutrition of the local residents. This is due to the requisition of land for the project activities. However, the probability of this situation occurring is considered to be extremely low because of the compensation provided by the developer to ensure the residents have access to at least the same previous level of nutrition or better.

The positive impacts on public health may include the following:

- improved health care in the area, and improved access to district and provincial health centers due to road improvements;
- increased income could lead to improved nutritional status;
- community development funds from the project operation could result in greater investment in infrastructure and services such as clean drinking water systems, latrines, health education programs, and mobile clinics.

9.3.6.2 Mitigation Measures

According to a survey conducted over the last two years, there have been a number of diseases occurring in and around the project area. While not being very dangerous or life threatening, such diseases need to be closely monitored to ensure the well-being of all communities in the project area.

- A public health education campaign needs to be carried out to ensure that the local population understands and is aware of proper hygiene, disease prevention and basic health promotion.
- It is likely that resettlement and migration will be quite rapid due to the expansion of job opportunities, fisheries, transportation, local trading, health services and tourism. For a rural community with a large number of people living together, public health education would be very helpful concerning maternal and child health, nutrition, malaria, Japanese encephalitis, intestinal parasitic diseases and some water-born diseases such as opisthorchiasis and paragonimiasis with vectors and intermediate hosts existing in the area. It is suggested that the Nam Ngiep1 project could cooperate with district and local health authorities in this regard.
- Impregnated mosquito nets need to be provided to the project workers and the general population. The provision of treatment programs and rapid diagnostic testing must also be available in the project area and should be implementedin cooperation with health authorities, including volunteer health workers.
- Latrines should be provided for each household in the project area so that villagers have access to clean and safe water as soon as possible, particularly before the construction phase is launched.

9.3.6.3 Monitoring Plan

- Health monitoring in the villages along the access roads should be carried out regularly, to identify changes in the patterns of disease, and if increases are observes, appropriate action taken through and support of the district and provincial health services.
- Regular surveillance of disease vectors and the occurrence of these diseases in the affected area should be undertaken in the post project phase by the project proponent.

9.4 SOCIAL AND CULTURE RESOURCES

9.4.1 SOCIO-ECONOMICS

9.4.1.1 Impact Assessment

The access road will have a major positive effect on the economy in within and around the project site.

9.4.1.2 Mitigation Measures

(1) During the construction

The developer should be sure to carefully manage the labor conditions and atmosphere around the construction site. Further, the developer should monitor the quality of life of the villagers in the project area during the construction phase.

Even though the local people can be categorized as unskilled laborers in regard to construction work, the contractor needs to make an effort to hire more locals during the project development. At the very least, the local people should know the project targets be involved in public consultation or participation.

By hiring locally, the developer helps the villagers by giving them new sources of income and new skill sets. This can help to improve the quality of life in the villages.

Local people who join the project staff can learn more about the construction occupation such as using construction equipment and working as a team. It is acknowledged, however, that much of the labor, especially skilled labor, will come from outside the project area.

(2) During the operation phase

The developer should carefully monitor the quality of life of the people in the project area. Any potential negative impacts should be mitigated.

9.4.2 ARCHAEOLOGY

9.4.2.1 Impact Assessment

(1) Direct impacts

- Sites and objects of archaeological, historical, and cultural significance will be disturbed by the noise and vibration.
- Sites of archaeological significance and those offering high potential for ecotourism are currently in a poor condition.

(2) Indirect impacts

- Appreciation of arts and culture will suffer because people will not want to visit the archaeological sites due to the construction.
- Looting and illicit trade of antiquities will be increased.

9.4.2.2 Mitigation Measures

The following recommendations are given to mitigate the impacts on archaeology at the project site.

(1) Conduct a systematic search for archaeological sites in the project area by implementing transects of test-pits within the villages in order to document, analyze and rescue archaeological materials.

(2) Acquire the archaeological artifacts owned by the villagers before they sell to them to antique dealers. Start a provincial collection of national treasures and objects which could be displayed in a museum.

(3) Construct a museum to house the collections. This would conserve the historical artifacts and provide public exhibitions. The museum could also be a place for public education programs concerning awareness of cultural heritage and protection of the environment.

(4) Improve and create if absent the system for cultural heritage management at provincial, district and village levels. Train the local staff to deal with artifact protectionsurveying and fieldwork. C oordinate with the existing system at government level.

(5) Organize public education campaigns to share information concerning the protection of cultural heritage in order to raise public awareness and participation in cultural heritage activities.

(6) Integrate actions of document and rescue the cultural heritage with the rest of the program of the hydropower project

10 POTENTIAL IMPACTS

10.1 ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION STAGE

10.1.1 AIR QUALITY (DUST)

Dust will be a nuisance created by all construction works and activities inside the ROW of the access road; to a greater or lesser extent, dust will affect the air quality. Moreover, warm temperatures and the presence of heavy traffic on the roads will likely generate a higher level of dust in the atmosphere. To mitigate this intermediate impact, measures have been proposed, including frequent watering of the access road and appropriate construction scheduling techniques.

10.1.1.1 Impact Assessment

Pre-construction and construction:

At the construction site, the particles and fugitive dust from the construction activities, the emissions from road vehicles associated with the construction site, and on-site machinery (off-road emissions) need to be considered. In addition to the land clearing and surface excavation activities, construction of water conveyance systems will also represent potential sources of air emissions from point sources. Increased traffic on unsealed gravel road surfaces will be able to contribute to air pollution from the generation and release of fugitive dust.

The adverse impacts could be on flora and fauna; therefore it will be important to consider the impact of dust on sensitive sites, such as special areas of conservation, protected areas, and non-statutory wildlife sites in the vicinity of the construction site.

The impacts caused by dust will be reduced when the operation phase begins. During operation, the hydropower project is widely considered to have minimal effects on air quality.

10.1.1.2 Mitigation Measures

Three principles – prevention, suppression and containment – are used to control the emission of dust and other particulates which could negatively impact health. The impacts on air quality caused by the project construction activities will likely be temporary and controllable.

The contractor should implement an emission and dust control plan within their environmental protection and mitigation framework. The emission and dust control plan should include methods for dust suppression resulting from road construction, embankment and channel construction, haulage of materials and construction of work camps. Methods for dust suppression should be employed as necessary, including supplying water to control dust which results from construction activities. The following best practices should be used.

(1) Site planning

- Operating machinery and other activities which cause dust should be located away from sensitive receptors.

(2) Construction traffic

- All idle or stopped vehicles should switch off engines.
- Wash or clean all vehicles before leaving the site if close to sensitive receptors.
- All loads entering and leaving the site must be covered.
- The construction equipment emissions as a result of diesel fuel combustion are expected to be relatively minor and localized. However, combustion engines should be inspected on a regular basis and adjusted as required to minimize pollution levels.

(3) Site activities

- Minimize dust-generating activities.
- Use water as a dust suppressant where applicable (i.e., on dirt roads).
- Keep stockpiles for the shortest possible time, especially during rainy season.
- At the construction sites near communities, the traffic must slow down to reduce dust. The speed limit sign and warning sign must be placed before entering the community's area.

10.1.2 NOISE AND VIBRATION

For most of its length, the project access road passes through open or sparsely populated zones. There are, however, some areas where population densities are higher; in such areas, noise impacts during construction could be a problem. To attenuate these intermediate impacts, two mitigation measures have been included in the contract documentation: a limit on night time work in populated areas, and the requirement that equipment be fitted with functioning mufflers.

10.1.2.1 Impact Assessment

The impact assessment takes into consideration the project construction and operation phases. The impacts during the project operation could be negligible. T he impacts of noise and vibration were point specific as to the sources of such noise and vibration; the distance between sensitive receptors and those sources exposure time; and time of occurrence.

The sensitivity receptors of the project could be placed at Ban Nonsomboun, Ban Thahuea and Ban Hat Gniun, was all of which are located next to the proposed access road. This area could be most affected by the project vehicles and construction machines.

Therefore, the impacts on the receptors during the construction activities were considered.

(1) Noise pollution

During the construction phase, activities such as cutting excavation and the moving of equipment and materials for construction could cause noise impact to surrounding area. Using noise level of construction equipment of Federal Transit Administration (FTA) and typical usage factors, equivalent hourly sound levels must be calculated for each construction activity. For instance, sound levels of 90 dBA and 84 dBA were obtained at 100 feet and 200 feet, respectively, for pile driving activities during the bridge construction process. .

Potential noise impacts associated with grading and construction have been assessed using methodology developed by FTA (Federal Transit Administration, 1995). Table 7 is a summary of noise levels generated from construction equipment (in terms of Leq) (Federal Transit Administration, 1995). Generally, construction equipment can be operated intermittently or fairly continuously, with multiple pieces of equipment operating concurrently. Typically, construction site noise levels are about 80-90 dBA as measured 50 feet from the activity.

The WHO report entitled "Guidelines for Community Noise" establishes health-based guideline values of noise exposure, for which no adverse effects of community noise exposure on human health would be expected. The report provides guidance on various levels of risk to public health due to noise. This concept allows countries and developers to adopt their own level of noise control, according to affordability and technical feasibility versus public health risks. It is also recommended that community noise exposure should be managed through the use of environmental health impact analyses.

Table 7 Noise Levels Generated from Construction Equipment

Type of Equipment	Maximum Level (dBA at 50 feet)
1. Grader	85
2. Scrapers	89
3. Bulldozers	85
4. Heavy Trucks	88
5. Backhoe	80
6. Pneumatic Tools	85
7. Concrete Pump	82

Source: Federal Transit Administration (1995).

In order to model the possible effects from construction equipment at the project site, the consulting team assessed a typical scenario in which a grader (85dBA) and a scraper (89 dBA) operate concurrently and continuously in the same area. The combined sound level of these two pieces of equipment would be approximately 90 dBA at a distance of 50 feet from the construction site.

Table 8 indicated construction-period noise levels at various distances based on a source level of 90 dBA (measured at 50 feet). Distance attenuation, molecular absorption, and anomalous excess attenuation were taken into account in the calculation. The results in the table indicate that the foreseeable construction noise could be approximately 90 dBA at the closest residences. If short–term sound–level measurements at residential locations in the project area indicated that existing ambient sound levels are in the range of 40 to 45 dBA, the construction noise will have a potential to be more than 5 dBA above the existing ambient sound level.

Table 8 Estimated Grading–Related Construction Noise in the Project Area*

Distance Attenuation	
Distance to Receptor (feet)	Sound Level at Receptor (dBA)
50	90
100	84
200	78
400	71
600	67
800	65
1,200	60
1,500	58
2,000	55
2,500	52
3,000	49
4,000	45
5,280	41
7,500	34

*The above table is based on the following assumptions:

- Basic sound level drop-off rate: 6.0 dB per doubling of distance
- Molecular absorption coefficient: 0.7 dB per 1,000 feet
- Analogous excess attenuation: 1.0 dB per 1,000 feet
- Reference sound level: 90 dBA
- Distance for reference sound level: 50 Feet

These construction noise impacts could occur throughout the construction phase. The project would involve the use of various types of equipment and activities. Large machinery, such as a backhoe, will be transported to the access road site by trucks. The other raw materials for construction will be transported by trucks or lorry via a new bridge and access road. Noise impacts from this transportation would be low because there are less residential areas along this road. The contractor should undertake mitigation measures during transportation activities.

(2) Vibration

Vibration levels from different construction activities must be calculated. Using reference source vibration levels and typical usage factors, peak particle velocities (PPV) must be calculated for construction activities.

Using the method recommended by FTA (Federal Transit Administration, 1995) known as reference vibration amplitude (PPV ref), the vibration produced by the grading activities of a large bulldozer was 0.089 in/s at 25 feet of distance. The vibration was assumed to attenuate over changing distance according to the following equation:

$$PPV = PPV_{ref} \times (25/distance)^{1.5}$$

Using the above equation and recommended reference amplitude, the estimated vibration amplitude at various distances was calculated and summarized in Table 9.

Table 9 Estimation of Vibration Amplitude Released from Large Bulldozer

Distance (feet)	PPV (in/s)
25	0.08900
50	0.03100
100	0.01100
200	0.00390
500	0.00100
1,000	0.00035
1,200	0.00027
2,000	0.00012

Implementation of the following mitigation measures would reduce this impact but not to a less-than-significant level. This impact is therefore considered to be significant and unavoidable.

10.1.2.2 Mitigation Measures

(1) Noise

Since there is not many residential areas along the project site, there would be only a noise impact to the workers and some communities that were established along the access road such as Ban Nonsomboun (at km 0), Ban Tharuea (at km 18) and Ban Hat Gniun (at km 20).

The following measure shall be incorporated into the contract specifications for all construction work to reduce the impact from construction noise: A ll noise generating construction equipment shall have sound-control devices (e.g., exhaust mufflers) that are no less effective than the sound control devises that are provided on the equipment when new – no n equipment shall have an unmuffled exhaust.

The construction contractor has to set the working time to be only during day time from 6.00 am to 6.00 pm. During the night time, the contractor must avoid work that has loud noise activities or uses heavy equipment. I f necessary, a warning must be sent out to the communities before work is started.

(2) Vibration

Contractors should keep the use of heavy equipment to the minimum necessary level and retain a qualified heavy equipment specialist to develop a site-specific work program. The program should assess, monitor and control the ground vibration from using heavy equipment.

Working time must be set only during daytime from 6.00 am to 6.00 pm. to avoid conflict with the residential quality of life of the villagers.

10.1.3 EROSION AND SEDIMENTATION

10.1.3.1 Impact Assessment (Pre-construction and construction)

Most of the erosion from construction results from removal of protective ground cover and vegetation brought about by land clearing activities. It is anticipated that until the ground is stabilized through natural or artificial means, the project will result in increased sediment yields through greater erosion and subsequent sediment discharge.

If suitable mitigation measures are implemented, such erosion impacts due to construction would likely be significantly reduced and controlled. Consequently, it will be essential that appropriate mitigation measures are implemented with the best management measures followed. In addition, construction and particularly land clearing activities should be conducted to the maximum extent possible during dry periods to help minimize erosion impacts. Moreover, care is to be taken during access road construction and excavation works.

10.1.3.2 Mitigation Measure

In the general project area, erosion and sediment control design plans will be prepared prior to the commencement of works. The design plans will contain the following aspects.

- Conceptual design of erosion and sediment controls are to be implemented on-site in accordance with the requirements of this project.
- Erosion and sediment control programs at the bridge construction area must be carefully designed because the duration of the bridge construction will be longer than the road construction. Typically, the bridge construction will take several months and interfere with the natural flow during both rainy and dry seasons. It is recommended to construct the bridge during the dry season to avoid excessive sediment flow.
- Water quality monitoring stations will be set up in accordance with the requirements of the water quality monitoring plan.

Erosion and sediment control plans will be included in the site specific plans prepared for construction site. The erosion and sediment program and activities will be implemented prior to the commencement of any construction activity on the site.

10.1.4 IRRIGATION AND/OR DRAINAGE CHANNELS

Road construction activities will cause a minor impact to surface water hydrology and water quality in the project area. Considering the number of people that are potentially affected, this modification will generate a negative environmental impact on agricultural activities and population. As elaborated in this report, mitigation measures concerning irrigation and drainage channels must be implemented by the contractor to decrease the magnitude of this impact. The residual environmental impact will be minor with the mitigation measures implemented.

10.1.5 TRAFFIC DISTURBANCE

Traffic disturbance will occur during construction works at the junction of Ban Nonsomboun along the section of the existing highway from Pakxan to Bolikhan and Thasi. In this

location, disturbance of traffic will be high. Traffic control by local authorities (and by the contractor where appropriate) will be essential in order to decrease the impact of construction works on the population.

Traffic signs must be installed during construction phase of the access road, especially at the junction of Ban Nonsomboun. Along the access road, warning signs must be placed at and along the construction section. It is necessary to have manual traffic control at the construction section because most of the local vehicles are not aware of the construction process and will be inconvenienced by the heavy equipment.

10.2 ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE OPERATION STAGE

10.2.1 MAINTENANCE

Road maintenance work generates positive impacts, eliminating or reducing environmental problems caused by the deterioration of road surfaces, drains, and roadsides. The most important mitigation measure related to this activity is to make sure that maintenance is done, so that the environmental features built into the road design operate effectively.

10.2.2 TRAFFIC

Traffic flow will be greatly improved after the completion of the project. This modification of the traffic will generate a major positive economic impact throughout the project area.

10.2.3 ROAD SAFETY

Road safety will be improved with the project. The environmental impacts will be positive and major. To maintain this improvement in the long term, the developer will control access of the road.

10.3 SPECIFIC IMPACTS ASSOCIATED WITH BRIDGE CONSTRUCTION

The construction of the project's bridges may create an intermediate negative environmental impact. Bridge construction can affect river navigation, population (ex: noise, dust, disturbance to agricultural activities, etc.), aquatic biology (erosion and siltation) and infrastructure. Specific mitigation measures will be applied according to the location of a particular bridge. These mitigation measures will reduce the general residual environmental impact to as minor a level as possible.

In the project, a number of bridges will be constructed over streams or rivers. The water quality is good in this section and the potential for aquatic life is high. Moreover, this water is used all along the river for domestic uses. As this river has many streams and tributaries, the project must build at least three permanent bridges. In addition, it may be necessary to construct up to four temporary bridges for the contractor's access, and to avoid fording the river. Specific mitigation measures are included in the contract documents. The contract must be administered so that they are implemented during the construction stage. These mitigation measures will reduce the residual environmental impact created by the construction of these bridges to as minor a level as possible.

10.4 ENVIRONMENTAL IMPACTS ASSOCIATED WITH TEMPORARY INFRASTRUCTURE

Specific environmental impacts associated with temporary works, such as temporary roads and stockpiles, cannot be assessed at this stage of the study since the locations of most these will be known only when the contractor submits his work program and method statement. These temporary construction works could create more negative impacts than the other activities if they are not properly controlled. They are dealt with in detail in the contract documentation. Judicious selection for any temporary infrastructure will be carried out in collaboration with the environmental monitoring specialist who will be part of the supervision consultant's organization.

11 INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PROGRAM

During the environmental monitoring for the construction stage, a domestic team will be selected and trained by the environmental specialist. This team, directed by the consultant, will monitor all the construction activities. These team members will have a background in engineering and environmental studies and will become the core of MOT's IEE monitoring capability, something which it does not possess at present.

The environmental monitoring activities will be included in the project's monthly progress reports.

12 FINDINGS AND RECOMMENDATIONS

This Initial Environmental Examination was carried out in conjunction with the preliminary design phase of the developer. Route selection and detailed alignment was a joint effort by engineering and environmental specialists. For this reason, route selection has integrated environmental criteria.

The major positive environmental impact anticipated by the Project will be economic. Implementation of the project will allow the local people to facilitate more trade and economic activity with the surrounding areas.

Improvement of road safety will be another major positive environmental impact of the project.

Potential erosion will create a major or intermediate negative environmental impact depending on the location. The Nam Ngiep River will be particularly affected by the construction works. Potential erosion will be more important after the project because the section of the river will be reduced.

Construction works, including bridge construction, will generate a number of negative environmental impacts. Many environmental impacts that will be generated during this period cannot be assessed at this moment, because these sites have not been identified and/or information concerning the period and the duration of these activities is not available. The temporary construction works could create more impacts than the other activities related to the project. For this reason, environmental monitoring will be required.

ANNEX E

PUBLIC CONSULTATION

1 Village Level

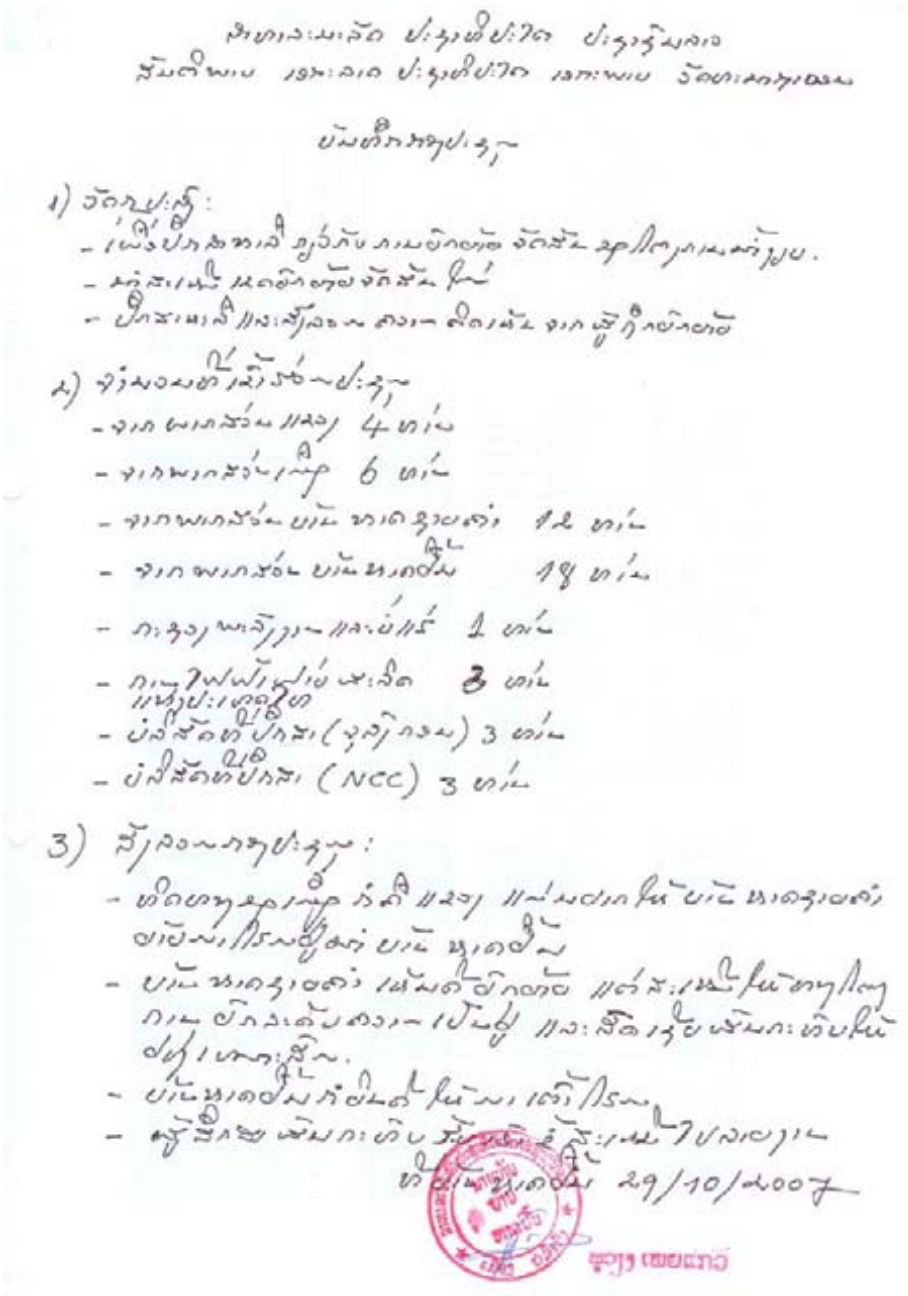
2 District Level

3 Provincial Level

1 VILLAGE LEVEL

1.1 Bolikhamxay Province (Ban Hat Gniun, Bolikhan District)

Minute of Public Consultation at Village Level on October 29, 2007



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ບັນທຶກກອງປະຊຸມ

1) ວັດຖຸປະສົງ:
- ເພື່ອປຶກສາຫາລື ກ່ຽວກັບ ການຍົກຍ້າຍ ຈັດສັນ ສຳປະທານທີ່ດິນ.
- ສ້າງຄວາມ ເຂົ້າໃຈຕໍ່ ຈັດສັນໃໝ່
- ປຶກສາແລກ ແນະນຳເຊິ່ງກັນ ແລະ ຄົ້ນຄວ້າ ຫາທາງ ອອກ ຮ່ວມກັນ

2) ຜູ້ເຂົ້າຮ່ວມກອງປະຊຸມ:
- ຈາກພາກສ່ວນ ແຂວງ 4 ທ່ານ
- ຈາກພາກສ່ວນ ເມືອ 6 ທ່ານ
- ຈາກພາກສ່ວນ ບ້ານ ຫາດຊາຍຄຳ 12 ທ່ານ
- ຈາກພາກສ່ວນ ບ້ານ ຫາດຊາຍ 19 ທ່ານ
- ກະຊວງ ພະລັງງານ ແລະ ບໍ່ແຮ່ 1 ທ່ານ
- ກະຊວງ ໄຟຟ້າ ຜູ້ຜ່ານ ສະເໜີ 3 ທ່ານ
ແຫ່ງປະເທດໄທ
- ບໍລິສັດ ທີ ປຶກສາ (ຫຸ່ງ ກອນ) 3 ທ່ານ
- ບໍລິສັດ ທີ ປຶກສາ (NCC) 3 ທ່ານ

3) ຜົນ ຂອງ ກອງປະຊຸມ:
- ທີ ດິນ ທຳ ກິນ ແລ ແມ່ນ ຫາກ ໃຫ້ ບ້ານ ຫາດຊາຍ ຄຳ ຍ້ອນ ເຂົ້າ ມາ ຫາ ບ້ານ ຫາດ ຊາຍ
- ບ້ານ ຫາດ ຊາຍ ເຫັນ ດີ ຍົກ ຍ້າຍ ແຕ່ ສະ ເໜີ ໃຫ້ ຫາ ທີ ດິນ ການ ຍົກ ຍ້າຍ ຄວນ ເປັນ ຫຍັງ ແລະ ຄິດ ເຫັນ ແກ້ ໄຂ ແນວ ໃດ.
- ບ້ານ ຫາດ ຊາຍ ກໍ ບໍ່ ໃຫ້ ຍ້າຍ ເຂົ້າ ໄປ ໃນ ເຂດ ປ່າ ສະ ຫງວນ
- ຜູ້ ເຂົ້າ ຮ່ວມ ເຫັນ ດ ເຊັນ ຊື່ ຕໍ່ ໜ້າ ທີ ປະ ຊຸມ

ທ້ອນ ຊ ວັນ ທີ 29/10/2007

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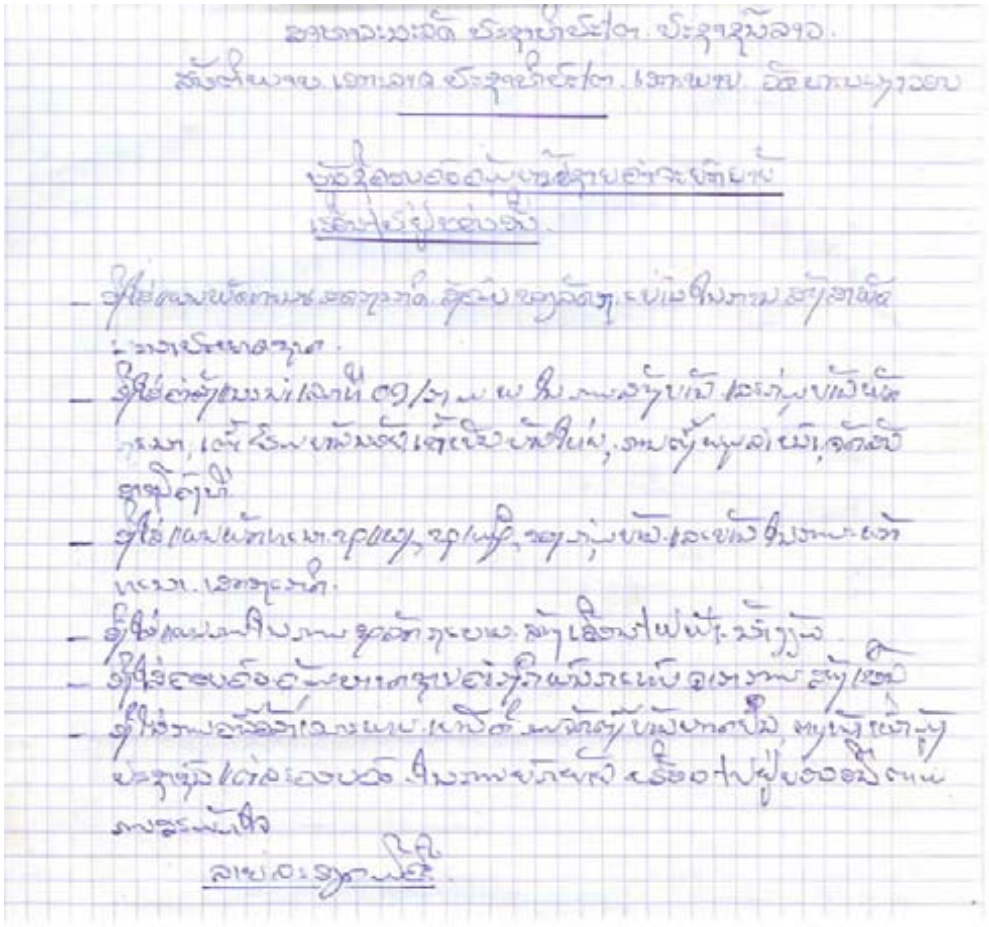

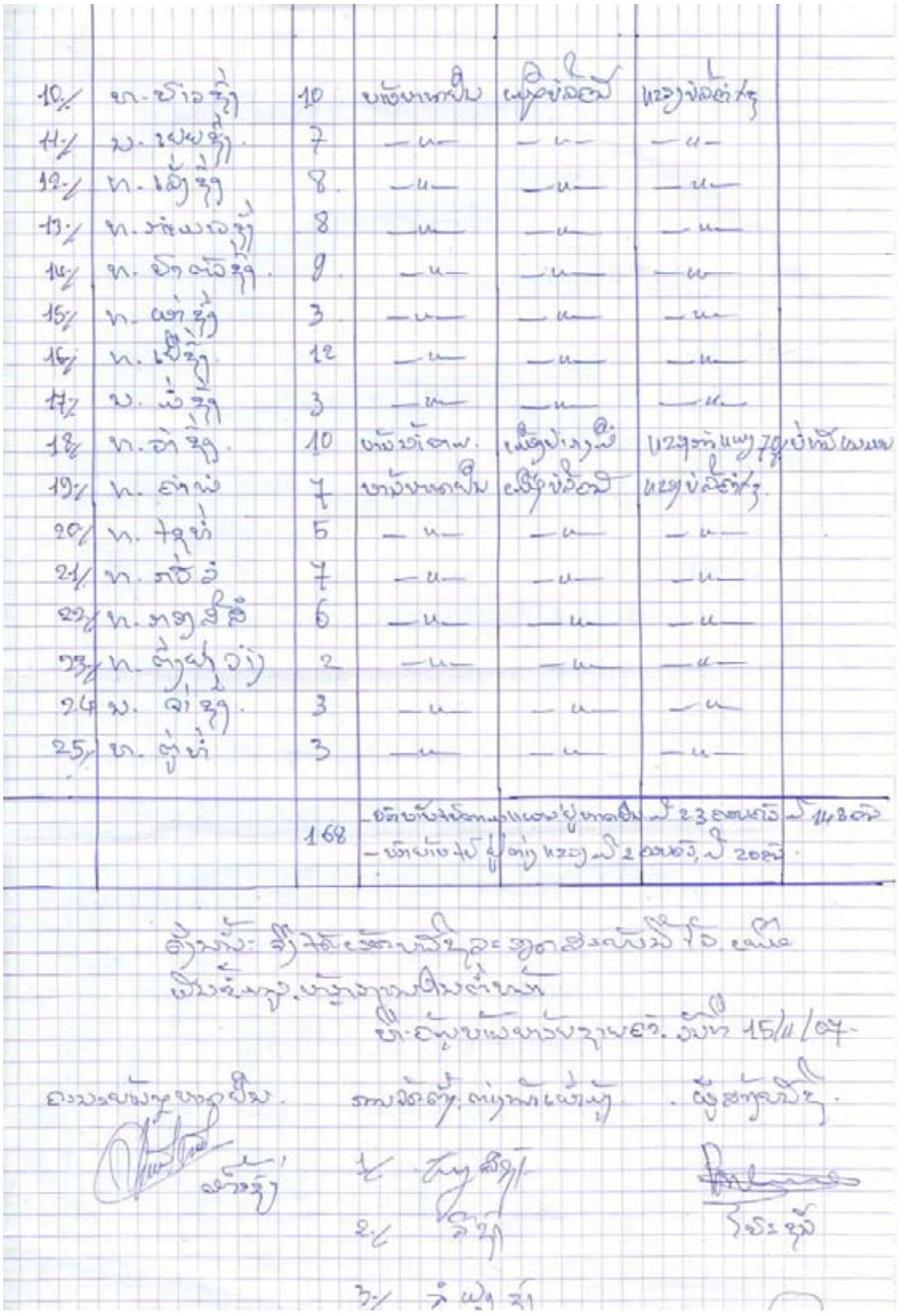

1.2 Vientiane Province (Ban Sopyouak, Hom District)

Minute of Public Consultation at Village Level on October 31, 2007

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ສະຫລຸບ

ການລາຍງານຂອງແຕ່ລະບ້ານກ່ຽວກັບການຍົກຍ້າຍ
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1/ ບ້ານນ້ຳຢວກ

- ອຳນາດການປົກຄອງບ້ານແລະພໍ່ແມ່ປະຊາຊົນໄດ້ເອກະພາບກັນດັ່ງນີ້:

ກ/ ຖ້າຫາກທາງໂຄງການຊອກໄດ້ດິນຕອນທີ່ເໝາະສົມສາມາດບັນຈຸປະຊາຊົນໄດ້ໝົດບ້ານ(ໂດຍບໍ່ແມ່ນ ເຂດນ້ຳປຸ່ງ-ຫາແອ່ນແລະເຂດຊຽ່ງຊຸ່ນຊຽ່ງລີ)ປະຊາຊົນກໍ່ຈະຍົກຍ້າຍໄປນຳໂຄງການ.

ຂ/ ໃຫ້ທາງໂຄງການຊົດເຊີຍໃຫ້ເໝາະສົມແລະເຕັ້ມສ່ວນແລ້ວປະຊາຊົນຈະໄປຊອກບ່ອນຢູ່ດ້ວຍຕົນເອງ

2/ ບ້ານໜອງ(ສົບຢວກ)

- ໄປຕາມການຈັດສັນຂອງໂຄງການ 1 ຄອຍຄົວ.
- ໄປຕາມແຜນໂຄງການ(ເຂດບໍ່ລິຄຳໄຊ,ຫາແອ່ນ,ນ້ຳປຸ່ງ) ບໍ່ມີ
- ຖ້າທາງໂຄງການມີແຜນບ່ອນຈັດສັນໃໝ່(ໂດຍບໍ່ແມ່ນນ້ຳປຸ່ງ,ຫາແອ່ນ,ແລະເຂດບໍ່ລິຄຳໄຊ) ປະຊາຊົນ ຂໍໃຫ້ທາງໂຄງການພາຕົວແທນໄປເບິ່ງກ່ອນຖ້າເໝາະສົມກໍ່ຈະໄປຕາມການຈັດສັນຂອງໂຄງການ.
- ຖ້າທາງໂຄງການຊອກບ່ອນຈັດສັນໃໝ່ບໍ່ໄດ້ປະຊາຊົນຂໍຄ່າຊົດເຊີຍແລະຈະໄປຊອກບ່ອນຢູ່ດ້ວຍຕົນ ເອງ.

3/ ບ້ານສົບໜວນ

- ໃຫ້ທາງໂຄງການຊົດເຊີຍໃຫ້ເຕັ້ມສ່ວນ.ຈະໄປຊອກບ່ອນຢູ່ດ້ວຍຕົນເອງ,ນ້ຳຖ້ວມຮອດບ່ອນໃດຈະ ຢູ່ບ່ອນນັ້ນ.ແຕ່ບ່ອນຢູ່ຍັງບອກບໍ່ໄດ້ໃຫ້ຮູ້ເຂດນ້ຳຈະຂຶ້ນກ່ອນຈຶ່ງຕອບຕາມທີ່ຫລັງ.

4/ ບ້ານຫ້ວຍປາມ້ອມ.

- ທັງໝົດບ້ານໄດ້ເອກະພາບນ້ຳຖ້ວມຮອດໃສຈະຢູ່ບ່ອນນັ້ນແຕ່ດິນທຳການຜະລິດເຊັ່ນ:ໄຮ່,ນາ,ຄ້ຽ ລ້ຽງສັດຈະໄປເຮັດຢູ່ເຂດຊຳເຕີຍ.

ສະນັ້ນຈຶ່ງລາຍງານໃຫ້ທາງໂຄງການຊາບເພື່ອວາງແຜນໃນການຈັດສັນຕໍ່ໄປ.

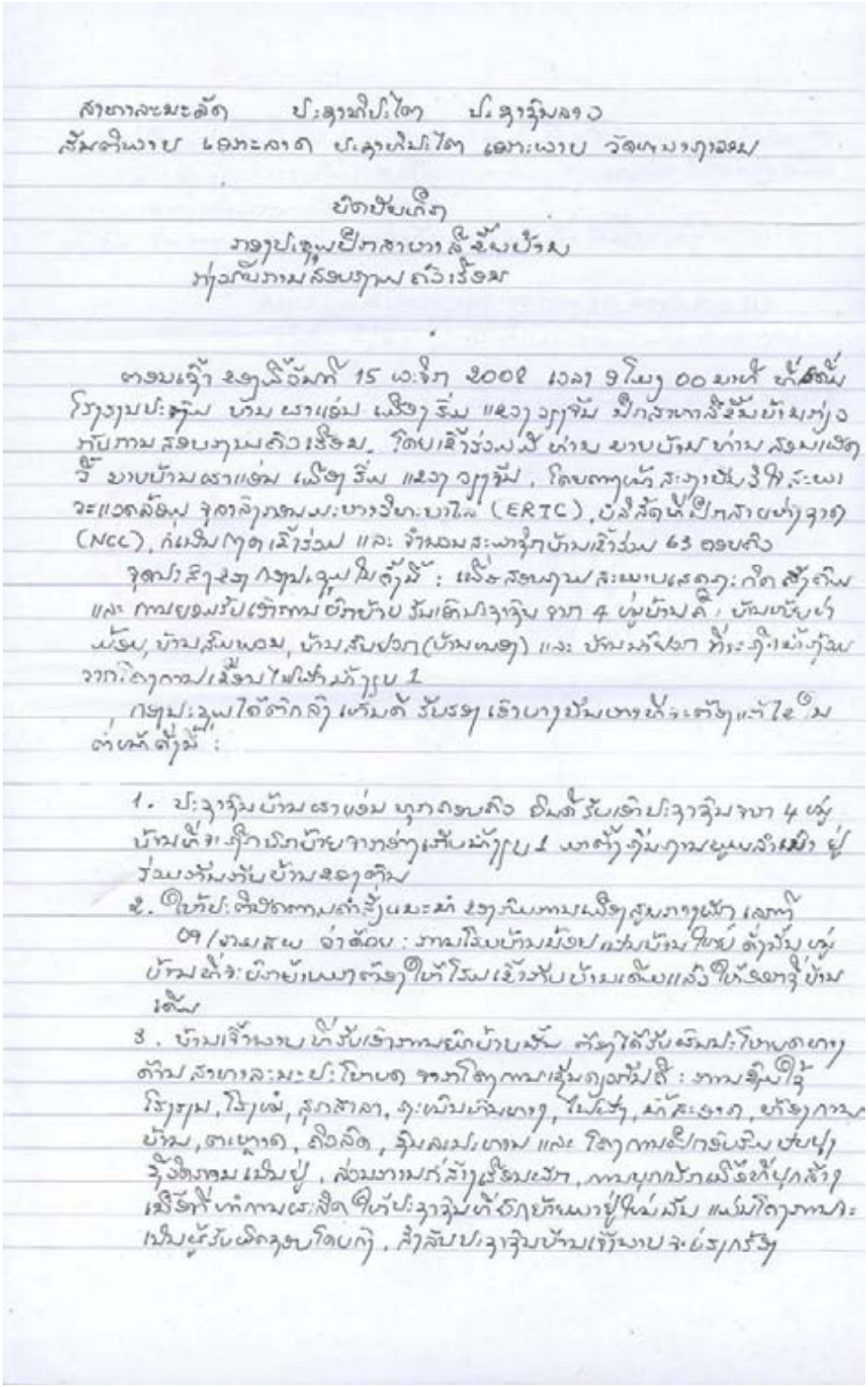
ເມືອງຮ່ຶມ ວັນທີ 26 / 11 / 07

ຫ້ອງການພະລັງງານແລະບໍ່ແຮ່ເມືອງຮ່ຶມ

ຈິງຄຳ ສຸທຳມະວົງ

1.3 Vientiane Province (Ban Pha-an, Hom District)

Minute of Public Consultation at Village Level on November 15, 2008



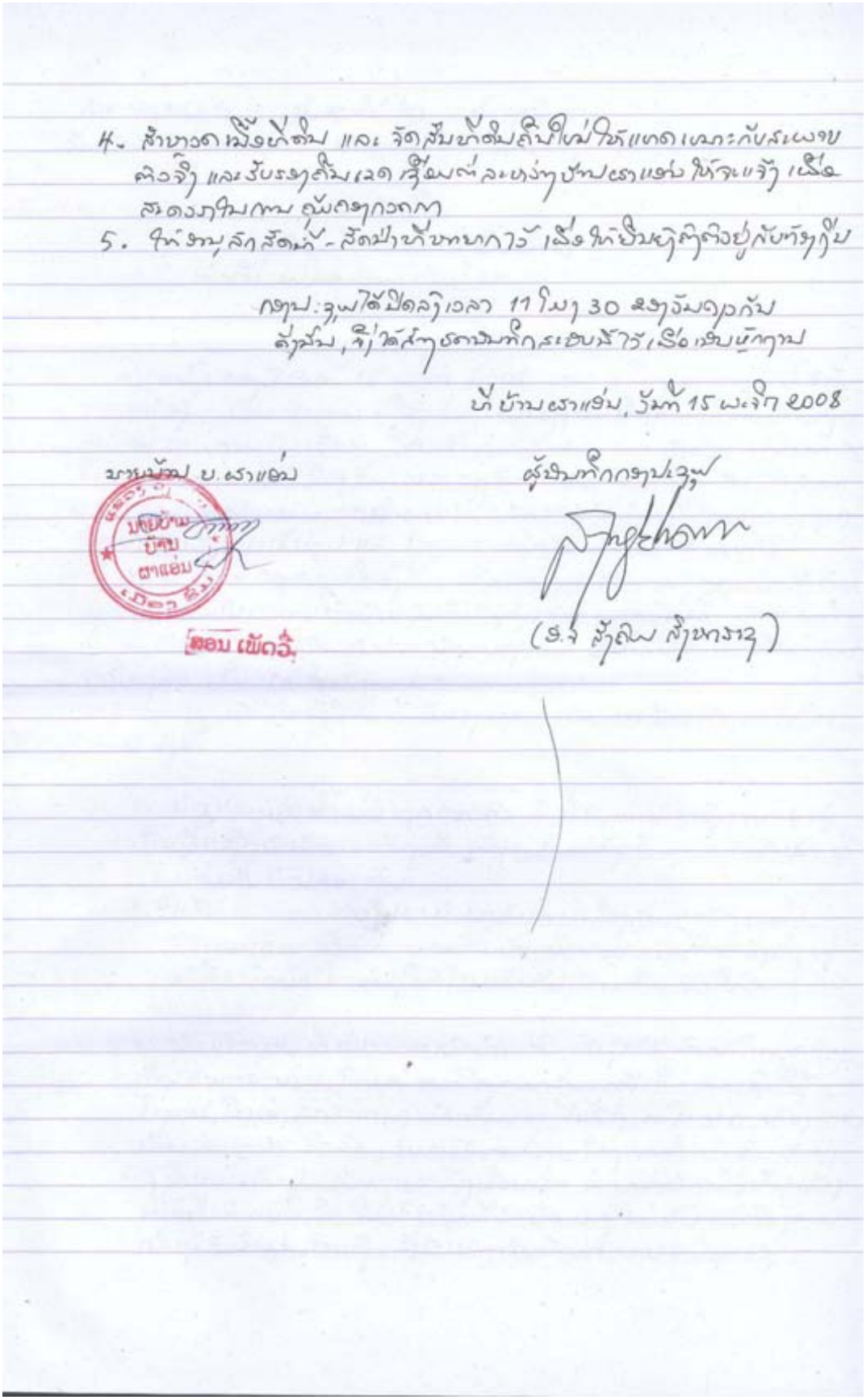
ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນະຖາວອນ

ບົດບັນທຶກ
ການປະຊຸມປຶກສາຫາລືຂັ້ນບ້ານ
ກ່ຽວກັບການສອບຖາມຄົວເຮືອນ

ຕອນເຊົ້າ ຂອງມື້ວັນທີ 15 ພະຈິກ 2008 ເວລາ 9 ໂມງ 00 ນາທີ ເລີ່ມຕົ້ນ
ໂຮງງານປະຊຸມ ບ້ານ ຫາແຄ່ມ ເມືອງ ຈັ່ນ ແຂວງ ວຽງຈັນ ມີການຫາລືລັ້ນບ້ານກ່ຽວ
ກັບການ ສອບຖາມຄົວເຮືອນ. ໂດຍເຊີນຜ່ອນໃຫ້ ທ່ານ ນາຍບ້ານ ທ່ານ ສອນແພງ
ຈີ ນາຍບ້ານ ຫາແຄ່ມ ເມືອງ ຈັ່ນ ແຂວງ ວຽງຈັນ. ໂດຍການເຂົ້າຮ່ວມ ແລະ ປະທານ
ກອງປະຊຸມ ຈຸດປະສົງ ຂອງ ກອງປະຊຸມ ໃນຄັ້ງນີ້ : ເພື່ອ ສອບຖາມ ລະພາບ ເສດຖະກິດ ສັງຄົມ
ແລະ ການຍອມຮັບ ເຫັນດີ ຂອງ ປະຊາຊົນ ຈັ່ນ ເຫັນດີ ປະຊາຊົນ ຈາກ 4 ໜ່ວຍ ບ້ານ ຄື : ບ້ານ ຫາແຄ່ມ
ເໜືອ, ບ້ານ ຫາແຄ່ມ ໃຕ້, ບ້ານ ຫາແຄ່ມ ກາງ (ບ້ານ ໜອງ) ແລະ ບ້ານ ໜ້ອງ ຫາ ທີ່ ຈະ ຖືກ ເອົາ ທີ່ ດິນ
ຈາກ ໂຄງການ ເຂື່ອນ ໄຟຟ້າ ນ້ຳ ງຽບ 1

ກອງປະຊຸມ ໄດ້ ຕົກລົງ ເຫັນດີ ຮັບຮອງ ເອົາ ບາງ ເນື້ອ ຫາ ທີ່ ຈະ ຕ້ອງ ແກ້ ໄຂ ມີ
ດັ່ງ ຫລັກ ຄັ້ງນີ້ :

1. ປະຊາຊົນ ບ້ານ ຫາແຄ່ມ ທຸກ ຄອບຄົວ ຍິນດີ ຮັບ ເອົາ ປະຊາຊົນ ຈາກ 4 ໜ່ວຍ
ບ້ານ ທີ່ ຈະ ຖືກ ເກັບ ເອົາ ທີ່ ດິນ ຈາກ ທ່ວ ເຂື່ອນ ນ້ຳ ງຽບ 1 ມາ ຕັ້ງ ຖິ່ນ ຖານ ຢູ່ ນຳ ກັນ ເພື່ອ ຢູ່
ຮ່ວມ ສັນ ຫລັ ກັບ ບ້ານ ຂອງ ຕົນ
2. ເງື່ອ ໄຂ ທີ່ ປະ ຊາ ຊົນ ຕ້ອງ ການ ຂໍ ແລະ ຂໍ ຮ້ອງ ຂໍ ຈາກ ລັດ ຖະ ບານ ເພື່ອ ຊ່ວຍ ເຫລືອ
09 / ຫລາຍ ສຸດ ຈ່າ ຕັ ດ ນ : ການ ໂອນ ບ້ານ ນ້ອຍ ເຂົ້າ ກັບ ບ້ານ ໃຫຍ່ ຕັ້ງ ນັ້ນ ໜ່ວຍ
ບ້ານ ທີ່ ຈະ ຍົກ ຍ້າຍ ໜາ ຕ້ອງ ໄດ້ ໂອນ ເຂົ້າ ກັບ ບ້ານ ເດີ ມ ແລ້ວ ຈຶ່ງ ຈະ ຍ້ອນ ໄປ ບ້ານ
ໃໝ່
3. ບ້ານ ເຈົ້າ ພາ ບ ທີ່ ຮັບ ເອົາ ການ ຍົກ ບ້ານ ນັ້ນ ຕ້ອງ ໄດ້ ຮັບ ຜົນ ປະ ໂຫ ຍ ດ ທາງ
ດ້ານ ສາ ທາ ລະ ນະ ປະ ໂຫ ຍ ດ ຈາກ ໂຄງ ການ ເຊັ່ນ ດຽວ ກັນ ດີ : ການ ສ້ອມ ແປງ
ໂຮງ ຮຽນ, ໂຮງ ໝໍ, ອຸ ປະ ສາ ລາ, ຖ ະ ໜົນ ຫົນ ທາງ ຕ່ າ ງ ໆ, ໄຟ ຟ້ າ, ແຫ ລ ່ ງ ນ ້ ຳ, ເຄື ່ ອ ງ ກ ານ
ບ້ານ, ຕະ ຫລາ ດ, ຄົ ວ ລົ ດ, ຊຸ ມ ຊົ ນ ປ ະ ທ ານ ແລະ ໂຄ ງ ກ ານ ປ ຶ ກ ສ າ ຫ ານ ປ ັ ບ ປ ຸ ງ
ຊີ ວ ິ ດ ກ ານ ອ ຢ ູ ່ ດ ີ ກ ິ ນ ດ ີ . ສ ່ ວ ນ ທ າ ງ ດ ້ ານ ກ ່ ໍ ສ ້ າ ງ ເ ຮ ື ອ ນ ທ ີ ່ ພ ັ ກ ອ າ ໄ ສ , ກ ານ ປ ຸ ກ ສ ້ າ ງ ປ ່ ໍ ໄ ມ ້ ,
ເ ຮ ື ອ ນ ໄ ມ ້ ທ ໍ ່ ກ ານ ຜ ະ ລ ິ ດ ທ ີ ່ ປ ະ ຊ າ ຊ ົ ນ ທ ີ ່ ຍ ົ ກ ຍ ້ າ ຍ ມ າ ຢ ູ ່ ໃ ໝ ່ ນ ັ ້ ນ ແ ມ ່ ນ ມ ີ ຄ ວ າ ມ ຫ ວ ັ ງ
ເ ໝ ື ອ ນ ຄ ົ ນ ທ ີ ່ ຮ ັ ບ ຜ ົ ນ ປ ະ ໂ ຫ ຍ ດ ໂ ດ ຍ ກ ົ ງ . ສ ໍ າ ລ ັ ບ ປ ະ ຊ າ ຊ ົ ນ ບ ້ ານ ເ ຈ ົ ້ າ ພ າ ບ ຈ ະ ບ ໍ ່ ຮ ຽ ກ ຮ ້ ອ ງ



4. ສ້າງຄວາມເຂົ້າໃຈ ແລະ ຈັດສັນທີ່ໝັ້ນຄົນໃໝ່ໃຫ້ແກ່ຄອບຄົວ ທີ່ຈະໄດ້ ແລະ ຮັບຮອງຄົ້ນເຊິ່ງ ເຊິ່ງຕ້ອງໄດ້ ແລະ ຮັບຮອງຄົ້ນເຊິ່ງ ເຊິ່ງ ສະດວກໃນການ ຜັດຕາກວດກາ

5. ທົ່ວໝູ່ ລົງ ສັດ - ສັດປ່າ ທີ່ ພາຍ ທ ວ ເຮັ ໃຫ້ ຢືນ ຫ ຄົ ຄ ຢູ່ ກັ ທ ຖ ຖ ຍ

ການ: ຊຸມ ໄ ປ ເ ວ ລ 11 ໂ ມ 30 ຂ ວ ມ ກ ວ ກ ນ
ຕ ສ ນ, ຈ ໄ ສ ຖ ຍ ຄ ນ ທ ກ ລ ຍ ນ ສ ວ, ເ ຍ ນ ຫ ກ ນ

ທ ບ ນ ຕ ແ ນ, ວ ທ 15 ພ ຈ ກ 2008

ນ ນ ບ ນ ຕ ແ ນ

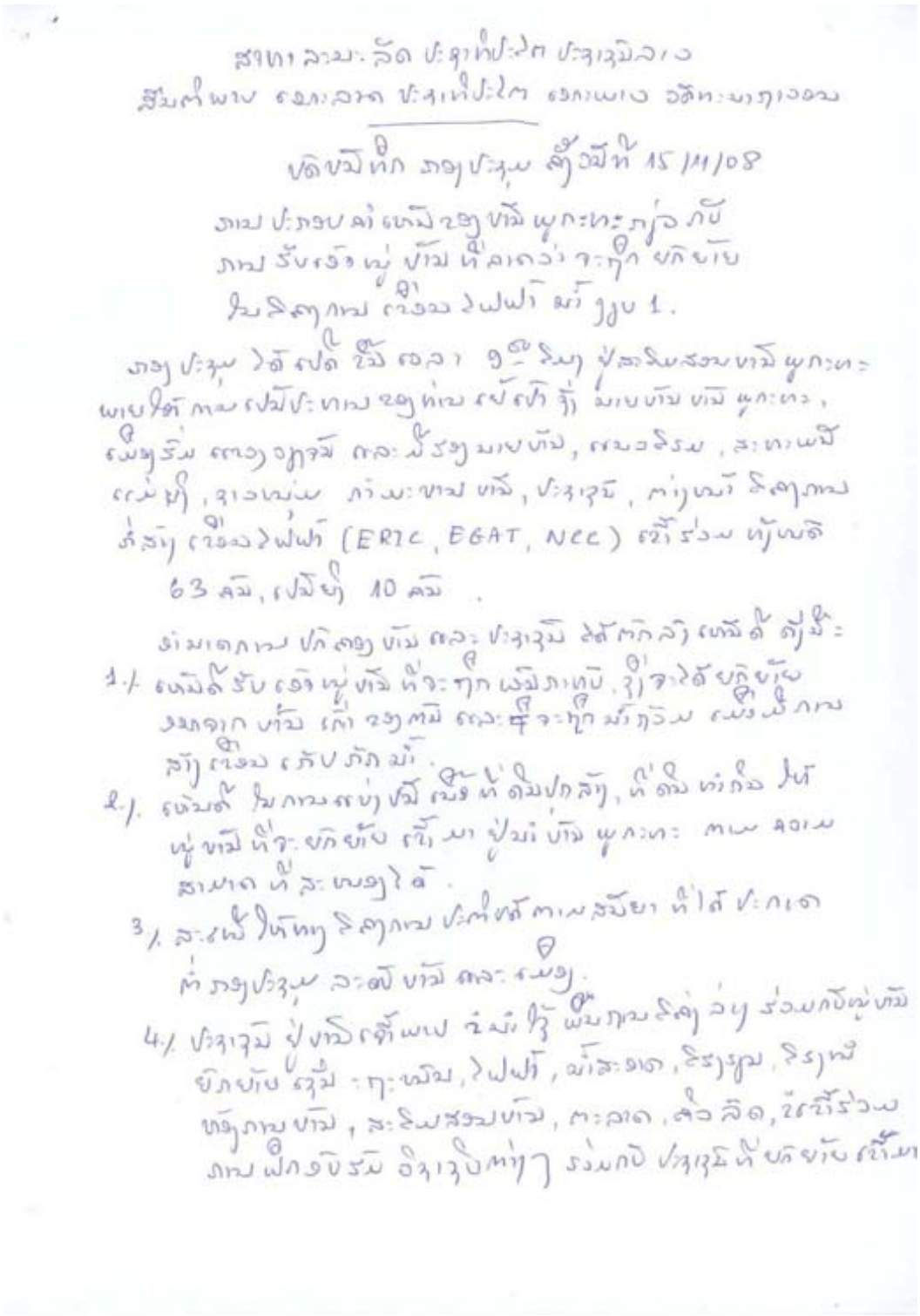
ສ ນ ທ ກ ກ ນ ຊ ມ

(ອ.ຈ ສ ລ ສ ຫ ງ)

ສ ນ ເ ດ ວ

1.4 Vientiane Province (Ban Phukatha, Hom District)

Minute of Public Consultation at Village Level on November 15, 2008



5/. ຈຶ່ງໃຫ້ໝູ່ ບ້ານ ທີ່ ຍົກຍ້າຍ ໃຫ້ຮີບຮົ້ນ ສ້ຳ ມອບ ການ ປົກ ຄອງ ຂອງ ຕົ ບ້ານ ພູ ກະ ທະ ບ້ານ ຄູ ວ ຕາມ ລະ ຍະ ເວ ລາ ທີ່ ກຳ ນົ ດ ຄວ ນ ບ້ານ ມ ໃຈ ເກົ່ າ ຄື ບ້ານ ໃຫ ມ່ .

6/. ຈຶ່ ໃ ໜ້ ເຄົ ມ ຄ ວ ນ ຊ ວ ມ ຊ ວ ຍ ເ ຫ ລ ື ອ , ປ ະ ສ ານ ງ ຄ ວ ບ ຄ ຸ ມ ກ ວ ດ ກ ວ ຍ ປ ະ ສ ານ ງ ານ ຢ ູ ່ ບ ້ ານ ພ ູ ກ ະ ທ ະ ເ ກ ົ ່ າ ກ ລ ະ ປ ະ ສ ານ ງ ທ ີ ່ ຍ ົ ກ ຍ ້ ານ ເ ຖ ິ ງ ບ ້ ານ ໃ ໝ ່ ່ ກ ລ ະ ຕ ິ ດ ຕ ໍ ່ ໃ ຫ ້ ກ ຸ ມ ຄ ົ ນ ເ ຫ ລ ົ ່ ານ ີ ້ ກ ລ ັ ບ ຄ ືນ ກ ລ ະ ຄ ວ ນ .

ກອງ ປະ ຊຸ ມ ໄ ດ ້ ປ ິ ດ ລົ ງ ເ ວ ລ ະ 12 ໂ ມ ງ 00 ນ າ ທ ີ

ທ ີ ່ ພ ູ ກ ະ ທ ະ ວ ນ ທ ີ 15/11/08

ຜ ູ ້ ບ ັ ນ ທ ຶ ກ

ປ ຽ ນ

ຄ ຳ ຢ ັ ້ ງ ຢ ືນ

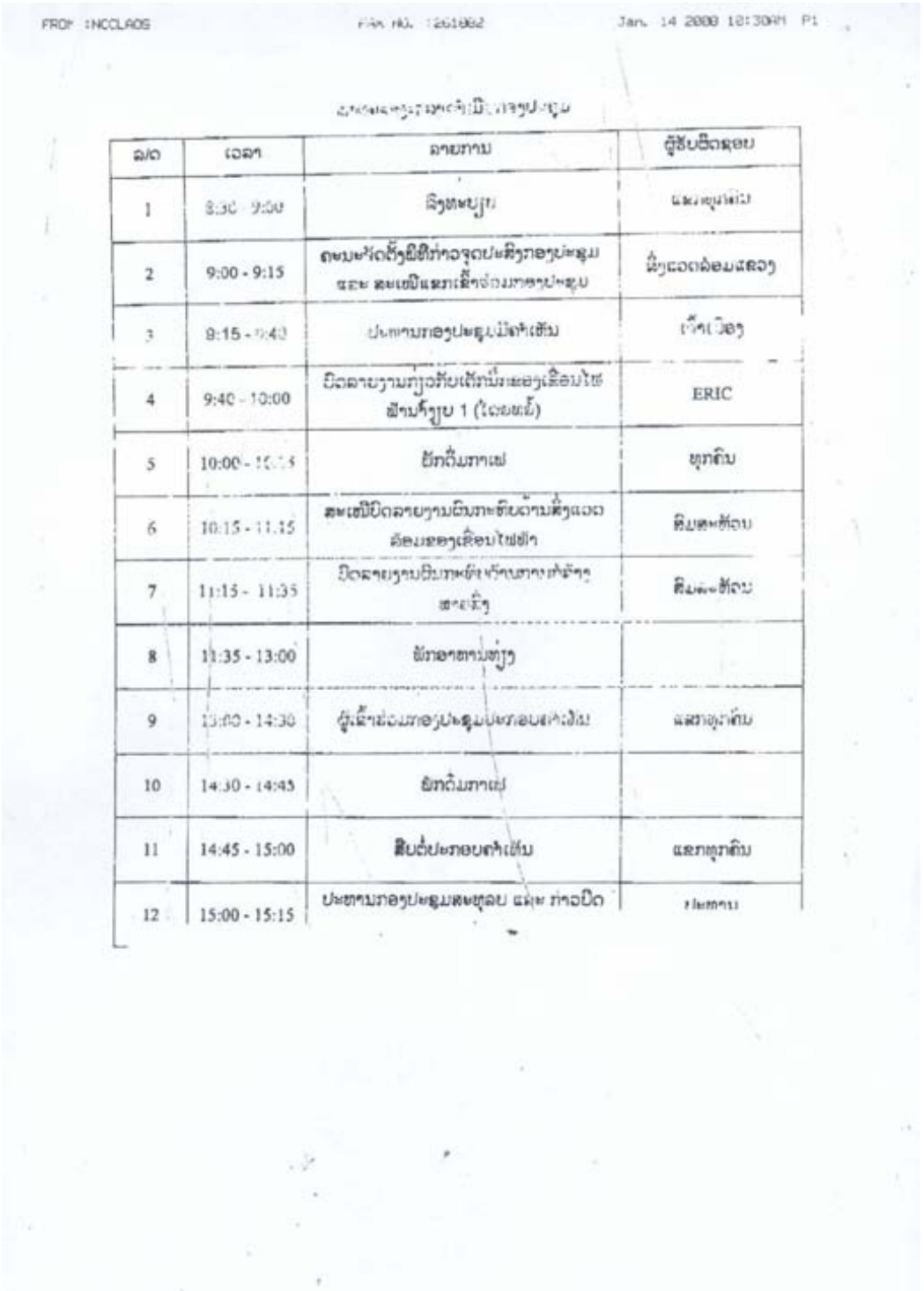
ນ າ ຍ ບ ້ ານ , ບ ້ ານ ພ ູ ກ ະ ທ ະ

ເ ຢ ີ ່ ຍ ວ ຊ ົ ່ ໍ

2 DISTRICT LEVEL

2.1 Bolikhamxay Province (Bolikhan District)

Minute of the First Public Consultation at District Level on January 16, 2008



ລ/ດ	ເວລາ	ລາຍການ	ຜູ້ຮັບຜິດຊອບ
1	8:30 - 9:00	ລົງທະບຽນ	[illegible]
2	9:00 - 9:15	ຄຳນຳ[illegible]	[illegible]
3	9:15 - 9:40	[illegible]	[illegible]
4	9:40 - 10:00	[illegible]	ERIC
5	10:00 - 10:15	[illegible]	[illegible]
6	10:15 - 11:15	[illegible]	[illegible]
7	11:15 - 11:35	[illegible]	[illegible]
8	11:35 - 13:00	[illegible]	
9	13:00 - 14:30	[illegible]	[illegible]
10	14:30 - 14:45	[illegible]	
11	14:45 - 15:00	[illegible]	[illegible]
12	15:00 - 15:15	[illegible]	[illegible]

2.2 Bolikhamxay Province (Bolikhan District)

Minute of the Second Public Consultation at District Level on June 12, 2008

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນະຖາວອນ
ບົດບັນທຶກ

ກອງປະຊຸມປຶກສາຫາລື
ກ່ຽວກັບ ການຈັດສັນທີ່ຢູ່ອາໄສໃຫ້ປະຊາຊົນ ທີ່ໄດ້ຮັບຜົນກະທົບ ທາງ ກົງ ແລະ
ການຊົດເຊີຍໃຫ້ປະຊາຊົນທີ່ໄດ້ຮັບຜົນກະທົບທາງກົງແລະທາງອ້ອມ
ຂອງ ໂຄງການເຂື່ອນໄຟຟ້ານ້ຳຕິກ ນ້ຳງຽບ 1

ໃນຕອນເຊົ້າຂອງວັນທີ 12/06/2008 ກອງປະຊຸມໄດ້ເປີດຂຶ້ນ ໃນເວລາ 9 ໂມງ ຢູ່ຫ້ອງປະຊຸມຂອງ ພະແນກກະສິກຳ-ປ່າໄມ້ ແຂວງບໍລິຄຳໄຊ ພາຍໃຕ້ການເປັນປະທານຂອງທ່ານ ຄຳປະສົງ ວົງທະນາ ຫົວໜ້າ ຫ້ອງການຊັບພະຍາກອນນ້ຳແລະສິ່ງແວດລ້ອມແຂວງບໍລິຄຳໄຊ, ມີ ທ່ານ ວົງສີ ທອງສີອິນທີປັນຍາ, ຮອງເຈົ້າ ເມືອງ,ເມືອງບໍລິຄັນ, ມີພະແນກການຕ່າງໆອ້ອມຂ້າງແຂວງ, ເມືອງ, ຕາງໜ້າອຳນາດການປົກຄອງຂອງ ໝູ່ ບ້ານທີ່ໄດ້ຮັບຜົນກະທົບທາງກົງແລະທາງອ້ອມ, ມີຕາງໜ້າຕູ້ພັດທະນາໂຄງການ, ສະຖາບັນວິໄຈສະພາວະ ແວດລ້ອມ ຈຸລາລົງກອນມະຫາວິທະຍາໄລ (ERIC) ແລະ ບໍລິສັດທີ່ປຶກສາແຫ່ງຊາດ (NCC) ເຂົ້າຮ່ວມ ລວມທັງໝົດ 31 ທ່ານ, ຍິງ 2 ທ່ານ

ທີ່ປະຊຸມໄດ້ຕົກລົງ:

1. ຜ່ານການຄົ້ນຄວ້າ ປະຊາຊົນ 2 ຄຸ້ມ (ຄຸ້ມຫາດຍົ້ນແລະຄຸ້ມຫາດຊາຍຄຳ) ເຫັນດີຍົກຍ້າຍຢູ່ ຮ່ວມກັນ.
2. ຈະຫັດແຜນຄືນຄ່າເສຍຫາຍໃຫ້ຄຸ້ມຫາດຊາຍຄຳ ຕາມຄຳສັ່ງ 192/ນຍ ລົງວັນທີ 7/7/2006.
3. ສິ່ງທີ່ໂຄງການຈະພັດທະນາບ້ານຫາດຍົ້ນ ມີຄື:
   - ໂຄງການຈະຮັບຜິດຊອບເບິ່ງແຍງຊີວິດການເປັນຢູ່ປະຊົນຊົນ ກຳນົດ 8 ປີ.
   - ປົກວິຊາຊີບ, ຝຶກ ແລະ ສ້າງກອງທຶນໝູ່ບ້ານ.
   - ຂະຫຍາຍເນື້ອທີ່ສຳລັບການປູກຝັງ ແລະ ລ້ຽງສັດ.
   - ຂະຫຍາຍລະບົບຊົນລະປະທານ
   - ສ້າງຖະໜົນໃຫຍ່ ແລະ ທາງຮ່ອມຕາມຈຳນວນທີ່ເໝາະສົມ(ໃນບໍລິເວນບ້ານຫາດຍົ້ນ)
4. ວຽກງານກໍ່ສ້າງຕົກລາຄາຕ່ຳໆ:
   - ການປຸກສ້າງເຮືອນຊານຂອງປະຊາຊົນ ທີ່ຖືກຜົນກະທົບໂດຍກົງ ໂດຍອີງໃສ່ຄວາມເປັນເອກະພາບ ລະຫວ່າງປະຊາຊົນ ແລະ ຄະນະກຳມະການຍົກຍ້າຍຈັດສັນ ແຕ່ຄວນມີການຮັກສາເອກະລັກຂອງຊົນເຜົ່າ
   - ການກໍ່ສ້າງໂຮງຮຽນອະນຸບານ, ປະຖົມ, ໂຮງຮຽນມັດທະຍົມ ຕາມມາດຕະຖານທີ່ກະຊວງສຶກສາ ທິການວາງອອກ
   - ການກໍ່ສ້າງຕະຫຼາດ ແລະ ຄົວລົດ.
   - ການກໍ່ສ້າງຫ້ອງການບ້ານ.

- ສ້າງສະໄມສອນບ້ານ.
- ການກໍ່ສ້າງສຸກສາລາ.
- ການຕອບສະໜອງໄຟຟ້າ ແລະ ນ້ຳສະອາດ.

➢ ປະຊາຊົນທີ່ຢູ່ກ້ອງເຂື່ອນ ຈະໄດ້ຮັບການຊົດເຊີຍດັ່ງນີ້:

- ສະໜອງນ້ຳສະອາດຢ່າງພຽງພໍ
- ລະບົບປ້ອງກັນຕະຝັ່ງເຈື່ອນ
- ຝຶກອາຊີບໃໝ່ ເຊັ່ນ: ການປູກຝັງ, ລ້ຽງສັດ, ຫັດຖະກຳ ແລະ ອື່ນໆ
- ໂຄງການຕ້ອງຮັບປະກັນຄວາມປອດໄພຈາກການປ່ອຍນ້ຳຈາກເຂື່ອນ ໃນໄລຍະສັ້ນແລະ ໄລຍະຍາວ (ກໍລະນີມີການເສຍຫາຍ ໂຄງການຕ້ອງຮັບຜິດຊອບຄ່າເສຍຫາຍ).

ໝາຍເຫດ: ມີບັນຊີລາຍຊື່ຜູ້ເຂົ້າຮ່ວມກອງປະຊຸມຂັດຕິດມາພ້ອມນີ້.

ກອງປະຊຸມໄດ້ປິດລົງ ໃນເວລາ 12 ໂມງ ຂອງວັນທີ 12/06/2008

ດັ່ງນັ້ນ, ຈຶ່ງໄດ້ເຮັດບົດບັນທຶກກອງປະຊຸມໃນຄັ້ງນີ້ໄວ້ ເພື່ອເປັນບ່ອນອີງໃນການລາຍງານຂັ້ນເທິງ ແລະ ຈັດຕັ້ງປະຕິບັດວຽກງານຍົກຍ້າຍຈັດສັນ ໃນຂັ້ນຕໍ່ໄປ.

ທີ່ປາກຊັນ,ວັນທີ 12/06/2008

ຜູ້ບັນທຶກ

ອຳນາດການປົກຄອງບ້ານຫາດຍົ້ນ

1.) ...

2.) ...

3.) ...

ຫົວໜ້າຫ້ອງການຊັບພະຍາກອນນ້ຳ
ແລະສິ່ງແວດລ້ອມແຂວງບໍລິຄຳໄຊ

ປະທານກອງປະຊຸມ

ຄຳປະສົງ ວິຈິດພາ

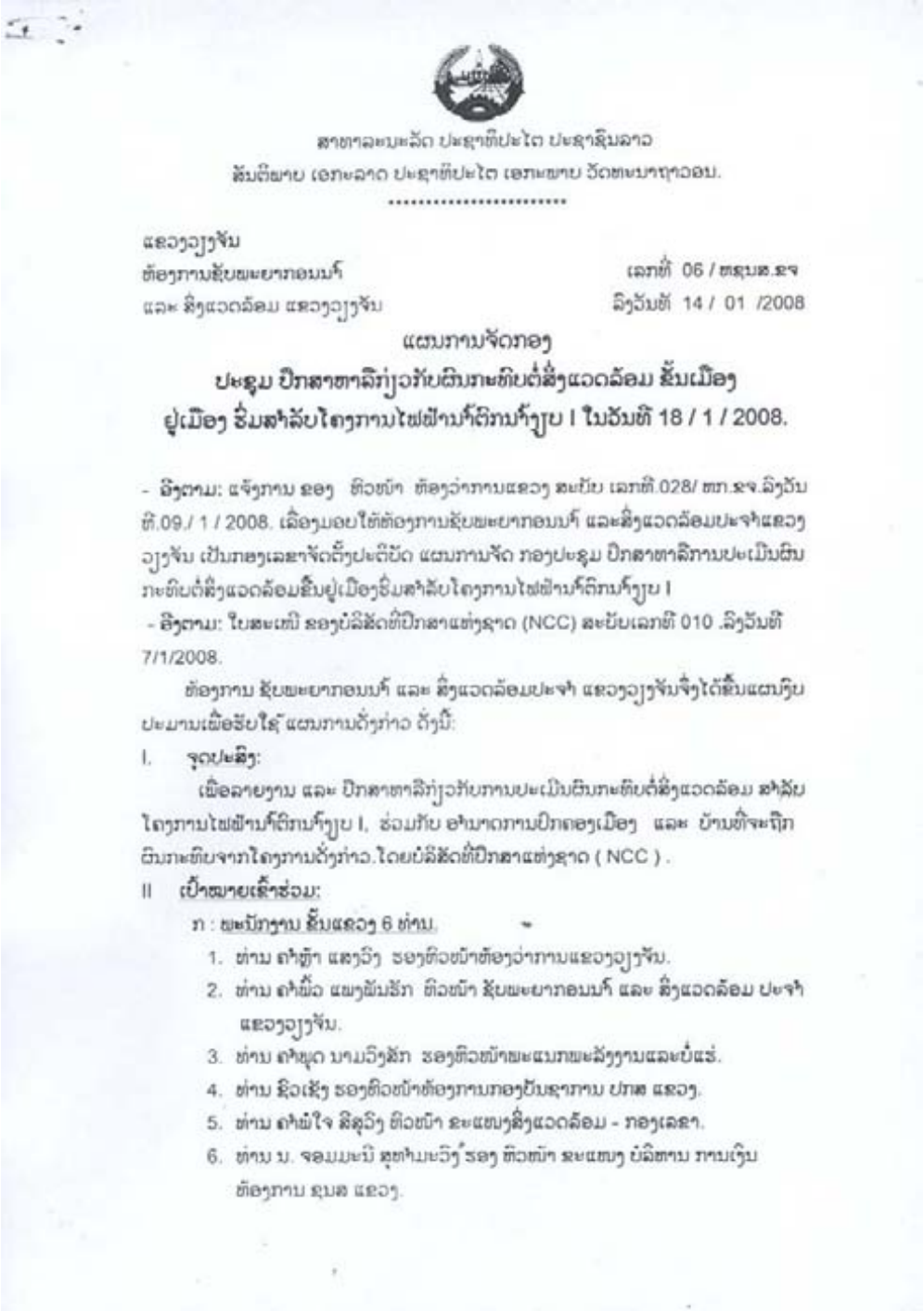
ຮອງເຈົ້າເມືອງເມືອງບໍລິຄັນ

12/6/2008

ທ. ... ...

2.3 Vientiane Province (Hom District)

Minute of the First Public Consultation at District Level on January 18, 2008



ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ.

ແຂວງວຽງຈັນ
ຫ້ອງການຊັບພະຍາກອນນ້ຳ ແລະ ສິ່ງແວດລ້ອມ ແຂວງວຽງຈັນ

ເລກທີ 06 / ຫຊນສ.ຂຈ
ລົງວັນທີ 14 / 01 /2008

ແຜນການຈັດກອງ

ປະຊຸມ ປຶກສາຫາລືກ່ຽວກັບຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ຂັ້ນເມືອງ ຢູ່ເມືອງ ຮ້ອມສຳລັບໂຄງການໄຟຟ້ານ້ຳຕົກນ້ຳງຽບ I ໃນວັນທີ 18 / 1 / 2008.

- ອີງຕາມ: ແຈ້ງການ ຂອງ ຫົວໜ້າ ຫ້ອງວ່າການແຂວງ ສະບັບ ເລກທີ.028/ ຫກ.ຂຈ.ລົງວັນທີ.09./ 1 / 2008. ເລື່ອງມອບໃຫ້ຫ້ອງການຊັບພະຍາກອນນ້ຳ ແລະສິ່ງແວດລ້ອມປະຈຳແຂວງ ວຽງຈັນ ເປັນກອງເລຂາຈັດຕັ້ງປະຕິບັດ ແຜນການຈັດ ກອງປະຊຸມ ປຶກສາຫາລືການປະເມີນຜົນ ກະທົບຕໍ່ສິ່ງແວດລ້ອມຂັ້ນຢູ່ເມືອງຮ້ອມສຳລັບໂຄງການໄຟຟ້ານ້ຳຕົກນ້ຳງຽບ I
- ອີງຕາມ: ໃບສະເໜີ ຂອງບໍລິສັດທີ່ປຶກສາແຫ່ງຊາດ (NCC) ສະບັບເລກທີ 010 .ລົງວັນທີ 7/1/2008.

ຫ້ອງການ ຊັບພະຍາກອນນ້ຳ ແລະ ສິ່ງແວດລ້ອມປະຈຳ ແຂວງວຽງຈັນຈຶ່ງໄດ້ຂຶ້ນແຜນງົບ ປະມານເພື່ອຈັດໃຊ້ ແຜນການດັ່ງກ່າວ ດັ່ງນີ້:

I. ຈຸດປະສົງ:

ເພື່ອລາຍງານ ແລະ ປຶກສາຫາລືກ່ຽວກັບການປະເມີນຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ສຳລັບ ໂຄງການໄຟຟ້ານ້ຳຕົກນ້ຳງຽບ I, ຮ່ວມກັບ ອຳນາດການປົກຄອງເມືອງ ແລະ ບ້ານທີ່ຈະຖືກ ຜົນກະທົບຈາກໂຄງການດັ່ງກ່າວ.ໂດຍບໍລິສັດທີ່ປຶກສາແຫ່ງຊາດ (NCC) .

II ເປົ້າໝາຍເຂົ້າຮ່ວມ:

ກ : ພະນັກງານ ຂັ້ນແຂວງ 6 ທ່ານ.

1. ທ່ານ ຄຳຫຼ້າ ແສງວິງ ຮອງຫົວໜ້າຫ້ອງວ່າການແຂວງວຽງຈັນ.
2. ທ່ານ ຄຳພັ໋ວ ແພງພັນສັກ ຫົວໜ້າ ຊັບພະຍາກອນນ້ຳ ແລະ ສິ່ງແວດລ້ອມ ປະຈຳ ແຂວງວຽງຈັນ.
3. ທ່ານ ຄຳໝຸດ ບາມວິງສັກ ຮອງຫົວໜ້າພະແນກພະລັງງານແລະບໍ່ແຮ່.
4. ທ່ານ ຊົວເຊ້ຍ ຮອງຫົວໜ້າຫ້ອງການກອງປັນຊາການ ປກສ ແຂວງ.
5. ທ່ານ ຄຳພ໋ໃຈ ສີສຸວິງ ຫົວໜ້າ ຂະແໜງສິ່ງແວດລ້ອມ - ກອງເລຂາ.
6. ທ່ານ ນ. ຈອມມະນີ ສຸທຳມະວົງ ຮອງ ຫົວໜ້າ ຂະແໜງ ບໍລິຫານ ການເງິນ ຫ້ອງການ ຊມສ ແຂວງ.

ຂ : ພະນັກງານຮັ້ນເມືອງ-ເມືອງຮີ່ມ: 22 ທ່ານ.

1. ທ່ານ ເຈົ້າເມືອງ ໆ ຮີ່ມ.
2. ທ່ານ ຫົວໜ້າ ຫ້ອງວ່າການເມືອງຮີ່ມ.
3. ທ່ານ ຫົວໜ້າ ແນວໂຮມ ເມືອງຮີ່ມ.
4. ທ່ານ ຫົວໜ້າ ສະຫັວດດີການ ເມືອງຮີ່ມ.
5. ທ່ານ ຫົວໜ້າ ສະຫະພັນແມ່ຍິງ ເມືອງຮີ່ມ.
6. ທ່ານ ຫົວໜ້າ ສະຫະພັນກຳມະບານ ເມືອງຮີ່ມ.
7. ທ່ານ ຫົວໜ້າ ຊາວໜຸ່ມ ເມືອງຮີ່ມ.
8. ທ່ານ ຫົວໜ້າ ນັກຮົບເກົ່າເມືອງຮີ່ມ.
9. ທ່ານ ຫົວໜ້າ ກາແດງ ເມືອງຮີ່ມ.
10. ທ່ານ ຫົວໜ້າ ພະແນກງານ - ບໍແຮ່ ເມືອງຮີ່ມ.
11. ທ່ານ ຫົວໜ້າ ອຸດສະຫະກຳ - ການຄ້າ ເມືອງຮີ່ມ.
12. ທ່ານ ຫົວໜ້າ ການເງິນ ເມືອງຮີ່ມ.
13. ທ່ານ ຫົວໜ້າ ສຶກສາ ເມືອງຮີ່ມ.
14. ທ່ານ ຫົວໜ້າ ສາທານະສຸກ, ເມືອງຮີ່ມ.
15. ທ່ານ ຫົວໜ້າ ກະສິກຳປ່າໄມ້ແຂວງ, ເມືອງຮີ່ມ
16. ທ່ານ ຫົວໜ້າ ຖະແຫຼງຂ່າວ- ວັດທະນະທຳ,ເມືອງຮີ່ມ.
17. ທ່ານ ຫົວໜ້າ ໄຄສະນາ - ອີເວັ້ນ ເມືອງຮີ່ມ.
18. ທ່ານ ຫົວໜ້າ ທ່ອງທ່ຽວ ເມືອງຮີ່ມ .
19. ທ່ານ ຫົວໜ້າ ທະຫານ ເມືອງຮີ່ມ.
20. ທ່ານ ຫົວໜ້າ ປ ກ ສ ເມືອງຮີ່ມ.
21. ທ່ານ ຫົວໜ້າໄຍທາ ແລະຂົນສົ່ງ ເມືອງຮີ່ມ.
22. ທ່ານ ຫົວໜ້າ ວ ຕ ສ ເມືອງຮີ່ມ.
23. ທ່ານ ຫົວໜ້າ ກວດກາ ພັກ - ລັດ ເມືອງຮີ່ມ.
24. ທ່ານ ຫົວໜ້າ ຄະນະຈັດຕັ້ງ ເມືອງຮີ່ມ.

ຄ : ພະນັກງານຮັ້ນບ້ານ 4 ບ້ານ : 16 ທ່ານ.

1.ນາຍບ້ານໆ ສີບຢວກ, ແນວໂຮມບ້ານ,ຜູ້ອຳນວຍໂສບ້ານ ແລະ ສະຫະພັນແມ່ຍິງບ້ານ.
2.ນາຍບ້ານໆ ນ້ຳຢວກ, ແນວໂຮມບ້ານ,ຜູ້ອຳນວຍໂສບ້ານ ແລະ ສະຫະພັນແມ່ຍິງບ້ານ.
3.ນາຍບ້ານໆ ສີບຄວນ ແນວໂຮມບ້ານ, ຜູ້ອຳນວຍໂສບ້ານ ແລະ ສະຫະພັນແມ່ຍິງບ້ານ.
4.ນາຍບ້ານໆຫ້ວຍປາມ້ອມແນວໂຮມບ້ານ,ຜູ້ອຳນວຍໂສບ້ານແລະສະຫະພັນແມ່ຍິງບ້ານ.

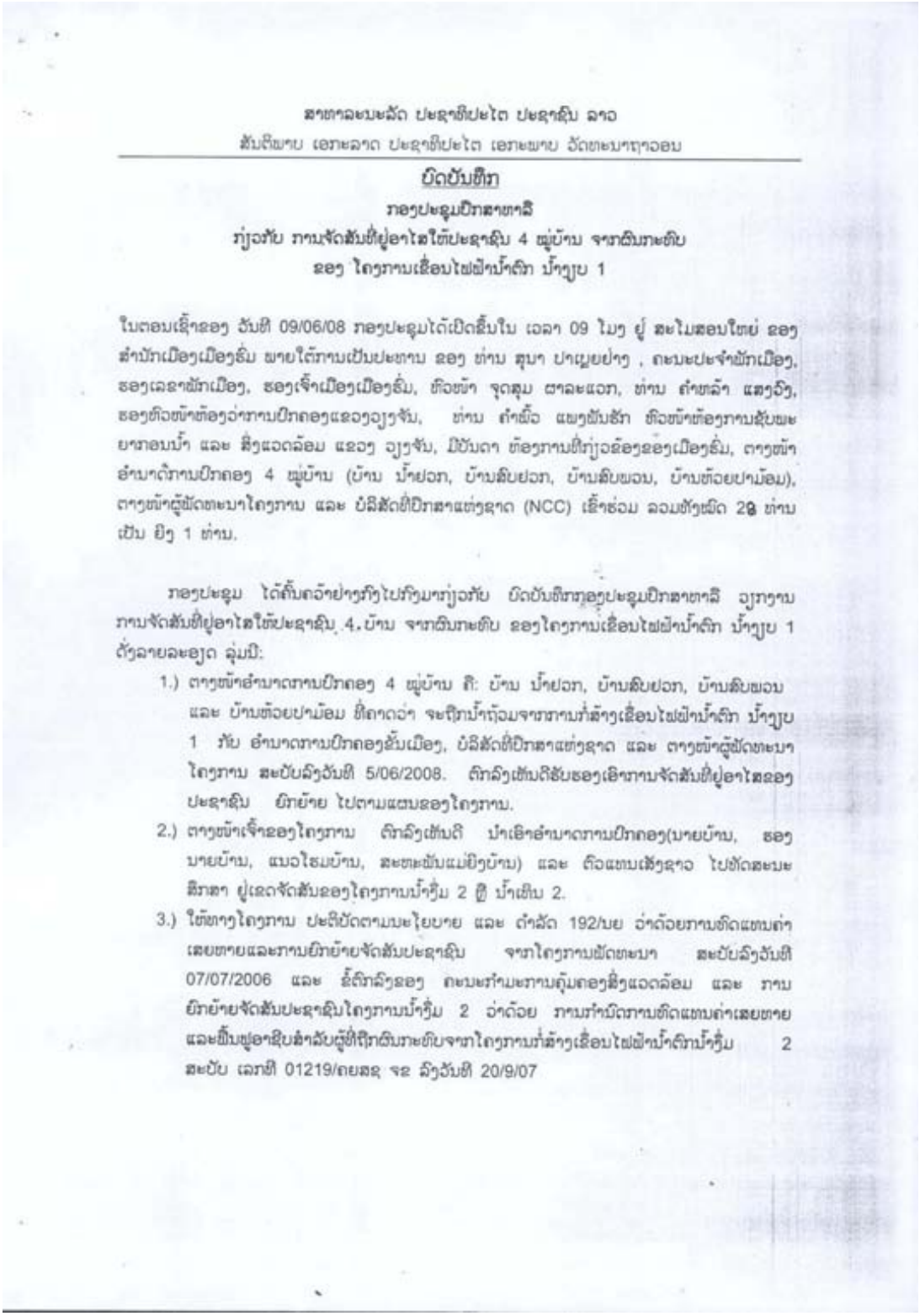
ລວມທັງໝົດ 44 ທ່ານ.

ຫົວໜ້າຫ້ອງການຮັບພະຍາກອນນ້ຳ
ແລະ ສິ່ງແວດລ້ອມແຂວງວຽງຈັນ

ຄຳພັ ແພງພັນຮັກ

2.4 Vientiane Province (Hom District)

Minute of the Second Public Consultation at District Level on June 9, 2008



ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນ ລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ

ບົດບັນທຶກ
ກອງປະຊຸມປຶກສາຫາລື
ກ່ຽວກັບ ການຈັດສັນທີ່ຢູ່ອາໄສໃຫ້ປະຊາຊົນ 4 ໝູ່ບ້ານ ຈາກຕົນກະທົບ
ຂອງ ໂຄງການເຂື່ອນໄຟຟ້ານ້ຳຕົກ ນ້ຳງຽບ 1

ໃນຕອນເຊົ້າຂອງ ວັນທີ 09/06/08 ກອງປະຊຸມໄດ້ເປີດຂຶ້ນໃນ ເວລາ 09 ໂມງ ຢູ່ ສະໂມສອນໃຫຍ່ ຂອງ ສຳນັກເມືອງເມືອງຮ້ຳ ພາຍໃຕ້ການເປັນປະທານ ຂອງ ທ່ານ ສຸນາ ປາເມຍຢ່າງ , ຄະນະປະຈຳພັກເມືອງ, ຮອງເລຂາພັກເມືອງ, ຮອງເຈົ້າເມືອງເມືອງຮ້ຳ, ຫົວໜ້າ ຈຸດສຸມ ຕາລະແວກ, ທ່ານ ຄຳຫລ້າ ແສງວົງ, ຮອງຫົວໜ້າຫ້ອງວ່າການປົກຄອງແຂວງວຽງຈັນ, ທ່ານ ຄຳພົ້ວ ແພງພັນຮັກ ຫົວໜ້າຫ້ອງການຊັບພະຍາກອນນ້ຳ ແລະ ສິ່ງແວດລ້ອມ ແຂວງ ວຽງຈັນ, ມີບັນດາ ຫ້ອງການທີ່ກ່ຽວຂ້ອງຂອງເມືອງຮ້ຳ, ຕາງໜ້າ ອຳນາດການປົກຄອງ 4 ໝູ່ບ້ານ (ບ້ານ ນ້ຳຢວກ, ບ້ານສົບຢວກ, ບ້ານສົບໝອນ, ບ້ານຫ້ວຍປາມ້ອມ), ຕາງໜ້າຜູ້ພັດທະນາໂຄງການ ແລະ ບໍລິສັດທີ່ປຶກສາແຫ່ງຊາດ (NCC) ເຂົ້າຮ່ວມ ລວມທັງໝົດ 29 ທ່ານ ເປັນ ຍິງ 1 ທ່ານ.

ກອງປະຊຸມ ໄດ້ຄົ້ນຄວ້າຢ່າງກົງໄປກົງມາກ່ຽວກັບ ບົດບັນທຶກກອງປະຊຸມປຶກສາຫາລື ວຽກງານ ການຈັດສັນທີ່ຢູ່ອາໄສໃຫ້ປະຊາຊົນ 4.ບ້ານ ຈາກຕົນກະທົບ ຂອງໂຄງການເຂື່ອນໄຟຟ້ານ້ຳຕົກ ນ້ຳງຽບ 1 ດັ່ງລາຍລະອຽດ ລຸ່ມນີ:

1.) ຕາງໜ້າອຳນາດການປົກຄອງ 4 ໝູ່ບ້ານ ຄື: ບ້ານ ນ້ຳຢວກ, ບ້ານສົບຢວກ, ບ້ານສົບໝອນ ແລະ ບ້ານຫ້ວຍປາມ້ອມ ທີ່ຄາດວ່າ ຈະຖືກນ້ຳຖ້ວມຈາກການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳຕົກ ນ້ຳງຽບ 1 ກັບ ອຳນາດການປົກຄອງຂັ້ນເມືອງ, ບໍລິສັດທີ່ປຶກສາແຫ່ງຊາດ ແລະ ຕາງໜ້າຜູ້ພັດທະນາ ໂຄງການ ສະບັບລົງວັນທີ 5/06/2008. ຕົກລົງເຫັນດີຮັບຮອງເອົາການຈັດສັນທີ່ຢູ່ອາໄສຂອງ ປະຊາຊົນ ຍົກຍ້າຍ ໄປຕາມແຜນຂອງໂຄງການ.
2.) ຕາງໜ້າເຈົ້າຂອງໂຄງການ ຕົກລົງເຫັນດີ ນຳເອົາອຳນາດການປົກຄອງ(ນາຍບ້ານ, ຮອງ ນາຍບ້ານ, ແນວໄຮມບ້ານ, ສະຫະພັນແມ່ຍິງບ້ານ) ແລະ ຕົວແທນຜູ້ສູງອາວຸໂສ ໄປຢັດສະບະ ສຶກສາ ຢູ່ເຂດຈັດສັນຂອງໂຄງການນ້ຳງື່ມ 2 ຫຼື ນ້ຳເທີນ 2.
3.) ໃຫ້ທາງໂຄງການ ປະຕິບັດຕາມນະໂຍບາຍ ແລະ ຄຳສັ່ງ 192/ນຍ ວ່າດ້ວຍການຫົດແທນຄ່າ ເສຍຫາຍແລະການຍົກຍ້າຍຈັດສັນປະຊາຊົນ ຈາກໂຄງການພັດທະນາ ສະບັບລົງວັນທີ 07/07/2006 ແລະ ຂໍ້ຕົກລົງຂອງ ຄະນະກຳມະການຄຸ້ມຄອງສິ່ງແວດລ້ອມ ແລະ ການ ຍົກຍ້າຍຈັດສັນປະຊາຊົນໂຄງການນ້ຳງື່ມ 2 ວ່າດ້ວຍ ການກຳນົດການຫົດແທນຄ່າເສຍຫາຍ ແລະຟື້ນຟູອາຊີບສຳລັບຜູ້ທີ່ຖືກຜົນກະທົບຈາກໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳຕົກນ້ຳງື່ມ 2 ສະບັບ ເລກທີ 01219/ຄຍສຊ ຈະ ລົງວັນທີ 20/9/07

ລາຍລະອຽດມີບັນຊີລາຍຊື່ຜູ້ເຂົ້າຮ່ວມກອງປະຊຸມຄັດຕິດມາພ້ອມນີ້.

ກອງປະຊຸມ ໄດ້ປິດລົງ ໃນເວລາ 12 ໂມງ 00 ນາທີ

ດັ່ງນັ້ນ, ຈຶ່ງໄດ້ເຮັດບົດບັນທຶກກອງປະຊຸມຄັ້ງກ່າວນີ້ໄວ້ ເພື່ອເປັນບ່ອນອີງໃນການຈັດຕັ້ງ ປະຕິບັດວຽກງານຍົກຍ້າຍຈັດສັນ ໃນຂັ້ນຕໍ່ໄປ.

ທີ່ເມືອງຮຶ່ມ ວັນທີ 09/06/2008

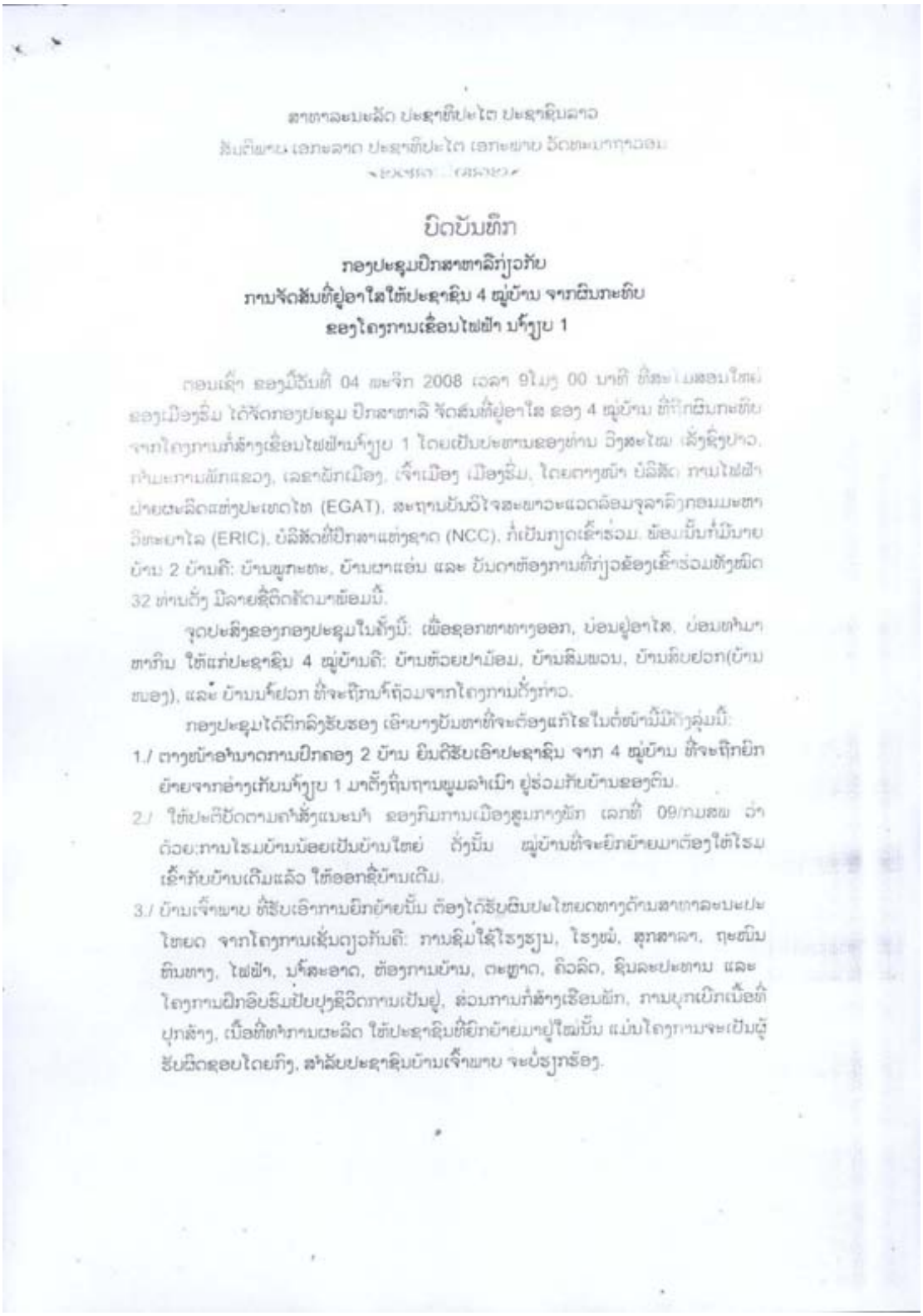
ປະທານກອງປະຊຸມ
ຮອງເຈົ້າເມືອງເມືອງຮຶ່ມ

ຜູ້ບັນທຶກ

ເຫຼືອ ຈຳເລີນເພ່ຍປາວເຮີ

2.5 Vientaine Province (Hom District)

Minute of the Third Public Consultation at District Level on November 5, 2008



ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ

...

ບົດບັນທຶກ

ກອງປະຊຸມປຶກສາຫາລືກ່ຽວກັບ
ການຈັດສັນທີ່ຢູ່ອາໄສໃຫ້ປະຊາຊົນ 4 ໝູ່ບ້ານ ຈາກຜົນກະທົບ
ຂອງໂຄງການເຂື່ອນໄຟຟ້າ ນ້ຳງຽບ 1

ກອງປະຊຸມເລີ່ມ ຂຶ້ນໃນວັນທີ 04 ພະຈິກ 2008 ເວລາ 9ໂມງ 00 ນາທີ ທີ່ສະໂມສອນໃຫຍ່ ຂອງເມືອງຮ້ອມ ໄດ້ຈັດກອງປະຊຸມ ປຶກສາຫາລື ຈັດສັນທີ່ຢູ່ອາໄສ ຂອງ 4 ໝູ່ບ້ານ ທີ່ຖືກຜົນກະທົບ ຈາກໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບ 1 ໂດຍເປັນປະທານຂອງທ່ານ ວິໄສ ໄຫ ເລ້ງຊິ່ງປາວ, ເຈົ້າແຂວງ, ເລຂາພັກເມືອງ, ເຈົ້າເມືອງ ເມືອງຮ້ອມ, ໂດຍການໜ້າ ບໍລິສັດ ການໄຟຟ້າ ຝ່າຍຜະລິດແຫ່ງປະເທດໄທ (EGAT), ສະຖາບັນວິໄຈສະພາວະແວດລ້ອມຈຸລາລົງກອນມະຫາ ວິທະຍາໄລ (ERIC), ບໍລິສັດທີ່ປຶກສາແຫ່ງຊາດ (NCC), ກໍ່ເປັນກຽດເຂົ້າຮ່ວມ. ພ້ອມນີ້ກໍ່ມີການ ບ້ານ 2 ບ້ານຄື: ບ້ານໜອງໜ, ບ້ານເຫຼ່ານ ແລະ ບັນດາຫ້ອງການທີ່ກ່ຽວຂ້ອງເຂົ້າຮ່ວມທັງໝົດ 32 ທ່ານດັ່ງ ມີລາຍຊື່ຕິດຄັດມາພ້ອມນີ້.

ຈຸດປະສົງຂອງກອງປະຊຸມໃນຄັ້ງນີ້: ເພື່ອຊອກຫາທາງອອກ, ບ່ອນຢູ່ອາໄສ, ບ່ອນທຳມາ ຫາກິນ ໃຫ້ແກ່ປະຊາຊົນ 4 ໝູ່ບ້ານຄື: ບ້ານຫ້ວຍປ່າມ້ອນ, ບ້ານສົມພວນ, ບ້ານຫ້ວຍປ່ວກ(ບ້ານ ໜອງ), ແລະ ບ້ານນ້ຳປ່ວກ ທີ່ຈະຖືກນ້ຳຖ້ວມຈາກໂຄງການດັ່ງກ່າວ.

ກອງປະຊຸມໄດ້ຕີກລົງຮັບຮອງ ເອົາບາງບັນຫາທີ່ຈະຕ້ອງແກ້ໄຂໃນຕໍ່ໜ້ານີ້ມີດັ່ງລຸ່ມນີ້:

1./ ຕາງໜ້າອຳນາດການປົກຄອງ 2 ບ້ານ ຍິນດີຮັບເອົາປະຊາຊົນ ຈາກ 4 ໝູ່ບ້ານ ທີ່ຈະຖືກຍົກ ຍ້າຍຈາກອ່າງເກັບນ້ຳງຽບ 1 ມາຕັ້ງຖິ່ນຖານໝູນລ້ຳເມິ ຢູ່ຮ່ວມກັບບ້ານຂອງຕົນ.

2./ ໃຫ້ປະຕິບັດຕາມຄຳສັ່ງແນະນຳ ຂອງກົມການເມືອງສູນກາງພັກ ເລກທີ 09/ກມສພ ວ່າ ດ້ວຍ:ການໂຮມບ້ານນ້ອຍເປັນບ້ານໃຫຍ່ ດັ່ງນັ້ນ ໝູ່ບ້ານທີ່ຈະຍົກຍ້າຍມາຕ້ອງໃຫ້ໂຮມ ເຂົ້າກັບບ້ານເດີມແລ້ວ ໃຫ້ຂໍອາຊີບ້ານເດີມ.

3./ ບ້ານເຈົ້າພາບ ທີ່ຮັບເອົາການຍົກຍ້າຍນັ້ນ ຕ້ອງໄດ້ຮັບຜົນປະໂຫຍດທາງດ້ານສາທາລະນະປະ ໂຫຍດ ຈາກໂຄງການເຊັ່ນດຽວກັນຄື: ການຊົມໃຊ້ໂຮງຮຽນ, ໂຮງໝໍ, ສຸກສາລາ, ຖະໜົນ ຫົນທາງ, ໄຟຟ້າ, ນ້ຳສະອາດ, ຫ້ອງການບ້ານ, ຕະຫຼາດ, ຄິວລິດ, ຊົນລະປະທານ ແລະ ໂຄງການຝຶກອົບຮົມປັບປຸງຊີວິດການເປັນຢູ່, ສ່ວນການກໍ່ສ້າງເຮືອນພັກ, ການບຸກເບີກເນື້ອທີ່ ປູກສ້າງ, ເນື້ອທີ່ຫ້ວາການຜະລິດ ໃຫ້ປະຊາຊົນທີ່ຍົກຍ້າຍມາຢູ່ໃໝ່ນັ້ນ ແມ່ນໂຄງການຈະເປັນຜູ້ ຮັບຜິດຊອບໂດຍກົງ, ສ່ຳລັບປະຊາຊົນບ້ານເຈົ້າພາບ ຈະບໍ່ຮຽກຮ້ອງ.

4./ ສ້າງຈວດເນື້ອທີ່ດິນ ແລະ ຈັດສັນທີ່ດິນຄືນໃໝ່ໃຫ້ແທດເໝາະກັບສະພາບຕົວຈິງ ແລະ ຮັບຮອງຄືນເຂດເຊື່ອມຕໍ່ລະຫວ່າງບ້ານ ພູກະທະ ແລະ ບ້ານ ຜາແອ່ນໃຫ້ຈະແຈ້ງ ເພື່ອສະດວກໃນການຄຸ້ມຄອງ ກວດກາ.

5./ ໃຫ້ອະນຸລັກສັດນ້ຳ-ສັດປ່າທີ່ຫາຍາກໄວ້ ເພື່ອໃຫ້ຍືນຍົງຄົງຕົວຢູ່ກັບທ້ອງຖິ່ນ.

ກອງປະຊຸມໄດ້ປິດລົງ ເວລາ 12 ໂມງ 00 ຂອງວັນດຽວກັນ.

ດັ່ງນັ້ນ, ຈຶ່ງໄດ້ສ້າງບົດບັນທຶກລະບັບນີ້ໄວ້ເພື່ອເປັນຫລັກຖານ

ທີ່ເມືອງລັ່ມ, ວັນທີ 5 ພະຈິກ 2008

ປະທານກອງປະຊຸມ

ຜູ້ບັນທຶກກອງປະຊຸມ

2.6 Xieng Khoung Province (Thaviang sub-district, Thathom District)

Minute of the First Public Consultation at District Level on February 21, 2008

ສາທາລະນະລັດປະຊາທິໄຕປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ

ແຂວງຊຽງຂວາງ
ເມືອງທ່າໂທມ
ໂຄງການເຂື່ອນໄຟຟ້ານ້ຳຕິນນ້ຳງຽບ

ບົດບັນທຶກກອງປະຊຸມ

ປະທານກອງປະຊຸມ: ທ່ານ ບຸນສັນ ພິມມະຈັນ, ກຳມະການພັກແຂວງ, ເລຂາພັກເມືອງ, ເຈົ້າເມືອງທ່າໂທມ

ຈຳນວນປະຊາຊົນ ແລະ ພະນັກງານທີ່ເຂົ້າຮ່ວມມີ: 82 ຄົນ.

ແຂກເຂົ້າຮ່ວມ:
1. ສັດວິສາທະກິດຖິ່ນລາວ 4 ທ່ານ
2. ຮອງຫົວໜ້າຫ້ອງວ່າການແຂວງຊຽງຂວາງ
3. ພະແນກອຸດສາຫະກຳການຄ້າແຂວງຊຽງຂວາງ
4. ພະແນກພະລັງງານ ແລະ ບໍ່ແຮ່ແຂວງຊຽງຂວາງ
5. ພະແນກກະສິກຳ-ປ່າໄມ້ແຂວງຊຽງຂວາງ
6. ຫ້ອງການຊັບພະຍາກອນນ້ຳ ແລະ ສິ່ງແວດລ້ອມແຂວງ
7. ທີ່ປຶກສາໂຄງການຈາກຈຸລາລົງກອນມະຫາວິທະຍາໄລ 4 ທ່ານ
8. ການໄຟຟ້າຜ່າຍຜະລິດແຫ່ງປະເທດໄທ 4 ທ່ານ
9. ບັນດາຂະແໜງການຕ່າງໆອ້ອມຂ້າງເມືອງທ່າໂທມ
10. ຄະນະປົກຄອງບ້ານພ້ອມດ້ວຍອົງການຈັດຕັ້ງ 13 ໝູ່ບ້ານ
11. ບໍລິສັດທີ່ປຶກສາ NCC

ເວລາ 9:00
ທ່ານ ບຸນສັນ ພິມມະຈັນ, ກຳມະການພັກແຂວງ, ເລຂາພັກເມືອງ, ເຈົ້າເມືອງໆທ່າໂທມ, ປະທານກອງປະຊຸມໄດ້ກ່າວເປີດພິທີ ແລະ ໄດ້ກ່າວເຖິງແນວທາງ ການພັດທະນາທາງດ້ານເສດຖະກິດຂອງ ສປປ ລາວ ໂດຍສະເພາະໂຄງການໆກໍ່ສ້າງເຂື່ອນນ້ຳງຽບທີ່ຄາດວ່າຈະມີຜົນກະທົບທາງດ້ານດີ ແລະ ດ້ານເສັຍຕໍ່ 13 ໝູ່ບ້ານໃນເຂດຈຸດສຸມທ່ວງໆ ແລະ ແບ່ງອອກເປັນ 2 ປະເພດຄືດຸ່ມນີ້:

ເຂດທີ່ໄດ້ຮັບຜົນກະທົບໂດຍກົງ ມີ 4 ບ້ານຄື:

1. ບ້ານປູ້
2. ບ້ານຫາດສ່ວນຄອນ
3. ບ້ານພຽງຕາ
4. ບ້ານນກ້ຽງ

ເຂດທີ່ໄດ້ຮັບຜົນກະທົບທາງອ້ອມມີ 9 ບ້ານຄື:

1. ບ້ານຊຽງຄີງ
2. ບ້ານວຽງທອງ
3. ບ້ານນາຊ້າຍ
4. ບ້ານນາຂີ້ງ
5. ບ້ານໂພນແຍງ
6. ບ້ານດົງ
7. ບ້ານນາຫ້ອງ
8. ບ້ານໂພນໂຮມ
9. ບ້ານນ້ໍລ້ອງ

ຈາກນັ້ນ ທ່ານ ສົມສະຫວັນ ພົມມະຖາ, ຕາງໜ້າບໍລິສັດ NCC ໄດ້ສະເໜີຄວາມເປັນໄປ ມາຂອງໂຄງການ, ຍົດລາຍງານຜົນການສຶກສາເຖິງຜົນກະທົບຕາມຂອບເຂດປົກຫລັກໝາຍ ແລະ ຂໍ້ມູນເບື້ອງຕົ້ນທີ່ມີຕໍ່ບັນດາກຸ່ມບ້ານທີ່ກ່ຽວຂ້ອງໂດຍສະເພາະຜົນກະທົບ:

1. ຕໍ່ເນື້ອທີ່ການປູກຝັງ
2. ຕໍ່ເນື້ອທີ່ການປຸກສ້າງ
3. ຕໍ່ເໜືອທີ່ປ່າໄມ້
4. ຕໍ່ຜົນລະປູກ, ຕົ້ນໄມ້ກິນໝາກ
5. ຕໍ່ການປະມົງ (ຫາປາ)
6. ຕໍ່ແຫລ່ງທຳມາຫາກິນ
7. ຕໍ່ວິຖີຊີວິດ ແລະ ວັດທະນະທຳຂອງຊົນເຜົ່າ
8. ຕໍ່ສະຖານທີ່ປະຫວັດສາດ
9. ສະຖານທີ່ວັດຖຸໂບຮານ ແລະ ອື່ນໆ

ນອກນັ້ນທ່ານຍັງໄດ້ອະທິບາຍເຖິງມາດຕະການລຸດຜ່ອນ, ການປ້ອງກັນຜົນກະທົບ ແລະ ການ ສ້າງເຂດອະນຸລັກຊີວະນາໆພັນໃນບໍລິເວນຂອບອ່າງໄຕ່ງ ທີ່ຄາດວ່າຈະຕາມມາກ່ອນ ແລະ ຫລັງການສ້າງເຂື່ອນ.

ຈາກນັ້ນ, ທ່ານ ບຸນຄັນ ພົມມະຈັນ, ກຳມະການພັກແຂວງ, ເລຂາພັກເມືອງ, ເຈົ້າ ເມືອງໆທ່າໄຫມ, ປະທານກອງປະຊຸມໄດ້ເຫັນຫນັກເຖິງຄວາມສຳຄັນຂອງການພັດທະນາພະ ລັງງານໃນ ສປປ ລາວ ແລະ ໄດ້ເປີດປະຊາທິປະໄຕໃຫ້ແກ່ບັນດາ 13 ໝູ່ບ້ານປະກອບຄຳຄິດ ເຫັນທີ່ເປັນປະໂຍດໃຫ້ແກ່ກອງປະຊຸມເພື່ອນຳມາພິຈະລະນາ ແລະ ນຳສະເຫນີຕໍ່ກອງປະ ຊຸມຂັ້ນແຂວງໃນຕົ້ນເດືອນມີນາ. 2008.

ພາກປະກອບຄຳຄິດເຫັນໃຫ້ແກ່ກອງປະຊຸມ.

1. **ທ່ານ ເລຂາໜ່ວຍພັກ, ພໍ່ບ້ານຫາດ 3 ຄອນ ສະເໜີ 4 ບັນຫາ:**
   - ການທົດແທນຄ່າເສຍຫາຍ
   - ທຶນໃນການສ້າງຫລວດພົ້ນທີ່
   - ການເລືອກພົ້ນທີ່
   - ທຶນການສຶກສາວິຊາຊີບເພື່ອສ້າງແຮງງານທ້ອງຖິ່ນ
2. **ຊາວບ້ານບ້ໍ່ປູ້**
   - ການທົດແທນພົ້ນທີ່ໆເສຍຫາຍ
   - ຈັດສັນເນື້ອທີ່ນາແຊງ
3. **ນາຍບ້ານໆນາກ້ວງ**
   - ມີ 2 ຄອບຄົວຖືກຜົນກະທົບ ແຕ່ບ້ານມີການຍົກຍ້າຍທາງໂຄງການສາມາດ ຊ່ວຍເຫລືອແນວໃດເຊັ່ນ: ການຂົນຍ້າຍ, ການຮື້ຖອນ ແລະ ການສ້າງສາ ຫາລະນຸປະໄພກໃຫ້ແກ່ບ້ານ.
   - ເຖິ້ງແກ່ແນວໃຮມບ້ານນາກ້ວງບ່ຢາກຍົກຍ້າຍຈາກຖິ່ນຖານເດີມທີ່ບ່ໄດ້ຮັບຜົນ ກະທົບຈາກໂຄງການ.
4. **ເລຂາໜ່ວຍພັກບ້ານພຸ້ງຕາ:**ບັນຫາມ້ຖ້ວມເສັ້ນທາງໄປໄຮ່ນາ,ສະເໜີໃຫ້ສ້າງຂົ ວຂະ ນາດນ້ອຍຂ້າມນ້ຳງຽບໃຫ້ແກ່ຊາວບ້ານເພື່ອສະດວກໃນການໄປມາ.
5. **ເລຂາພັກບ້ານປູ້:** ຖ້າຈະມີການຍົກຍ້າຍ ຫລືການທົດແທນມູນຄ່າເຮືອນ ຫລືເນື້ອ ທີ່ການປູກຝັ່ງຈະແມ່ນທີມງານຊຸດເກົ່ານີ້ບ່ຈະລົງມາເກັບກຳໃຫມ່.
6. ທ່ານ ບຸນຄັນ ພົມມະຈັນ, ກຳມະການພັກແຂວງ, ເລຂາພັກເມືອງ, ເຈົ້າເມືອງໆທ່າໄຫມ, ປະທານກອງປະຊຸມ ໄດ້ເຫັນດີນຳການປະກອບຄຳຄິດເຫັນຂອງປະຊາຊົນໃນການຍົກ ຍ້າຍຈັດສັນ ແລະ ການກໍ່ສ້າງໂຄງລ່າງ: ເສັ້ນທາງ, ໂຮງຮຽນ, ສຸກສາລາ, ຫ້ອງການ ບ້ານ, ໄຟຟ້າ, ນ້ຳສະອາດ ແລະ ອື່ນໆ.

ຕອບ: ຫລັກການໃນການຊົດເຊີຍ ຈະຕ້ອງໄດ້ປະຕິຕາມມະຕິ ຫລົ້ວ່າລັດຂອງສ່ານັກງານ ນາຍົກປີ 2004 ທີ່ເປັນຄູ່ມືຂອງລະບຽບການ "ວ່າດ້ວຍການຊົດເຊີຍຈັດສັນ ຊຶ່ງປະກອບດ້ວຍ ຄະນະກ່ຳມະການໆຊົດເຊີຍມີ: ຂັ້ນແຂວງ, ຂັ້ນເມືອງ ແລະ ບ້ານທີ່ກ່ຽວຂ້ອງເປັນຄະນະກ່ຳ ມະການ. ໃນຫ່ໆປະຕິບັດແລ້ວ, ຜູ້ພັດທະນາໂຄງການສ່ານາດມີນ່ານດຕະການໆປ້ອງກັນ ພື້ນທີ່ການປູກຝັ່ງດ້ວຍວິທີສ່ານ່ງຄູປ້ອງກັນ ແລະ ປະຕູລະບາຍນ່ຳໃນເຂດທົ່ງນາບ້ານປູ, ທົ່ງກະ ບະ, ທົ່ງເລີ, ລ່ອງນ່ຳປຸ ແລະ ທົ່ງນາບ້ານພຸ່ງຕ່ ຕໍ່ຍັນຫາດັ່ງກ່າວ, ກອງປະຊຸມຈະໄດ້ນ່ຳ ເອົາບັນຫາຕ່ໆໆທີ່ຫ່ໆປະຊ່ານຊົມໄດ້ສະເໜີຕໍ່ກອງປະຊຸມໃນຄັ້ງນີ້ນ່ຳສະເໜີຕໍ່ກອງປະຊຸມຂັ້ນ ແຂວງໃນຂັ້ນຕໍ່ໄປ ເພື່ອການແກ້ໄຂໃນທິດຕໍ່ນ່ າ.

ກອງປະຊຸມໄດ້ດ່ ເນີນມ່ ຈົນເຖິງເວລ ່ 12:00, ເປັນເວລ ່ ນ່ ງຕອນ, ຕ່ ຍສຸດ, ທ່ ານ ບຸນຂັນ ພົມມະຈັນ, ກ່ ມະການພັກແຂວງ, ເລຂ ່ ພັກເມືອງ, ເຈົ້ ເມືອງ ໆ ທ່ ໄຫມ, ໄດ້ໃຫ້ກຽດໂອ້ລົມ ແກ່ຜູ້ເຂົ້ ຮ່ວມປະຊຸມ ແລະ ກ່ ວປິດພິທີຢ ່ ໆເປັນທ ່ ໆການ.

ທ່ ວງ, ວັນທີ 21.02.2008

ເຈົ້ ເມືອງທ່ ໄຫມ

ບຸນຂັນ ພົມມະຈັນ

2.7 Xieng Khoung Province (Thaviang sub-district, Thathom District)

Minute of the Second Public Consultation at District Level on July 2, 2008

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ

ແຂວງຊຽງຂວາງ
ເມືອງທ່າໂທມ
ຫ້ອງການກຸ່ມບ້ານພັດທະນາເຂດທ່າວຽງ

ບົດບັນທຶກ
ກອງປະຊຸມກວດກາຄືນເຖິງຜົນກະທົບທາງດ້ານ
ເສດຖະກິດ-ສັງຄົມ ແລະ ສິ່ງແວດລ້ອມ

ກອງປະຊຸມກວດກາຄືນເຖິງຜົນກະທົບທາງດ້ານເສດຖະກິດສັງຄົມ ແລະ ສິ່ງແວດລ້ອມ ຈາກໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບ, ຈັດຂຶ້ນຢູ່ເຂດທ່າວຽງ, ເມືອງທ່າໂທມ, ແຂວງຊຽງຂວາງ, ຄັ້ງວັນທີ 2 ເດືອນ ກໍລະກົດ 2008 ພາຍໃຕ້ການເປັນປະທານຂອງທ່ານ ທອງເພັງ ອຸ່ນຍາຣັກ, ຮອງເລຂາພັກເມືອງໆທ່າໂທມ ແລະ ປະກອບດ້ວຍຜູ້ເຂົ້າຮ່ວມຈາກພະແນກການຕ່າງໆຂອງແຂວງ, ເມືອງ ແລະ ບ້ານທີ່ໄດ້ຮັບຜົນກະທົບເຊັ່ນ: ບ້ານປູ້, ບ້ານຫາດສາມ ຄອນ, ບ້ານພຽງຕາ ແລະ ບ້ານນາກ້ວາທີ່ກ່ຽວຂ້ອງ; ຕາງໜ້າຈາກບໍລິສັດທີ່ປຶກສາ, ເຂົ້າຮ່ວມລວມ ທັງໝົດ 27 ທ່ານ ເປັນຍິງ 3 ທ່ານ. ກອງປະຊຸມຈຶ່ງໄດ້ເປັນເອກະສັນຕົກລົງກັນດັ່ງລຸ່ມນີ້:

1. ກອງປະຊຸມສະເໜີໃຫ້ທາງໂຄງການຫົດແທນຄ່າເສັຍຫາຍໃຫ້ແກ່ປະຊາຊົນ 4 ບ້ານຄື: ບ້ານປູ້, ບ້ານຫາດສາມຄອນ, ບ້ານພຽງຕາ ແລະ ບ້ານນາກ້ວາທີ່ຖືກຜົນກະທົບຈາກໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບໃນລະດັບ 320 ແມັດ, ຕາມດຳລັດເລກທີ 192/ນຍ ລົງວັນທີ 07/07/2006.
2. ບ້ານປູ້, ບ້ານຫາດສາມຄອນ, ບ້ານພຽງຕາ ແລະ ບ້ານນາກ້ວາທີ່ໄດ້ຮັບຜົນກະທົບຈາກໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບຂໍສະເໜີໃຫ້ຜູ້ພັດທະນາໂຄງການ ສ້າງພື້ນຖານໂຄງລ່າງໃຫ້ແກ່ 4 ໝູ່ບ້ານເຊັ່ນ:
   - ກໍ່ສ້າງໂຮງຮຽນປະຖົມສຶກສາພ້ອມດ້ວຍອຸປະກອນການສຶກສາເຊັ່ນ: ໂຕະ, ຕັ່ງ, ກະດານ, ເອກະສານການສິດສອນໃຫ້ແຕ່ລະບ້ານທີ່ໄດ້ຮັບຜົນກະທົບ.
   - ກໍ່ສ້າງລະບົບນ້ຳສະອາດ (ນ້ຳລິນ) ພ້ອມດ້ວຍຫົວກ໋ອກປິດເປີດ 10-15 ຫົວໃຫ້ແຕ່ລະບ້ານ.

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- ກໍ່ສ້າງຊົນລະປະທານຂະໜາດກາງ ແລະ ຂະໜາດນ້ອຍຢູ່ນ້ຳປູ, ນ້ຳເລີ, ນ້ຳປຸ່ງ, ນ້ຳໃສ ແລະ ຫ້ວຍກະປະ ພ້ອມດ້ວຍຄອງເໝືອງໃຫ້ແຕ່ລະບ້ານ.
- ສ້າງເສັ້ນທາງຊອຍໃນແຕ່ລະບ້ານ, ຂະໜາດຄວາມກວ້າງ 4-6 ແມັດ, ປູດ້ວຍດິນລູກລັ້ງ ຫລືຫີນຂີບໃຫ້ແຕ່ລະບ້ານ.
- ຂະຫຍາຍຕາໜ່າງໄຟຟ້າໃນ 4 ບ້ານໃຫ້ທົ່ວເຖິງ.
- ສ້າງຂົວຂ້າມນ້ຳງຽບຂະໜາດລິດໄຖນາເດີນຕາມໄຕ່ໄດ້, ໃຫ້ແກ່ບ້ານພຸງຕາ ແລະ ບ້ານຫາດສາມຄອນ.
- ກໍ່ສ້າງສຸກສາລາປະຈຳເຂດທ່າວຸ້ງຂະໜາດ 15 ຕຽງນອນພ້ອມດ້ວຍອຸປະກອນການແພດຂັ້ນພື້ນຖານ ແລະ ສະໜອງເວດຊະພັນໃຫ້ແກ່ສຸກສາລາເຂດໃນຊ່ວງໂຄງການດຳເນີນງານ 7- 8 ປີ.
- ກໍ່ສ້າງໂຮງຮຽນມັດທະຍົມສົມບູນ 1 ແຫ່ງພ້ອມດ້ວຍອຸປະກອນການສຶກສາເຊັ່ນ: ໂຕະ, ຕັ່ງ, ກະດານ ແລະ ເອກະສານການສິດສອນໃຫ້ກຸ່ມບ້ານພັດທະນາເຂດທ່າວຸ້ງ.
- ຝຶກອົບຮົມວິຊາຊີບ, ສິ່ງເສີມຫັດຖະກຳ, ການລ້ຽງສັດປູກຝັງ, ສ້າງກອງທຶນໃຫ້ແກ່ 4 ບ້ານເຊັ່ນ: ບ້ານປູ, ບ້ານຫາດສາມຄອນ, ບ້ານພຸງຕາ ແລະ ບ້ານນາກ້ວງ, ທີ່ໄດ້ຮັບຜົນກະທົບໂດຍກົງຈາກໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບ.
- ທົດແທນຄ່າເສຍຫາຍເນື້ອທີ່ການຜະລິດທີ່ຖືກນ້ຳຖ້ວມຢ່າງຖາວອນ ໃຫ້ແກ່ປະຊາຊົນດ້ວຍການບຸກເບີກເນື້ອທີ່ໃຫມ່ ຫລືທົດແທນເປັນເງິນ, ຕາມລາຄາກາງຂອງທ້ອງຖິ່ນ.
- ເພື່ອເປັນການຍັ້ງການປ້ຳຫລັກໝາຍນ້ຳຖ້ວມໃຫ້ຊັດເຈນ, ສະເໜີໃຫ້ທາງໂຄງການລົງກວດກາການປ້ຳຫລັກໝາຍນ້ຳຖ້ວມໃນເຂດທົ່ງເລີ ແລະ ທົ່ງດາຍດິນໃຫມ່.
- ສະເໜີໃຫ້ທາງໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບ ພິຈະລະນາການຈັດສັນການຍົກຍ້າຍບ້ານນາກ້ວງ.

3. ເພື່ອເຮັດໃຫ້ໜ້າວຽກທີ່ໄດ້ກຳນົດໃນຂໍ້ 2 ຂ້າງເທິງນັ້ນ, ໄດ້ຮັບການຈັດຕັ້ງປະຕິບັດ, ກອງປະຊຸມສະເໜີໃຫ້ເຈົ້າເມືອງແຕ່ງຕັ້ງຄະນະຊີ້ນຳຂັ້ນເມືອງ 3 ທ່ານ ແລະ ຄະນະປະສານງານຂອງໂຄງການປະຈຳເຂດທີ່ໄດ້ຮັບຜົນກະທົບໂດຍກົງ, ຈຳນວນ 7 ທ່ານ. ສ້າງຕັ້ງຫ້ອງການປະສານງານຂອງໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບປະຈຳເຂດທ່າວຸ້ງຂຶ້ນ, ໃນນັ້ນ, ໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບ ຈະຕ້ອງສະໜອງສິ່ງອຳນວຍຄວາມສະດວກໃຫ້ແກ່ຄະນະ

ປະສານງານເຊັ່ນ: ໂຕະ, ຕັ່ງ, ຕູ້ເອກະສານ, ຄອມພິວເຕີ 1 ຊຸດ (ພ້ອມດ້ວຍເຄື່ອງພິມ), ເຄື່ອງມືຊີ ສານ ແລະ ພາຫະນະຮັບໃຊ້ (ລົດຈັກ 1 ຄັນ).

ດັ່ງນັ້ນ, ກອງປະຊຸມກວດກາຄືນເຖິງຜົນກະທົບທາງດ້ານເສດຖະກິດ-ສັງຄົມ ແລະ ສິ່ງແວດ ລ້ອມຊຶ່ງໄດ້ຈັດຂຶ້ນທີ່ຫ້ອງການກຸ່ມບ້ານພັດທະນາເຂດທ່າວຽງ, ຄັ້ງວັນທີ 2 ກໍລະກົດ 2008,ຈຶ່ງໄດ້ ເຮັດບົດບັນທຶກນີ້ໄວ້ເປັນບ່ອນອ້າງອີງ, ນຳສະເໜີຕໍ່ຂັ້ນເທິງ ແລະ ຜູ້ພັດທະນາໂຄງການເພື່ອເປັນ ທິດຊີ້ນຳໃຫ້ແກ່ການຈັດຕັ້ງປະຕິບັດໃນຂັ້ນຕໍ່ໄປ.

ເມືອງທ່າໄຫມ, ວັນທີ 02 ເດືອນກໍລະກົດ 2008.

ເຈົ້າເມືອງໆທ່າໄຫມ

ຕອງເພັ້ງ ອຸ່ນຍາຮັກ

ຜູ້ພັດທະນາໂຄງການ

[redacted]

3 PROVINCE LEVEL

3.1 Bolikhamxay Province (Pakxan District)

Minute of Public Consultation at Provincial Level on April 22, 2008

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ
ແຂວງບໍລິຄຳໄຊ

ເລກທີ ____ /__
ປາກຊັນ, ວັນທີ 28 APR 2008

ບົດບັນທຶກກອງປະຊຸມ

- ອີງໃບສະເໜີຈັດກອງປະຊຸມ ກ່ຽວກັບຜົນກະທົບທາງດ້ານສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ຈາກໂຄງການ ສ້າງເຂື່ອນໄຟຟ້ານ້ຳຕົກ ນ້ຳງຽບ 1

ປະຕິບັດຕາມເອກະສານອ້າງອີງຂ້າງເທິງ, ໃນຕອນເຊົ້າຂອງວັນທີ 22/04/2008 ຫ້ອງການ ສັບພະຍາກອນນ້ຳ ແລະ ສິ່ງແວດລ້ອມ ແຂວງບໍລິຄຳໄຊ ຮ່ວມກັບ ໂຄງການໄຟຟ້ານ້ຳຕົກ ນ້ຳງຽບ 1 ໄດ້ຈັດກອງປະຊຸມ ປຶກສາຫາລື ກ່ຽວກັບຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ຂອງໂຄງການໄຟຟ້ານ້ຳຕົກ ນ້ຳງຽບ 1 ແລະ ປະກອບຄຳຄິດຄຳເຫັນຈາກ ອຳນາດການປົກຄອງ ແລະ ປະຊາຊົນທ້ອງຖິ່ນ ຂຶ້ນພາຍໃຕ້ການເປັນປະທານ ໂດຍ ທ່ານ ດຣ. ກອງແກ້ວ ໄຊສົງຄາມ ຫົວໜ້າຫ້ອງການອ່າແຂວງບໍລິຄຳໄຊ, ໂດຍມີຜູ້ເຂົ້າຮ່ວມທັງໝົດ ຈຳນວນ 89 ທ່ານ; ໃນນັ້ນ ມາຈາກພາກ ສ່ວນທີ່ກ່ຽວຂ້ອງຈາກ ສູນກາງ 4 ທ່ານ; ຈາກພາກສ່ວນແຂວງ 23 ທ່ານ; ຈາກເມືອງປາກຊັນ, ເມືອງທ່າພະບາດ ແລະ ເມືອງບໍລິຄັນ 4 ທ່ານ; ຈາກ ບ້ານທີ່ຄາດວ່າຈະໄດ້ຮັບຜົນກະທົບ 23 ທ່ານ ຈາກບໍລິສັດ 39 ທ່ານ (ລາຍຊື່ຂອງຜູ້ເຂົ້າຮ່ວມ ສະໜີໄວ້ໃນບົດຕົນຫ້ວຍທີ 1).

ຈຸດປະສົງຫຼັກຂອງກອງປະຊຸມນີ້ ແມ່ນເພື່ອລາຍງານການປະເມີນຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ແລະ ວິທີການຫຼຸດຜ່ອນຜົນກະທົບຂອງໂຄງການໄຟຟ້ານ້ຳຕົກ ນ້ຳງຽບ 1 ແລະ ປຶກສາຫາລື ປະກອບ ຄວາມຄິດຄວາມເຫັນ ແລະ ຄວາມເປັນເອກະພາບ ກ່ຽວກັບນະໂຍບາຍ ແລະ ທິດທາງ ແຕ່ນການໃນການຍົກຍ້າຍ ຈັດສັນປະຊາຊົນ ຈະໄດ້ຮັບຜົນກະທົບຈາກການກໍ່ສ້າງເຂື່ອນໄຟຟ້າ ນ້ຳງຽບ 1 ແລະ ນະໂຍບາຍການຫົດແທນຄ່າເສຍຫາຍ ແກ່ຜູ້ທີ່ໄດ້ຮັບຜົນກະທົບຈາກການສ້າງເຂື່ອນ ດັ່ງກ່າວ. ຂ່ວນຈຸດປະສົງຂອງມີດັ່ງນີ້.

1

1. ເພື່ອສະໜີລາຍງານຫຍໍ້ ກ່ຽວກັບສ້າງເຂື່ອນໄຟຟ້ານ້ຳຜົ້ງ ເຕົ້າງ1 ລັອບທັ້ງກັບຄ່າຊົດເຊີຍ ແລະ ມາດຕະການຫຼຸດຜ່ອນ ທາງດ້ານສິ່ງແວດລ້ອມ ແລະ ທາງດ້ານສັງຄົມຕ່າງໆ ທີ່ອາດ ເກີດຂຶ້ນຈາກການສ້າງເຂື່ອນ ດັ່ງກ່າວ.
2. ເພື່ອລາຍງານ, ປຶກສາຫາລື ແລະ ປະກອບຄຳຄິດຄຳເຫັນ ກ່ຽວກັບ ນະໂຍບາຍ ແລະ ຫຼັກການຕ່າງໆ ການຍົກຍ້າຍຈັດສັນປະຊາຊົນ ແລະ ຫຼັກແຫລ່ງຄ່າເສັຍຫາຍ ໃຫ້ແກ່ປະຊາຊົນ ຜູ້ທີ່ໄດ້ຮັບຜົນກະທົບຈາກການສ້າງເຂື່ອນ.

ໃນວາລະການດຳເນີນກອງປະຊຸມນີ້ ພາຍຫຼັງການກ່າວເປີດກອງປະຊຸມຂອງປະທານກອງປະຊຸມ ແລະ ການແນະນຳກ່ຽວກັບລາຍລະອຽດຂອງກອງປະຊຸມແລ້ວ, ທ່ານ ດຣ ຫມໍວິຈ ສິບຸສີ ມາຈາກມະຫາວິທະ ຍາໄລຈຸລາລົງກອນ ສືບສະໜີກ່ຽວກັບ ສະພາບລວມຂອງໂຄງການໄຟຟ້ານ້ຳຜົ້ງ ເຕົ້າງ1 ເຊິ່ງຜົນກະ ທົບຂອງໂຄງການມີຢູ່ 3 ແຂວງ ຄື: ແຂວງບໍລິຄຳໄຊ, ແຂວງວຽງຈັນ ແລະ ແຂວງຊຽງຂວາງ, ຊຶ່ງສະໜີ ໄດ້ສະໜີໃຫ້ເຫັນ ກ່ຽວກັບຮັບສົນຂອງປະຊາຊົນ, ຊີວິດການເປັນຢູ່ຂອງປະຊາຊົນ, ການຊົດເຊີຍ ແລະ ແຈຈາຍສົ່ງໄຟຟ້າ, ຈາກນັ້ນ ທ່ານ ດຣ ກັນຍາ ຄຸນທະວົງສຸກ ສະໜີກ່ຽວກັບການປະເມີນຜົນກະທົບ ຕໍ່ສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ຄື: ຄຸນນະພາບນ້ຳ, ຊຸມປະທຸດ, ຫີນປະປົນກຳ, ຊຸມວາກ, ທ່ານ ສະຖຽນ ລຸຈິລະວົງປົດ ສະໜີກ່ຽວກັບການສຶກສາ ແລະ ປະເມີນຜົນກະທົບທາງສັງຄົມ, ວິທີການຫຼຸດຜ່ອນຜົນ ຂອງກະທົບຂອງໂຄງການໄຟຟ້ານ້ຳຜົ້ງ ເຕົ້າງ1 ຄື: ພື້ນທີ່ຂອງໂຄງການ, ພາຍລວມຂອງຜົນກະທົບ, ທ່ານ ສົມສະຫວັນ ພັນນະຖານ ສືບສະໜີກ່ຽວກັບແຜນການຊົດເຊີຍ ແລະ ແຜນການຍົກຍ້າຍຈັດສັນປະ ຊາຊົນ.

ນອກຈາກນັ້ນ, ເພື່ອເຮັດໃຫ້ກອງປະຊຸມມີເນື້ອໃນຄົບຖ້ວນ ຜູ້ເຂົ້າຮ່ວມທັງໝົດ ໄດ້ມີສ່ວນຮ່ວມໃນການ ຄົ້ນຄ້ວາປຶກສາຫາລື ແລະ ປະກອບຄວາມຄິດຄວາມເຫັນ ໄດ້ຢ່າງເຕັມສ່ວນ, ຕາມບັນຫາທີ່ຍັງ ຂ້ອງຄາໃຈ. ລ້ອມທັງຂໍ້ສະໜີຂອງຄົນ ຈາກຂະບວນການ ແລະ ຂັ້ນຕອນຂອງການດຳເນີນການປະຊຸມທັງໝົດນີ້, ໃນທີ່ສຸດ ຄະນະຜູ້ຈັດຈຶ່ງສະຫຼຸບເປັນບາ ແລະ ຂໍ້ສະເໜີ ໄດ້ດັ່ງລຸ່ມນີ້:

1. ສະໜີໃຫ້ທາງໂຄງການສະໜີຂັ້ນ ກ່ຽວກັບມາດຕະຖານຫຼຸດຜ່ອນຕໍ່ຜົນກະທົບ ກ່ຽວກັບຄຸນນະພາບນ້ຳ, ແລະ ການເຊາະເຈື່ອນ ຢູ່ເຂດລຸ່ມເຂື່ອນ ແລະ ຕອນລະຫວ່າງນ້ຳຕົ້ນ,ນ້ຳໃຕ້.
2. ສະໜີໃຫ້ທາງໂຄງການ ສະໜີເພີ່ມ ກ່ຽວກັບມາດຕະການປ້ອງກັນ ແລະ ຫຼຸດຜ່ອນ ໃນໄລຍະຍາວ ຍາດເຊັ່ນນ້ຳຖ້ວມໃນລະດູຝົນ ຢູ່ເຂດລຸ່ມເຂື່ອນ ແລະ ຕາມນ້ຳສາຂາຂອງນ້ຳງຸມ.
3. ສະໜີໃຫ້ທາງໂຄງການ ສືບຕໍ່ປະສານກັບເມືອງບໍລິຄັນ ແລະ ບ້ານຫາດຂຶ້ນ ຫົນສີກ ໃນການເລືອກ ສະຖານທີ ທີ່ຈະຍົກຍ້າຍຈັດສັນປະຊາຊົນໄປຢູ່.

4. ສະເໜີໃຫ້ທາງໂຄງການຈັດສັນເນື້ອທີ່ທຳການຜະລິດສະເພາະໜ້າ ແລະ ເນື້ອທີ່ລ້ຽງສັດ ຕ້ອງຈັດສັນໃຫ້ພຽງພໍ ແລະ ເໝາະສົມ.
5. ການຊົດເຊີຍທີ່ຕ້ອງໄດ້ຍົກຍ້າຍປະຊາຊົນ ສະເໜີໃຫ້ທາງໂຄງການ ຕ້ອງໃຫ້ກໍ່ສ້າງເຮືອນ ແລະ ຈັດສັນເນື້ອທີ່ທຳການຜະລິດສຳເລັດກ່ອນ ຈຶ່ງມີການຍົກຍ້າຍປະຊາຊົນໄປຢູ່.
6. ສະເໜີໃຫ້ທາງໂຄງການຄົ້ນຄ້ວາ ກ່ຽວກັບການປຸກເຮືອນ ແມ່ນໃຫ້ອີງຕາມຄອບຄົວ ແລະ ຈຳນວນຜົນ.
7. ສະເໜີໃຫ້ທາງໂຄງການເບິ່ງຄືນ ກ່ຽວກັບການຍົກຍ້າຍສະຖານທີ່ສັກສິດ (ປ່າຊ້າ) ໃຫ້ປະຕິບັດຕາມຮີດຄອງປະເພນີ ຂອງແຕ່ລະຊົນເຜົ່າ.
8. ການຊົດເຊີຍໃຫ້ແກ່ຄອບຄົວທີ່ຖືກຜົນກະທົບ ທີ່ຈະໄດ້ຍົກຍ້າຍ ລະຫວ່າງຜູ້ທີ່ມີລາຍໄດ້ສູງ ແລະ ລາຍໄດ້ຕ່ຳ ແມ່ນອີງໃສ່ຫຼັກການແນວໃດ ເພື່ອໃຫ້ເປັນເອກະພາບກັນ.
9. ສະເໜີໃຫ້ທາງໂຄງການກຳນົດເຂດຕອບສະໜອງຄືນ ໃນແຕ່ລະປີ ຄືນາຈາກຜົນປະໂຫຍດຂອງໂຄງການ ເພື່ອຊັດທະນາເປັນຖານໂຄງລ່າງຂອງເມືອງ ແລະ ຂອງແຂວງ.
10. ສະເໜີໃຫ້ທາງໂຄງການຄົ້ນຄ້ວາ ແລະ ຊອກວິທີຊົດເຊີຍ ຜົນຜະລິດໃນການທຳປາ ອາດຈະຜົນກະທົບໃນການຄອງຊີບ ແລະ ຜົນກະທົບຕໍ່ລາຍໄດ້ຂອງປະຊາຊົນ.
11. ສະເໜີໃຫ້ທາງໂຄງການຕອບສະໜອງ ໂຄງການນ້ຳສະອາດ (ບ້ຳບາດານ) ແລະ ໜອງປາ ໃຫ້ແກ່ປະຊາຊົນ ທີ່ຢູ່ລຸ່ມເຂື່ອນ.
12. ສະເໜີໃຫ້ທາງໂຄງການຊ່ວຍຝຶກອົບຮົມວິຊາງານ ແລະ ຈັດສັນອາຊີບ ໃຫ້ແກ່ປະຊາຊົນທີ່ໄດ້ຮັບຜົນກະທົບຢູ່ເຂດລຸ່ມເຂື່ອນ.
13. ສະເໜີໃຫ້ທາງໂຄງການ ອະທິບາຍລະອຽດ ກ່ຽວກັບນະໂຍບາຍ ແລະ ຕົວເລກລາຍຮັບ ທີ່ຈະໄດ້ໃນອາບາຄົດ ຂອງຜູ້ທີ່ໄດ້ຮັບຜົນກະທົບ.
14. ສະເໜີໃຫ້ທາງໂຄງການກ□ານົດລະອຽດ ກ່ຽວກັບການຊັດທະນາອົງການທີ່ດ້ານກະສິກ□ຳ.
15. ສະເໜີໃຫ້ທາງໂຄງການ ກຳນົດລະບຽບຂອງໂຄງການຈະແຈ້ງ ທີ່ຫົດແທນຄ່າເສຍຂອງຜູ້ໄດ້ຮັບຜົນປະໂຫຍດ.
16. ສະເໜີໃຫ້ທາງໂຄງການອະທິບາຍໃຫ້ຈະແຈ້ງ ກ່ຽວກັບຜົນປະໂຫຍດທີ່ໄດ້ຮັບຂອງບ້ານເຈົ້າພາບ.
17. ໃຫ້ສະເໜີເພີ່ມ ກ່ຽວກັບຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ຂອງແລວສາຍສົ່ງໄຟຟ້າ ຂອງເຂື່ອນໄຟຟ້ານ້ຳຜົ້ນ ບ້ານງຸບ 1.
18. ສະເໜີໃຫ້ທາງໂຄງການ ສົ່ງບົດລາຍງານການສຶກສາຜົນປະເມີນຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ລະອຽດຂອງໂຄງການ ໃຫ້ແຂວງ, ເມືອງ ແລະ ບ້ານໄດ້ຮັບຮູ້.
19. ສະເໜີໃຫ້ທາງໂຄງການກວດກາຄືນຕື່ມ ກ່ຽວກັບຊື່ຂອງບ້ານ ແລະ ສະຖານທີ່ຕ່າງໆ ໃຫ້ຖືກຕ້ອງຕາມຄວາມຈິງ.
20. ສະເໜີໃຫ້ທາງໂຄງການ ຈັດກອງປະຊຸມປະຊາສຳພັດ ໃຫ້ແກ່ປະຊາຊົນເຂົ້າໃຈ ກ່ຽວກັບນະໂຍບາຍຂອງໂຄງການ ຄືນໃໝ່.

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21. ສະເໜີທາງໂຄງການຊ່ວຍເຫຼືອການພັດທະນາຊັບພະຍາກອນມະນຸດ ແລະ ຍົກລະດັບຄຸນຄະພາບ.

ຈາກນັ້ນ, ຜູ້ພັດທະນາໂຄງການ ແລະ ທາງທີມງານທີ່ປຶກສາໄດ້ອະທິບາຍ ໃຫ້ຄວາມກະຈ່າງແຈ້ງຕື່ມ ກ່ຽວກັບບາງຄັນກະທືບ ທີ່ຜູ້ເຂົ້າຮ່ວມຢັງຂ້ອງຄາໃຈ ເຊັ່ນ:

- ສະຖານທີ່ ປະຊາຊົນຕ້ອງການໄປຢູ່ ຕ້ອງໄດ້ປະສານກັບທາງບ້ານ ແລະ ທາງເມືອງ ຄືນໃໝ່ ເພື່ອ ຄວາມເປັນເອກະພາບ.
- ບ້ານເຈົ້າພາບ ຕ້ອງໄດ້ເບິ່ງເລື່ອງການພັດທະນາພື້ນຖານໂຄງລ່າງ ຄືກັບບ້ານທີ່ໄດ້ຮັບຄັນກະທືບ.
- ສຳລັບບ້ານທີ່ຢູ່ລຸ່ມເຂື່ອນ ທາງໂຄງການຕ້ອງໄດ້ສຶກສາເບິ່ງເລື່ອງອຸທົກກະພາດ ແລະ ລະດັບນ້ຳ ຂຶ້ນລົງຫຼັງເຂື່ອນ ໃນກຳນົດການປ່ອຍນ້ຳອອກຈາກເຂື່ອນ ເພື່ອຫຼຸດຜ່ອນຄັນກະທືບທາງນ້ຳ ຕໍ່ບ້ານທີ່ ຢູ່ລຸ່ມເຂື່ອນ.
- ສຳລັບແລວສາຍສົ່ງໄຟຟ້າ ທາງໂຄງການແມ່ນໄດ້ປະເມີນຄັນກະທືບ ແລະ ສຳຫຼວດຊັບສິນແລ້ວ ຕ້ອງໄດ້ຊົດເຊີຍຕາມລະບຽບກຳນົດອອກ.
- ຄັນກະທືບໃນໄລຍະຍາວ ຜູ້ພັດທະນາໂຄງການ ແລະ ລັດຖະບານຕ້ອງໄດ້ປຶກສາຫາລືກັນ ແລະ ປະກອບເຂົ້າໃນສັນຍາສຳປະທານຂອງໂຄງການ.

ພາຍຫຼັງໄດ້ດຳເນີນການຄົ້ນຄ້ວາ ປຶກສາຫາລືໄປເປັນເວລາ 1 ຈັ່ນເຕັ່ນ ດ້ວຍບັນຍາກາດອັນຟົດຟື້ນ, ມີສັກສະນະສ້າງສັນ ທີ່ເຕັມໄປດ້ວຍໄມຕີຈິດມິດຕະພາບ ແລະ ຈະນຳສະເໜີຜົນຂອງກອງປະຊຸມດັ່ງກ່າວ ລາຍງານຂັ້ນເທິງ ເພື່ອຄົ້ນຄ້ວາ ໃນບາດກ້າວຕໍ່ໄປ, ກອງປະຊຸມໄດ້ຍັດລົງ ໃນເວລາ 15:30 ໂມງ ຂອງ ວັນດຽວກັນ ດ້ວຍຜົນສຳເລັດຕາມຈຸດປະສົງທຸກຢ່າງ ດ້ວຍການກ່າວປິດຂອງ ທ່ານ ຄຳປະສົງ ວົງທະບາ ຫົວໜ້າຫ້ອງການຊັບພະຍາກອນນ້ຳ ແລະ ສິ່ງແວດລ້ອມ ແຂວງ.

ຫົວໜ້າຫ້ອງການຊັບພະຍາກອນນ້ຳ
ແລະ ສິ່ງແວດລ້ອມ ແຂວງ

ຄຳປະສົງ ວົງທະບາ

4

3.2 Vientiane Province (Viengkham District)

Minute of Public Consultation at Provincial Level on April 28, 2008

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນາຖາວອນ
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ບົດບັນທຶກກອງປະຊຸມ

ໂຄງການໄຟຟ້ານ້ຳຕິກນ້ຳງຽບ1 ຄັ້ງວັນທີ 28/04/2008 ຢູ່ທີ່ແຂວງວຽງຈັນ.

- ອີງຕາມ: ແຈ້ງການຂອງ ຫ້ອງການກະຊວງພະລັງງານແລະບໍ່ແຮ່ ສະບັບເລກທີ 453/ພລ ລົງວັນທີ19/04/2007.....ວ່າດ້ວຍການສ້າງຫຼວດເກັບກຳຂໍ້ມູນເສດຖະກິດສັງຄົມແລະສິ່ງແວດລ້ອມ ຂອງໂຄງການໄຟຟ້ານ້ຳງຽບ1.
-ອີງຕາມ: ການສະເໜີຂອງບໍລິສັດ(NCC)ເຊິ່ງເປັນຜູ້ສ້າງຫຼວດຂໍ້ມູນເສດຖະກິດສັງຄົມ ແລະ ສິ່ງແວດລ້ອມຂອງໂຄງການດັ່ງກ່າວ.

➢ ໃນຕອນເຊົ້າວັນທີ 28/04/2008 ໄດ້ເປີດກອງປະຊຸມຂຶ້ນຢູ່ທີ່ຫ້ອງປະຊຸມໃຫ່ຍບ້ານສັກທ່າໄຜ ໄຊ,ເມືອງວຽງຄຳ ແຂວງວຽງຈັນ ໃນເວລາ 8:00ໂມງ,ໂດຍການເປັນປະທານຄະນະຂອງ ທ່ານບຸນມີ ຫຸດທະວົງ ຮອງເຈົ້າແຂວງ ວຽງຈັນ ແລະ ທ່ານວິລະສັກ ນາມມູນຕີ ຮອງຫົວໜ້າຫ້ອງວ່າການ ປົກຄອງນະຄອນຫຼວງວຽງຈັນ ພ້ອມດ້ວຍ ບັນທ່ານໃນຄະນະກຳມະການຄຸ້ມຄອງ ສິ່ງແວດລ້ອມ ຂັ້ນ ແຂວງ ແລະ ຂັ້ນເມືອງຈຳນວນໜຶ່ງ ນອກນີ້ຍັງມີຜູ້ຕ່າງໜ້າກົມໄຟຟ້າລາວ ແລະ ຜູ້ຕ່າງໜ້າກົມສິ່ງເສີມ ແລະ ພັດທະນາພະລັງງານ,ມີຮອງເຈົ້າເມືອງ ປາກງື່ມ ແລະ ຮອງເຈົ້າ ເມືອງ ໄຊທານີ ແລະ ວິຊາການ,ມີປະຊາຊົນ 4 ບ້ານຖືກເຫັນກະທົບຈາກນ້ຳຖ້ວມຂອງເມືອງ ຮົ່ມ (ແຂວງວຽງຈັນ) ພ້ອມດ້ວຍພະນັກງານວິຊາການ ບໍລິສັດທີ່ປຶກສາແຫ່ງຊາດແຫ່ງຊາດ (NCC) ແລະ ວິຊາການນະຫະວິທະຍາໄລຈຸລາລົງກອນແຫ່ງປະເທດໄທ,ການະວິຊາການຜະລິດໄຟຟ້າແຫ່ງ ປະເທດໄທ, ຜູ້ຕາງໜ້າ ບໍລິສັດ ຄັນຊາຍ ແຫ່ງປະເທດຍີ່ປຸ່ນ ແລະ ຜູ້ຕາງໜ້າລັດວິສະຫະກິດໜ້ຳຫ້ວຍ ລາວມີຜູ້ເຂົ້າຮ່ວມທັງໝົດ 93 ທ່ານ ຕາມລາຍຊື່ຕິດຄັດມາພ້ອມນີ້:

I.ຈຸດປະສົງຂອງກອງປະຊຸມມີຄື:

1. ເພື່ອເປັນການປຶກສາຫາລືກ່ຽວກັບຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ຂອງໂຄງການ ເຂື່ອນໄຟຟ້ານ້ຳງຽບ1 ໃນເຂດເມືອງ.
2. ສະເໜີແນວຍຸທະສາດຈັດສັນປະຊາຊົນ ແລະ ມາດຕະການຫຼຸດຜ່ອນຜົນກະທົບຕໍ່ສິ່ງແວດ ລ້ອມ ແລະ ສັງຄົມ.

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➢ ກອງປະຊຸມໄດ້ດຳເນີນໄປ ໂດຍແມ່ນ ທ່ານ ຄຳພົວແພງພັນຮັກ ຫົວໜ້າ ຫ້ອງການ ຊັບພະຍາກອນນ້ຳ ແລະ ສິ່ງແວດລ້ອມ ໄດ້ກ່າວຈຸດປະສົງຂອງກອງປະຊຸມ ແລະ ໄດ້ສະເໜີແຂກເຂົ້າຮ່ວມ ຂອງກອງປະຊຸມຈາກນັ້ນ ທ່ານ ບຸນມີ ພຸດທະວົງ ຮອງເຈົ້າແຂວງໆ ວຽງຈັນ ປະທານກອງ ປະຊຸມ ກໍ່ໄດ້ຂຶ້ນກ່າວເປີດກອງປະຊຸມຢ່າງເປັນທາງການ.

❖ ຈາກນັ້ນທ່ານ ຮອງຫົວໜ້າພະແນກ ດຣ ທະວີວົງ ຜູ້ອຳນວຍການສະຖາບັນວິໄຈສະພາວະ ແວດລ້ອມ ມະຫາວິທະຍາໄລຈຸລາລົງກອນປະເທດໄທໄດ້ສະເໜີດ່ານໂຄງສ້າງໃຫຍ່ຂອງ ໂຄງການ ໄຟຟ້ານ້ຳງຸບ I ໂດຍແຍກ ໃຫ້ເຫັນ ແຜນການປະຕິບັດງານອອກເປັນ 3 ກຸ່ມຄື:

+ ກຸ່ມຈຸດວຽກອ່າງນ້ຳຖ້ວມ(ເທິງໜ້າເຂື່ອນ).
+ ກຸ່ມຈຸດວຽກລຸ່ມອ່າງ
+ ກຸ່ມຈຸດວຽກໃນການຍົກຍ້າຍຈັດສັນບ່ອນໃໝ່ເຂດທ້າມາຫາກິນໃຫ້ປະຊາຊົນ.

- ພ້ອມນີ້ກໍ່ໄດ້ຊີ້ແຈງບັນຫາວຽກງານການຊົດເຊີຍຜົນເສຍຫາຍຈາກໂຄງການ ເຂື່ອນໄຟຟ້ານ້ຳງຸບI ແລະ ອະທິບາຍຮູບການກໍ່ສ້າງເຂື່ອນອອກເປັນ 2 ລະບົບຄື:
- ກໍ່ສ້າງເປັນເຂື່ອນຫຼັກ.
- ກໍ່ສ້າງເປັນເຂື່ອນສຳຮອງ.

❖ ທ່ານ ດຣ ແສງເດືອນຕາງໜ້າບໍລິສັດທີ່ປຶກສາແຫ່ງຊາດ(NCC) ໄດ້ຂຶ້ນສະເໜີເອກະສານປົດປະເມີນຜົນກະທົບ ຕໍ່ສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ໃນໄລຍະຜ່ານມາໂດຍຍົກໃຫ້ເຫັນຜົນກະທົບໃນທາງບວກ ແລະ ທາງລົບ ຕໍ່ສິ່ງແວດລ້ອມ ໃນປະຈຸບັນ ແລະ ຍາວນານ ພ້ອມມາດຕະການຫຼຸດຜ່ອນຜົນກະທົບຈາກການກໍ່ສ້າງໂຄງການດັ່ງກ່າວ (ເຊິ່ງລະອຽດໄດ້ມີເອກະສານຄູ່ມືໃຫ້ຜູ້ແທນເຂົ້າຮ່ວມກອງປະຊຸມ)

❖ ທ່ານ ດຣ ໄພສີ ຕ່າງໜ້າ ບໍລິສັດ ທີ່ປຶກສາແຫ່ງຊາດ (NCC) ໄດ້ຂຶ້ນສະເໜີເອກະສານກ່ຽວກັບການສຶກສາຄຸນນະພາບນ້ຳ ຂອງສາຍນ້ຳງຸບ ໃນໄລຍະຜ່ານມາ ທີ່ທີມງານໄດ້ລົງສຳຫລວດ ແລະ ກຳຂໍ້ມູນ ໂດຍຍົກໃຫ້ເຫັນບໍລິມາດຄວາມກົດດັນຂອງນ້ຳ, ສານອິນຊີເຈນໃນນ້ຳການໄຫຼວຽນຂອງນ້ຳຈຳພວກອົງຄະທາດ,ສານຕິດເຄມີ ແລະ ອື່ນທີ່ຢູ່ໃນນ້ຳ.

❖ ທ່ານ ຢາມາໄມໂຕະ ຫົວໜ້າ ທີມງານ ບໍລິສັດ ຮ່ວມລົງທຶນ (Khansay) ແຫ່ງປະເທດຍີ່ປຸ່ນ ໄດ້ຂຶ້ນອະທິບາຍຈຸດປະສົງ,ຄວາມສຳຄັນຂອງໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຸບI ແລະ ການຮ່ວມມືທາງດ້ານທຶນຮອນເຂົ້າໃນການກໍ່ສ້າງ ໂຄງການດັ່ງກ່າວ ແລະ ກຳນົດວັນເວລາທີ່ຈະລົງກໍ່ສ້າງເຂື່ອນ.

❖ ທ່ານ ດຣ ແກ່ນຈັນ ສີນສຳພັນ ຕ່າງໜ້າໃຫ້ ບໍລິສັດ ທີ່ປຶກສາແຫ່ງຊາດ (NCC)ໄດ້ສະເໜີປົດປະເມີນຜົນກະທົບຕໍ່ ສິ່ງແວດລ້ອມ ດ້ານເສດຖະກິດ ແລະ ສັງຄົມ ແລະ ແຜນຍົກຍ້າຍຈັດສັນບ່ອນໃໝ່ໃຫ້ປະຊາຊົນ ໂດຍໃຫ້ເຫັນຈຸດສຳຄັນດັ່ງນີ້:

- ບັນຫາພື້ນທີ່ຈະຖືກນ້ຳຖ້ວມ ແລະ ພື້ນທີ່ຖືກຜົນກະທົບບາງບໍລິເວນ 3 ແຂວງ (ແຂວງຊຽງຂວາງ, ແຂວງວຽງຈັນ,ແຂວງບໍລິຄຳໄຊ.

- ບັນຫາຜົນກະທົບແຕ່ລະດ້ານ ແລະ ມາດຕະການຫຼຸດຜ່ອນຜົນກະທົບ.
- ບັນຫາຜົນປະໂຫຍດຂອງການສ້າງເຂື່ອນ.
- ບັນຫາການຊົດເຊີຍການຍົກຍ້າຍຈັດສັນປະຊາຊົນ ແລະ ສະເໜີແຜນວາດການ ຍົກຍ້າຍ ຈັດສັນ, ການຊົດເຊີຍ(ລະອຽດມີເອກະສານຊ້ອນຄູ່ມືໃຫ້) ຜູ້ເຂົ້າຮ່ວມປະຊຸມ.

❖ ນອກນັ້ນ ວິຊາການ ບໍລິສັດ ທີ່ປຶກສາແຫ່ງຊາດ(NCC) ກໍ່ໄດ້ອະທິບາຍວຽກງານກໍ່ສ້າງແລວສາຍສົ່ງໄຟຟ້າແຮງສູງຜ່ານເມືອງປາກງື່ມ ນະຄອນຫຼວງວຽງຈັນ.

➢ ຈາກນັ້ນທ່ານປະທານກອງປະຊຸມກໍ່ໄດ້ສະເໜີຜູ້ເຂົ້າຮ່ວມກອງປະຊຸມແຕ່ລະທ່ານປະກອບຄຳຄິດຄຳເຫັນ ແລະ ປຶກສາຫາລືໃນການຈັດຕັ້ງປະຕິບັດເຂົ້າໃນວຽກງານດັ່ງກ່າວໃຫ້ໄດ້ຮັບຜົນດີ ຊຶ່ງຄະນະກຳມະການກໍ່ໄດ້ປະກອບຄຳເຫັນດັ່ງນີ້:

1. ທ່ານ ສຸລະພົນ ເນົາວະລາດ ຮອງປະທານແນວລາວສ້າງຊາດແຂວງ ມີຄຳເຫັນ:
   - ພື້ນຖານແມ່ນເຫັນດີນຳຍົດສະເນີໂຄງການ.
   - ບັນຫາການຍົກຍ້າຍການຈັດສັນປະຊາຊົນ ແມ່ນຄວນປະຕິບັດຕາມບົດຮຽນທີ່ແຂວງໄດ້ຈັດຕັ້ງປະຕິບັດຜ່ານມາແລ້ວ.
   - ສິ່ງສຳຄັນຄະນະກຳມະການຂອງແຂວງ,ເມືອງ ແລະ ບໍລິສັດຕ້ອງໄດ້ສົມທົບກັນລົງໄປເບິ່ງຕົວຈິງຢູ່ພື້ນທີ່ດັ່ງກ່າວ ແລະ ໃຫ້ມີຄວາມຮັບຜິດຊອບແທ້.

2.ທ່ານ ວິງສະໄໝ ເຈົ້າເມືອງໆ ຮຶ່ມມີຄຳເຫັນ:
   - ບັນຫາແນວຄິດຄອງຄອຍຂອງປະຊາຊົນ ຕໍ່ກັບການກໍ່ສ້າງເຂື່ອນໄຟຟ້າແມ່ນເກີດຂຶ້ນຕະຫຼອດໄລຍະການສ້າງຫລວດເຂື່ອນໄຟຟ້າ ໄດ້ພາໃຫ້ປະຊາຊົນບໍ່ໄດ້ທຳການຜະລິດ; ປູກຝັ່ງ, ລ້ຽງສັດແບບຍາວນານ.ເນື່ອງຈາກວ່າທາງການໄດ້ສັ່ງໃຫ້ໂຈະໄວ້ກ່ອນ
   -ບັນຫາກ່ຽວກັບທີ່ຕັ້ງເພື່ອຈັດສັນປະຊາຊົນຢູ່ສາມເຂດຂອງເມືອງຮຶ່ມ(ເຂດຜາແອນ, ນ້ຳປຸ່ງ,ສາມເຕີຍ)ແມ່ນປະຊາຊົນຍັງສັບສົນບໍ່ເຫັນດີ ເນື່ອງຈາກດິນທຳການຜະລິດບໍ່ພຽງພໍ
   - ບັນຫາຜົນກະທົບໂດຍກົງຕໍ່ເຂດພື້ນທີ່ສີໝູ່ບ້ານນີ້ ແມ່ນເປັນອູ່ເຂົ້າອູ່ປ່າເປັນບ່ອນທຳການຜະລິດກະສິກຳຢູ່ເຂດຜາລາແວກ ແລະບັນຫາ ຜົນກະທົບທາງອ້ອມ ແມ່ນຈະຂາດການເກັບລາຍຮັບຢູ່ເຂດນີ້ໝົດລົງ

3. ທ່ານ ນາຍບ້ານໆ ສົກຢວກ ມີຄຳເຫັນບັນຫາການຊົດເຊີຍພື້ນທີ່ເຂດຖະກິດຂອງປະຊາຊົນ ແລະ ການກຳນົດປີໃດຈະເປັນການກໍ່ສ້າງແທ້ສະເພາະປະຊາຊົນຢາກພັດທະນາດ້ານການຜະລິດ ປູກຝັ່ງ ແລະ ອື່ນໆ ເປັນຕົ້ນການປູກໄມ້ອຸດສາຫະກຳ(ຢາງພາລາ) ແມ່ນເຮັດບໍ່ໄດ້ຢ້ານໂຄງການບໍ່ຮັບຜິດຊອບ.
   - ບັນຫາບ່ອນຈັດສັນໃໝ່3ຈຸດ ແມ່ນບໍ່ເຫັນດີນຳຍ້ອນສະພາບພື້ນທີ່ນັ້ນບໍ່ເໝາະສົມ

4.ທ່ານ ຮາກົງຢ່າງ (ປະທານແນວໂຮມບ້ານໜອງ)ມີຄຳເຫັນ:
   - ບັນຫາການກະກຽມ ເບ້ຍຢາງພາລາໃນປີຜ່ານມາໄດ້ປະມານພັນກ່ວາເບ້ຍແຕ່ມາເຖິງປະຈຸບັນແມ່ນບໍ່ໄດ້ປູກຈະຕ້ອງໄດ້ມີການຊົດເຊີຍໃຫ້.

3

5. ນາຍບ້ານບ້ານທ້ຍວກ ມີຄຳເຫັນ:

- ບັນຫາຫຼຸມຝັງສົບຂອງພໍ່ແມ່,ປະຊາຊົນຕາມຮີດຄອງປະເພນີເຫົ່າເມົ້ຶ ຕ້ອງໄດ້ມີການຍົກຍ້າຍໄປຢູ່ບ່ອນເໝາະສົມ

6. ທ່ານ ເສີມຄຳທຸມາວົງສາ ຕາງໜ້າກົມໄຟຟ້າມີຄຳເຫັນ:

- ບັນຫາລະດັບການຈັດຄວາມສູງຂອງນ້ຳ ຈະຖ້ວມຮອດໃສແທ້ ດີທີ່ສຸດຄວນເອົາເຄື່ອງທີ່ໄດ້ມາດຕະຖານສາກົນ ມາຈັບລະດັບນ້ຳ ເພື່ອຄວາມແນ່ນອນຕື່ມ.
- ຄວນເຮັດການສຶກສາແຜນດິນໄຫວທີ່ຈະສົ່ງຜົນສະທ້ອນເຖິງເຂື່ອນ, ຮັບປະກັນຄວາມປອດໄພຂອງເຂື່ອນ

7. ທ່ານ ຈັນແດງ ແພງປະເສີດ ຫົວໜ້າ ພະແນກພະລັງງານ-ບໍ່ແຮ່ແຂວງມີຄຳເຫັນ:

- ບັນຫາຕົວເລກທີ່ຢູ່ໃນເອກະສານ ແລະ ຕົວເລກທີ່ຢູ່ໃນແຜນອະທິບາຍແມ່ນ ບໍ່ກົງກັນໂດຍສະເພາະເນື້ອທີ່ນາໜ້ອຍຫຼາຍ
- ບັນຫາຂໍ້ມູນດ້ານຕ່າງໆ ທີ່ໄດ້ສຳຫລວດຜ່ານມາ ຄວນນຳເອົາມາຍົກໃຫ້ເປັນລະບົບແຕ່ລະຄອບຄົວມີຜົນກະທົບເທົ່າໃດ
- ບັນຫາການຈັດຕັ້ງ, ການປະສານງານ ໂຄງການແຕ່ຕົ້ນຕະຫຼອດປາຍ ຄວນມີການປະສານສົມທົບກັບອຳນາດການປົກຄອງທ້ອງຖິ່ນບ້ານ, ເມືອງ, ແຂວງສາກ່ອນ ຈຶ່ງດຳເນີນງານໄປໄດ້ຖ້າ ເມືອງ, ແຂວງ ແກ້ໄຂບໍ່ຕົກຈຶ່ງສະເໜີທາງລັດຖະບານ (ຖ້າມີບັນ ຫາອັນໃດບໍ່ໃຫ້ບໍລິສັດຈ່າຍກ່ອນຫຼືເຮັດໄປກ່ອນ

❖ ພ້ອມນີ້ກໍ່ຍັງມີບາງທ່ານໄດ້ປະກອບຄຳຄິດຄຳເຫັນໃສ່ບົດທີ່ໄດ້ສະເໜີມານັ້ນເຊິ່ງມີເນື້ອໃນຄ້າຍໆ ຄືກັນກັບຂ້າງເທິງນັ້ນ.

➢ ຕ່ານການປະກອບຄຳຄິດຄຳເຫັນຫຼາຍທ່ານກົງໄປກົງມາ ແລະ ມີຄວາມຮັບຜິດຊອບສູງນັ້ນ.

➢ສຸດທ້າຍປະທານກອງປະຊຸມໄດ້ມີການຊີ້ນຳເປັນເອກະພາບເພື່ອຈັດຕັ້ງປະຕິບັດລຸ່ມນີ້:

1./ ໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບI ແມ່ນນອນຢູ່ໃນແຜ່ນການພັດທະນາຂອງລັດທະບານແຫ່ງສປປລາວ,ສະນັ້ນ ພວກເຮົາຕ້ອງໄດ້ມີຄວາມເອກະພາບນຳພັກລັດຖະບານ ດັ່ງນັ້ນ ເມື່ອມີການກໍ່ສ້າງກໍ່ຕ້ອງມີຜົນກະທົບແລະເຕາະຕ້ອງເຖິງຜົນປະໂຫດຂອງປະຊາຊົນ

2./ ຕ່ານການສະເໜີ ແລະ ຄົ້ນຄ້ວາຂໍ້ມູນເອກະສານຈຳນວນໜຶ່ງ ທີ່ທ່ານຜູ້ແທ່ນໄດ້ປະກອບຄຳເຫັນນັ້ນແມ່ນຍັງບໍ່ທັນຮັດກຸມ,ບໍ່ຄົບຖ້ວນ ສະນັ້ນ ຈະຕ້ອງໄດ້ລົງສຳຫຼວດ.ເກັບກຳຂໍ້ມູນອີກຕື່ມ ໂດຍມອບໃຫ້ ບໍລິສັດ ທີ່ປຶກສາແຫ່ງຊາດ(NCC)ປະຕິບັດໃຫ້ ມີການສົມທົບພາກສ່ວນທີ່ກ່ຽວຂ້ອງຂອງແຂວງ ແລະ ເມືອງ.

3./ ບັນຫາຜົນກະທົບໂດຍກົງຂອງ ໂຄງການນີ້, ຕົ້ນຕໍແມ່ນຢູ່ແຂວງວຽງຈັນ ມີ 4 ບ້ານ,ສະນັ້ນ ແຂວງພວກເຮົາຈະຕ້ອງໄດ້ນຳພາແນວຄິດຂອງປະຊາຊົນ ໃຫ້ດີໂດຍການປະສານສົມທົບກັບອຳນາດການປົກຄອງບ້ານ,ເຈົ້າກົມເຈົ້າເຫຼົ່າເຮັດວຽກງານແນວຄິດຫຼາຍລົບຫຼາຍຕ່າວເພື່ອໃຫ້ປະຊາຊົນໃຫ້ນດີເຫັນພ້ອມ

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4./ ບັນຫາການຍົກຍ້າຍຈັດສັນພື້ນທີ່ທຳມາຫາກິນບ່ອນໃໝ່ຈະຕ້ອງເຮັດໃຫ້ດີລື່ນອັນເກົ່າໃນແຕ່ລະດ້ານເພື່ອພັດທະນາໃຫ້ຈະເລີນກ່າວໜ້າ, ແຕ່ບາງອັນກໍ່ຈະລຸດລົງເປັນຕົ້ນເນື້ອທີ່ນາທຳການຜະລິດ,ສະນັ້ນຈຶ່ງມີແຜ່ນການປັບປຸງອາຊີບໃໝ່ປ່ຽນແທ່ນເພີ່ມຕື່ມ.

- ການຈັດສັນບ່ອນໃໝ່ ແມ່ນມອບໃຫ້ເມືອງສືບຕໍ່ຊອກສະຖານທີ່ໃຫ້ປະຊາຊົນຕາມຄວາມເໝາະສົມເພື່ອສະເໜີໃຫ້ລັດຖະບານ.

5./ ບັນຫາການຊົດເຊີຍຜົນເສຍຫາຍຕ່າງໆ ແມ່ນບໍ່ໃຫ້ປະຊາຊົນຕົກໃຈ, ທາງການຈັດຕັ້ງພັກ-ລັດຖະບານ,ແຂວງເມືອງແລະບໍລິສັດກໍ່ສ້າງເປັນຜູ້ຮັບຜິດຊອບບົນພື້ນຖານອີງໃສ່ລະບຽບ, ກົດໝາຍແລະປະສົບການຂອງແຂວງທີ່ເຄີຍປະຕິບັດຕໍ່ໂຄງການຕ່າງໆ ຢູ່ແຂວງຜ່ານມາ,ແຕ່ສະເພາະໂຄງການນີ້ກໍ່ຕ້ອງເຮັດຄືກັນເພື່ອເປັນເອກະພາບ

6./ ຕໍ່ການສຳລະຄ່າຊົດເຊີຍຜົນກະທົບຕ່າງໆ ບໍ່ໃຫ້ບໍລິສັດຈ່າຍກ່ອນແຕ່ຕ້ອງໃຫ້ປະສານສົມທົບກັບເບື້ອງລັດເພື່ອປຶກສາຫາລືເປັນເອກະພາບກັນກ່ອນຈຶ່ງປະຕິບັດໄດ້

7./ <u>ພາກສະເໜີຂອງຜູ້ເຂົ້າຮ່ວມກອງປະຊຸມ</u>

1. ທ່ານ ວິງສະໄໝ ເຈົ້າເມືອງໆ ຊຶ່ມ ສະເໜີ:

+ ຂົງເຂດ 4 ໝູ່ບ້ານທີ່ຖືກໂຄງການກໍ່ສ້າງເຂື່ອນໄຟຟ້ານ້ຳງຽບI ແມ່ນເປັນເຂດເສດຖະກິດຂອງເມືອງທີ່ຖືກຜົນກະທົບນັກ.ດັ່ງນັ້ນເມື່ອມີການກໍ່ສ້າງສຳເລັດແລ້ວ,ເມືອງສະເໜີເອົາ 1% ຂອງລາຍຮັບເພື່ອເອົາມາພັດທະນາຄືນໃໝ່

➢ ກອງປະຊຸມມາຮອດເວລາ12:30' ຂອງວັນດຽວກັນກໍ່ໄດ້ປິດລົງດ້ວຍຜົນສຳເລັດຕາມຄາດໝາຍ

ແຂວງວຽງຈັນ, ວັນທີ 28/04/08

<u>ຫົວໜ້າ ຫ້ອງການ ຊັບພະຍາກອນນ້ຳ</u>
<u>ແລະ ສິ່ງແວດລ້ອມ ປະຈຳແຂວງວຽງຈັນ,</u>
<u>ຕາງໜ້າປະທານກອງປະຊຸມ</u>

ຄຳພ໊ວ ແພງພັນຮັກ

Khamphua PHAENGPHANHAK

<u>ຜູ້ບັນທຶກກອງປະຊຸມ</u>
<u>ກອງເລຂາ</u>

ສີໃສ ພົມມະ

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3.3 Xieng Khouang Province (Phonsavanh District)

Minute of Public Consultation at Provincial Level on April 24, 2008

ບົດບັນທຶກກອງປະຊຸມ ປຶກສາຫາລືຜົນກະທົບສິ່ງແວດລ້ອມ ຈາກໂຄງການໄຟຟ້ານ້ຳງຽບ I
ເຂດທ່າວຽງ ເມືອງທ່າໂທມ ທີ່ຫ້ອງວ່າການແຂວງຊຽງຂວາງ
ຄັ້ງວັນທີ 24/04/2008

ກອງປະຊຸມປຶກສາຫາລືກ່ຽວກັບຜົນກະທົບດ້ານສິ່ງແວດລ້ອມຈາກໂຄງການໄຟຟ້ານ້ຳງຽບ I ເຂດທ່າວຽງ ເມືອງທ່າໂທມ ໄດ້ຖືກຈັດຂຶ້ນ ໃນເວລາ 8:30 ໂມງ ຂອງວັນທີ 24/04/2008 ໂດຍການເປັນປະທານ ຂອງທ່ານ ວຽງທະໜອມ ພິມມະຈັນ ຮັກສາການເຈົ້າແຂວງ ແຂວງຊຽງຂວາງ ປະທານຄະນະກຳມະການສິ່ງແວດລ້ອມແຂວງ ເຊິ່ງມີຜູ້ເຂົ້າຮ່ວມທັງໝົດ:.....ທ່ານ.

ແຂກທີ່ເຂົ້າຮ່ວມກອງປະຊຸມປະກອບມີ:

1. ທ່ານ. ວຽງທະໜອມ ພິມະຈັນ ຮັກສາການເຈົ້າແຂວງ ຊຽງຂວາງ
2. ທ່ານ. ເທີດສັກ ສັນຕິວໍລະວຸດ ຕາງໜ້າທູດໄທ ປະຈຳລາວ
3. ບໍລິສັດໄຟຟ້າການຜະລິດແຫ່ງປະເທດໄທ
4. ບໍລິສັດ Kansai
5. ລັດວິສາຫະກິດຖືຫຸ້ນລາວ
6. ມະຫາວິທະຍາໄລຈຸລາລົງກອນ
7. ບໍລິສັດທີ່ປຶກສາລາວ
8. ຜູ້ຕາງໜ້າຈາກກະຊວງ, ກົມກ່ຽວຂ້ອງ
9. ອຳນາດການປົກຄອງເມືອງທ່າໂທມ ແລະ 4 ບ້ານຂອງເມືອງ ທີ່ໄດ້ຮັບຜົນກະທົບ
10. ບັນດາພະແນກການທີ່ກ່ຽວຂ້ອງອ້ອມຂ້າງແຂວງ

ໃນວາລະເປີດກອງປະຊຸມ ທ່ານ ວຽງທະໜອມ ພິມມະຈັນ ຮັກສາການເຈົ້າແຂວງ ແຂວງຊຽງຂວາງ ປະທານຄະນະກຳການສິ່ງແວດລ້ອມແຂວງ ປະທານກອງປະຊຸມ ໄດ້ກ່າວເຖິງຈຸດປະສົງ ຂອງກອງປະຊຸມເຊິ່ງປະກອບມີ 2 ຈຸດປະສົງຫຼັກຄື:

1. ຟັງການສະເໜີບົດຈາກບໍລິສັດທີ່ປຶກສາກ່ຽວກັບການປະເມີນຜົນກະທົບທາງດ້ານສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ຈາກໂຄງການໄຟຟ້ານ້ຳງຽບ I.
2. ປະກອບຄຳຄິດເຫັນ, ຂໍ້ສະເໜີຕ່າງໆ ແລະ ເປັນເອກະພາບຕໍ່ການກຳນົດບັນຫາຜົນກະທົບ ແລະ ມາດຕະການ ຫຼຸດຜ່ອນ ຜົນກະທົບສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ລວມທັງມາດຕະການຊົດເຊີຍ.

ນອກນັ້ນ, ທ່ານຍັງກ່າວເຖິງສະພາບ ແລະ ທິດທາງການພັດທະນາເສດຖະກິດ-ສັງຄົມຢູ່ພາຍໃນແຂວງ ເປັນຕົ້ນແມ່ນ ການພັດທະນາທ່າແຮງແຫຼ່ງນ້ຳ ໂດຍສະເພາະແມ່ນນ້ຳງຶມ, ນ້ຳງຽບ... ທັງໝົດນີ້ ເພື່ອແນໃສ່ການຍົກຍູ້ສິ່ງເສີມ ປັບປຸງຊີວິດການເປັນຢູ່ ກໍ່ຄືການແກ້ໄຂຄວາມທຸກຈົນຂອງປະຊາຊົນເພື່ອລະຫ້າວ.

ໃນການຈັດຕັ້ງກອງປະຊຸມ ໄດ້ປະກອບມີພາກການສະເອກະສານ ແລະ ພາກການປຶກສາຫາລື ເຊິ່ງລະ ອຽດມີດັ່ງນີ້:

I. *ພາກການສະເໜີ:*

ທ່ານ ຮອງສາດສະດາຈານ ດຣ. ທະວີວົງ ຜູ້ອຳນວຍການສະຖາບັນວິໄຈສິ່ງແວດລ້ອມ-ມະຫາ ວິທະຍາໄລຈຸລາລົງກອນ

1. **ສະພາບລວມຂອງໂຄງການ:**
   - ທີ່ຕັ້ງເຂື່ອນ, ເນື້ອທີ່ອ່າງໄຕ໋ງ, ກຳລັງຕິດຕັ້ງ, ສາຍສົ່ງໄຟຟ້າ, ເຈົ້າຂອງໂຄງການ
2. **ການສຶກສາຜົນກະທົບສິ່ງແວດລ້ອມ:**
   - ແບ່ງພື້ນທີ່ໃນການສຶກສາຜົນກະທົບສິ່ງແວດລ້ອມ ເປັນ 4 ສ່ວນ: ເຂດການກໍ່ສ້າງເຂື່ອນ, ເຂດອ່າງເກັບນ້ຳຕອນລຸ່ມ, ເຂດອ່າງເກັບນ້ຳຕອນເທິງ, ເຂດບໍລິເວນກ້ອງເຂື່ອນ.
   - ການປະເມີນຜົນກະທົບສິ່ງແວດລ້ອມ-ສັງຄົມຕາມ 3 ອົງປະກອບຂອງສິ່ງແວດລ້ອມ : ກາຍະພາບ, ຊີວະພາບ, ເສດຖະກິດ-ສັງຄົມ.
3. **ການຊົດເຊີຍ:**
4. **ຜົນປະໂຫຍດຈາກໂຄງການໄຟຟ້ານ້ຳງຽບ I :**

ທ່ານ ສົມສະຫວັນ ຈາກບໍລິສັດທີ່ປຶກສາລາວ

1. **ພື້ນທີ່ຂອງໂຄງການ**

ຕັ້ງຢູ່ບ້ານຫາດຍົ້ນ, ເມືອງບໍລິຄັນ ແຂວງບໍລິຄຳໄຊ. ປະກອບມີ 2 ເຂື່ອນ ມີກຳລັງຕິດຕັ້ງທັ້ງໝົດ 282 ເມກາວັດ:

ເຂື່ອນຫຼັກ: ກຳລັງຕິດຕັ້ງ 262 ເມກາວັດ, ສາຍສົ່ງ 230 ກິໂລໂວນ, ຜະລິດໄຟຟ້າ ສຳລັບ ຂາຍໃຫ້ໄທ.
ມີ 4 ບ້ານ ຈາກແຂວງວຽງຈັນທີ່ຖືກນ້ຳຖ້ວມ ແລະຕ້ອງໄດ້ຍົກຍ້າຍອອກ 100 %: ນ້ຳຍວກ, ຫ້ວຍປາມ້ອມ, ສິບໃໝ ແລະ ສິບຍວກ.
ມີ 2 ບ້ານຈາກແຂວງບໍລິຄຳໄຊ: ບ້ານຫາດຍົ້ນ ແລະ ຫາດຊາຍຄຳ
ແຂວງຊຽງຂວາງ ມີ 4 ບ້ານ: ບ້ານນາກາງ, ປູ, ຫາດສາມຄອນ ແລະ ພຽງຕາ.

ເຂື່ອນສຳຮອງ: ກຳລັງຕິດຕັ້ງ 20 ເມກາວັດ, ສາຍສົ່ງ 115 ກິໂລໂວນ, ຜະລິດໄຟຟ້າສຳລັບ ຊົມໃຊ້ພາຍໃນແຂວງບໍລິຄຳໄຊ.

2. ຜົນການປະເມີນຜົນກະທົບ ແລະ ມາດຕະການຫຼຸດຜ່ອນຜົນກະທົບສິ່ງແວດລ້ອມ

2.1 ຂອບເຂດການສຶກສາຜົນກະທົບສິ່ງແວດລ້ອມ

ພູມສັນຖານ, ທໍລະນີສາດ, ພູມອາກາດ, ການເຊາະເຈື່ອນ, ນ້ຳ ແລະ ຄຸນນະພາບນ້ຳ, ນ້ຳຜິວດິນ, ສຽງລົບກວນ, ການສັ່ນສະເທືອນ, ຄຸນນະພາບອາກາດ, ປ່າໄມ້ ແລະ ສັດປ່າ, ສັດນ້ຳ ແລະ ການປະມົງ

2.2 ຂອບເຂດການສຶກສາຜົນກະທົບດ້ານສັງຄົມ

- ບັນດາເຄື່ອງທີ່ນຳໃຊ້ເຂົ້າໃນການສຶກສາຜົນກະທົບ, ລະບຽບກົດໝາຍກ່ຽວຂ້ອງເປັນຕົ້ນ: ມາດຕະຖານຄຸ້ມຄອງສິ່ງແວດລ້ອມໂຄງການໄຟຟ້າ, ລະບຽບການຍົກຍ້າຍຈັດສັນ ແລະ ການທົດແທນຄ່າເສຍຫາຍ.
- ການສຳຫຼວດ ແລະ ເກັບກຳຂໍ້ມູນ ຕາມແບບຟອມ ແລະ ການສຳພາດຕົວຈິງແຕ່ລະ ຄອບຄົວ ໂດຍມີການເຊັນຮັບລະຫວ່າງຄອບຄົວ ແລະ ທີມງານ ໂດຍມີການຢັ້ງຢືນ ຈາກບ້ານ.
- ອົງປະກອບຕ່າງໆຂອງບ້ານ: ລັກສະນະຂອງບ້ານ, ສິ່ງອຳນວຍຄວາມສະດວກໃນບ້ານ, ລັກສະນະທີ່ຢູ່ອາໄສ, ວິຖີຊີວິດການເປັນຢູ່, ເດັກນ້ອຍ, ແມ່ຍິງ ແລະ ສຸຂະອະນາໄມ, ວິຖີຊີວິດຂອງເດັກນ້ອຍ, ດ້ານການສຶກສາ, ວິຖີຊີວິດຂອງຜູ້ຍິງ, ການຫາເຂົ້າ, ອາຫານການກິນ, ການຫາເຄື່ອງປ່າຂອງດົງ, ການນຳໃຊ້ນ້ຳງູບເພື່ອຜົນປະໂຫຍດຕ່າງໆ, ການຄົມມະນາຄົມທາງບົກ ແລະ ທາງນ້ຳ.

2.3 ມາດຕະການຫຼິດເຊີຍ:

ການກຳນົດຂອບເຂດທີ່ໄດ້ຮັບຜົນກະທົບ:

- ການໝາຍຈຸດລະດັບນ້ຳ 320 ແມັດ ເໜືອໜ້ານ້ຳທະເລ
- ການສ້າງແຜນທີ່ບ້ານ ແລະ ຂອບເຂດອ່າງນ້ຳ
- 328 ຄອບຄົວ, 2.207 ຄົນ ຍິງ

ວິທີການ ຂັ້ນຕອນການຫຼິດເຊີຍ:

- ການສຳຫຼວດຊັບສິນຂອງປະຊາຊົນທີ່ໄດ້ຮັບຜົນກະທົບຈາກໂຄງການ ລວມທັງທີ່ສາມາດ ເຄື່ອນຍ້າຍໄດ້ ແລະ ບໍ່ສາມາດຍ້າຍໄດ້ (ເຮືອນ, ນ້ຳດື່ມນ້ຳໃຊ້, ເຄື່ອງປູກຂອງຝັ່ງ, ໄຮ່ນາຊື້ອສວນ....).

ແຜນການຫຼິດເຊີຍ:

- ມາດຕະການຫຼິດເຊີຍ:

- ✓ ຊົດເຊີຍເປັນເງິນ ແລະ
- ✓ ການຫາໃຫ້ໃໝ່ ຫຼື ທົດແທນ

- **ການຕັ້ງຄະນະກຳມະການຍົກຍ້າຍຈັດສັນ ຊົດເຊີຍ**
- **ການກຳນົດເນື້ອການຊົດເຊີຍ:**
  - ✓ ການສູນເສຍທີ່ດິນທີ່ຖາວອນ: ຊົດເຊີຍດ້ວຍດິນແທນດິນ ທີ່ບໍ່ໃຫ້ໝົດດິນເດີມ.
  - ✓ ບ້ານ ແລະ ທີ່ຢູ່ອາໄສ: ຊົດເຊີຍດິນເຮືອນ,ບ້ານ, ອຸປະກອນ ແລະ ຫຶບການປຸກ
- **ການປຶກສາຫາລືກັບຄະນະອຳນາດການປົກຄອງເມືອງທ່າໂທມ**
- **ການປຶກສາຫາລືກັບຄອບຄົວປະຊາຊົນ ທີ່ໄດ້ຮັບຜົນກະທົບ.**

II. *ພາກການປຶກສາຫາລື:*

ທ່ານ ວ່າງເລ່ຍ ຫົວໜ້າພະແນກແຮງງານ ແລະ ສະຫວັດດີການສັງຄົມແຂວງຊຽງຂວາງ

- ເຫັນດີ ໃນການພັດທະນາໂຄງການນ້ຳງຽບ I.
- ບັນຫາໃນການພັດທະນາໂຄງການ: ຜົນກະທົບຕໍ່ສະຖານທີ່ສັກສິດປ່າຊ້ຳ ແລະ ຮີດຄອງປະເພນີ,

ທ່ານ ນາຍບ້ານບ້ານປູ:

- ເຫັນດີ ໃນການພັດທະນາໂຄງການນ້ຳງຽບ I.
- ສະເໜີໂຄງການຕອບສະໜອງຈິດໃຈຂອງປະຊາຊົນ, ບໍ່ຢາກອອກໄກຈາກຂອບເຂດບ້ານເດີມ, ຖ້າຍົກຍ້າຍ ສະເໜີຍົກຍ້າຍເປັນກຸ່ມ ແລະ ໃຫ້ປະຊາຊົນກວດກາຕົວຈິງບ່ອນທີ່ຈະຍ້າຍໄປຢູ່ເສຍກ່ອນ. ແຕ່ຖ້າເປັນໄປໄດ້ສະເໜີໂຄງການ ໃນການກໍ່ກຳແພງອ້ອມບ້ານ.

ທ່ານ ບຸນສັນ ເຈົ້າເມືອງເມືອງທ່າໂທມ:

- ເຫັນດີ ໃນການພັດທະນາໂຄງການນ້ຳງຽບ I.
- ການສຳຫຼວດຊັບພະຍາກອນປ່າໄມ້ (ທຳມະຊາຕ).
- ສຳຫຼວດດ້ານບໍ່ແຮ່ ໃນເຂດໂຄງການ.
- ການຈັດສັນປະຊາຊົນ ໄປບ່ອນທີ່ມີບ່ອນທຳການຜະລິດ: ເຂດວັງໄຮ (ໂພນໄຊ) ສາມາດມີຊົນລະປະທານຮັບໃຊ້ການຜະລິດ ແລະ ເຂດຍາມ (ຈະເລີນໄຊ) ຖ້າສາມາດ

ທ່ານ ຄຳດອນ ພະແນກສາທາລະນະສຸກແຂວງ:

- ສະເໜີໂຄງການເຝົ້າລະວັງພະຍາດຕ່າງໆ ທີ່ອາດເກີດຂຶ້ນ ໃນການຍົກຍ້າຍຈັດສັນປະຊາຊົນ ເພື່ອແກ້ໄຂໃຫ້ທັນເວລາ.

ທ່ານ ບຸນປານີ ພາໃຄ້ຍານ ພະແນກກະສິກຳ-ປ່າໄມ້ແຂວງ:

- ການສຶກສາຜົນກະທົບຕໍ່ສັດນ້ຳ ໂດຍສະເພາະແຫ່ງເພາະພັນສັດນ້ຳ.
- ຜົນກະທົບໄລຍະຍາວ: ການຕົກຕະກອນ, ໄພແຫ້ງແລ້ງ ມີມາດຕະການແນວໃດ?
- ກ່ຽວກັບລະດັບນ້ຳ 320 ແມ່ນລະດັບນ້ຳປົກກະຕິບໍ? ໃນກໍລະນີມີນ້ຳປ່າໄຫຼຫຼາກ ອາດເຮັດໃຫ້ຂອບເຂດ ທີ່ໄດ້ຮັບກວ້າງອອກ ທາງໂຄງການໄດ້ສຶກສາ ແລະ ມີມາດຕະການແນວໃດ?
- ການເຮັດກຳແພງກັ້ນນ້ຳ ຈະເປັນໄປໄດ້ຍາກ ອາດມີການໃຊ້ຈັກດູດນ້ຳອອກຕະຫຼອດເວລາ.

ທ່ານ ບຸນຮ ນາຍບ້ານບ້ານໃໝ່ແຍງ:

- ເຫັນດີໃນການພັດທະນາໂຄງການ
- ຖ້າມີຜົນກະທົບ ຕ້ອງໃຫ້ມີມາດຕະການ ໃນການຫົດແທນ ຊົດເຊີຍ.

ທ່ານ ຄຳສິນ ຈັນທະວົງສີ ຮອງຫົວໜ້າພະແນກ ຍທຂ:

- ຜົນກະທົບຕໍ່ເສັ້ນທາງຄົມມະນາຄົມໃນຂອບເຂດໂຄງການ.

ສັງລວມບັນຫາທີ່ໄດ້ຍົກຂຶ້ນ ເພື່ອປຶກສາຫາລືໃນກອງປະຊຸມ:

1. ບັນຫາທີ່ກ່ຽວຂ້ອງກັບດ້ານວັດທະນາທຳ, ຮີດຄອງປະເພນີ, ສະຖານທີ່ສັກສິດ.
2. ການນຳໃຊ້ແຮງງານ ເພື່ອສ້າງວຽກເຮັດງານທຳ, ຫຼຸດຜ່ອນຍັດຕາການຫວ່າງງານ.
3. ບັນຫາດ້ານສັງຄົມ: ການຍົກຍ້າຍຈັດສັນປະຊາຊົນທີ່ໄດ້ຮັບຜົນກະທົບຈາກການພັດທະນາໂຄງການ, ລວມທັງການເຝົ້າລະວັງພະຍາດຕ່າງໆ ທີ່ອາດຈະເກີດຂຶ້ນ ແລະ ຜົນກະທົບຕໍ່ໂຄງລ່າງພື້ນຖານ.
4. ແລະ ຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ: ຊັບພະຍາກອນທຳມະຊາດ-ປ່າໄມ້ ແລະ ບໍ່ແຮ່, ສັດປ່າ-ສັດນ້ຳ ໃນຂອບເຂດໂຄງການ ລວມທັງແຫ່ງເພາະພັນຂອງມັນ.

ການອະທິບາຍ ໃຫ້ຄວາມກະຈ່າງແຈ້ງຕໍ່ຄຳສະເໜີຕ່າງໆໃນກອງປະຊຸມ:

ທ່ານ. ດຣ. ໄພສີ

1. ການຍົກຍ້າຍສະຖານທີ່ສັກສິດ ແມ່ນປະຕິບັດຕາມລະບຽບຫຼັກການລວມຂອງລັດ ແຕ່ງົບປະມານ ແມ່ນໂຄງການເປັນຜູ້ຮັບຜິດຊອບ.
2. ການປັນຈຸແຮງງານ ແມ່ນທາງໂຄງການ ຈະພະຍາຍາມໃນການນຳໃຊ້ປະໂຫຍດຂອງແຮງງານທ້ອງຖິ່ນ ເທົ່າທີ່ເປັນໄປໄດ້.

3. ການຍົກຍ້າຍຈັດສັນປະຊາຊົນ (4 ບ້ານທີ່ໄດ້ຮັບຜົນກະທົບຈຳເປັນຕ້ອງຍົກຍ້າຍ ໃນ ຈຳນວນ 12 ບ້ານ ຂອງແຂວງຊຽງຂວາງ ທີ່ໄດ້ຮັບຜົນກະທົບຈາກໂຄງການດັ່ງກ່າວ) ໄດ້ສະເໜີທາງເລືອກສຳ ລັບການຍົກຍ້າຍ: ໂດຍໄດ້ມີການສຳຫຼວດ ປຶກສາແບບມີສ່ວນຮ່ວມກັບອຳນາດການປົກຄອງ ແຕ່ລະຂັ້ນ. ໃນນັ້ນ ***ສຳລັບບ້ານໜູ*** ມີຄວາມເປັນໄປໄດ້ ໃນການສ້າງເຂື່ອນກັ້ນນ້ຳ ອາດຈະເປັນ ທາງເລືອກທີ່ດີກວ່າ ການຍົກຍ້າຍ 133 ຄອບຄົວ, 842 ຄົນ.
ສຳລັບທາງເລືອກໃນການຍົກຍ້າຍຈັດສັນ ແມ່ນອີງໃສ່ພື້ນທີ່ທຳການຜະລິດ ແລະ ຊົນລະປະທານ ເປັນຕົ້ນຕໍ ແລະ ຕິດພັນກັບແຜນການກໍ່ສ້າງພື້ນຖານໂຄງລ່າງ: ສາທາ, ສຶກສາ, ຄົມມະນາຄົມ...
4. ໄດ້ໃຫ້ຄວາມກະຈ່າງແຈ້ງກ່ຽວກັບລະດັບນ້ຳ 320 ເຊິ່ງເປັນລະດັບນ້ຳສູງສຸດຂອງເຂື່ອນ ແຕ່ປົກ ກະຕິອາດບໍ່ເຖິງ.
5. ສຳລັບຊັບພະຍາກອນປ່າໄມ້ ຈະໃຫ້ຄວາມກະຈ່າງແຈ້ງ ໃນກອງປະຊຸມລະດັບຊາດ.
6. ສຳລັບດ້ານບໍ່ແຮ່ ທາງໂຄງການໄດ້ອີງຕາມການສຳຫຼວດຂອງກົມບໍ່ແຮ່ ໃນຂອບເຂດດັ່ງກ່າວເຫັນ ວ່າ: ບໍ່ມີຈຸດປະກົດຂອງແຮ່.
7. ສຳລັບການອະນຸລັກສັດນ້ຳ ສັດປ່າ-ແຫຼ່ງເພາະພັນສັດ ຕ້ອງໄດ້ກຳນົດຂອບເຂດອະນຸລັກສັດໄວ້.
8. ຖ້າລະດັບນ້ຳຂຶ້ນສູງສຸດ ຈະໃກ້ກັບເສັ້ນທາງແຕ່ບ້ານພຽງຕາ ຫາ ບ້ານຫາດສານຄອນ ເທົ່ານັ້ນ ສ່ວນບ້ານອື່ນໆ ແມ່ນຍັງໄກເສັ້ນທາງ. ແຕ່ຖ້າມີການຖ້ວມເສັ້ນທາງຕ້ອງ ໄດ້ສົມທົບກັບຜູ້ພັດ ທະນາໂຄງການໃນການແກ້ໄຂ.

ທ່ານ. ສາຍເພັດ ອຳໄພວັນ ຮອງອຳນວຍການລັດວິສາຫະກິດຖິຫຸ້ນລາວ

1. ຄວາມເປັນມາຂອງລັດວິສາຫະກິດຖິຫຸ້ນລາວ ໄດ້ຮັບອະນຸຍາດຈາກລັດຖະບານ ໃນການຮ່ວມ ຖິຫຸ້ນກັບຕ່າງປະເທດ ໃນໂຄງການພັດທະນາພະລັງງານໄຟຟ້ານ້ຳຕົກ ປະຈຸບັນ ມີ 5 ໂຄງການ ທີ່ບໍລິສັດໄດ້ຮ່ວມຖິຫຸ້ນ: ນ້ຳງຽບ I, ນ້ຳເທີນ 1, ນ້ຳເທີນ 2, ຫົງສາ-ລິກໄນ, ນ້ຳງຶມ 3.
2. ທາງໂຄງການຢັ່ງຮາດຂໍ້ມູນລາຍລະອຽດ ກ່ຽວກັບຜົນກະທົບ ລວມທັງມາດຕະການໃນການຫຼຸດ ຜ່ອນ ແລະ ວິທີການລະອຽດເພື່ອແກ້ໄຂຜົນກະທົບສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ກ່ອນການຈັດຕັ້ງ ກອງປະຊຸມລະດັບແຂວງ ໃນຄັ້ງນີ້.
3. ການພັດທະນາໂຄງການ ຕ້ອງຕິດພັນກັບການພັດທະນາແບບຍືນຍົງ.
4. ໂຄງການຕ້ອງໄດ້ເອົາໃຈໃສ່ທຸກບັນຫາຜົນກະທົບ ໂດຍສະເພາະ ຕໍ່ຊັບພະຍາກອນປ່າໄມ້, ຕໍ່ຄຸນ ນະພາບນ້ຳ ແລະ ອື່ນໆ.

- ***ສັ່ງລວມບັນຫາທີ່ໄດ້ເປັນເອກະພາບໃນກອງປະຊຸມ:***

1. ຜູ້ເຂົ້າຮ່ວມທັງໝົດ ໄດ້ເຫັນດີເປັນເອກະພາບ ໃນການພັດທະນາໂຄງການໄຟຟ້ານ້ຳງຽບ I.

2. ໂດຍລວມເປັນເອກະພາບຕໍ່ກັບການກຳນົດບັນຫາຜົນກະທົບ, ແຜນການ, ມາດຕະການຫຼຸດຜ່ອນ ແລະ ແກ້ໄຂຜົນກະທົບຕໍ່ສິ່ງແວດລ້ອມ ແລະ ສັງຄົມ ທີ່ຜູ້ພັດທະນາໂຄງການ ໄດ້ສະເໜີ ແລະ ໃຫ້ຄວາມກະຈ່າງແຈ້ງຕໍ່ກອງປະຊຸມ.
3. ຜູ້ພັດທະນາໂຄງການ ເຫັນດີໃນການສັງລວມຂໍ້ມູນໃຫ້ລະອຽດ ແລະ ຄວາມພະຍາຍາມໃນການ ກຳນົດບັນຫາຜົນກະທົບໃຫ້ລະອຽດຄົບຖ້ວນ ແລະ ມີວິທີການ, ມາດຕະການຫຼຸດຜ່ອນ ແກ້ໄຂ ໂດຍພື້ນຖານການປະຕິບັດຕາມທິດທາງ ນະໂຍບາຍ ແລະ ລະບຽບຫຼັກການ ຂອງລັດ ກໍ່ຄືຂອງແຂວງ ທົ່ວໆຫລວກ.

ຫຼັງຈາກນັ້ນ, ໃນວາລະທ້າຍກອງປະຊຸມ ທ່ານປະທານກອງປະຊຸມໄດ້ສະເໜີຕໍ່ຄະນະອຳນວຍ ການປົກຄອງເມືອງທ່າໂທມ ໃນການແຈ້ງ ລະທິບາຍສຶກສາອົບຮົມແນວຄິດການເມືອງ ກ່ຽວກັບ ການພັດທະນາໂຄງການດັ່ງກ່າວ ໃຫ້ແກ່ບ້ານ, ປະຊາຊົນ ຄອບຄົວ ຜູ້ທີ່ໄດ້ຮັບຜົນກະທົບຈາກ ໂຄງການ ເພື່ອຫຼີກເວັ້ນບັນຫາຄວາມບໍ່ສະຫງົບທີ່ຈະຕາມມາ ແລະ ເພື່ອຄວາມເປັນເອກະພາບຕໍ່ ແນວທາງ ແຜນນະໂຍບາຍຂອງພັກລັດ ໃນການພັດທະນາເສດຖະກິດ-ສັງຄົມ, ແລະ ສະເໜີ ເຖິງຜູ້ພັດທະນາໂຄງການການມີສ່ວນຮ່ວມ / ການປະກອບສ່ວນຂອງປະຊາຊົນໃຫ້ຫຼາຍຂຶ້ນ ຕາມ ຄວາມສາມາດ, ຄວາມຮຽກຮ້ອງຕ້ອງການຂອງວຽກງານ ແລະ ຕາມຄວາມເໝາະສົມ ແລະ ຮຽກຮ້ອງມາຍັງຂະແໜງການທີ່ກ່ຽວຂ້ອງ ແຕ່ລະຂັ້ນ ໃນການສົມທົບກັບໂຄງການໃນການຈັດຕັ້ງ ປະຕິບັດ ແລະ ການກວດກາຕິດຕາມໂຄງການ ເພື່ອໃຫ້ສຳເລັດຜົນໄປດ້ວຍດີ.

ວັນທີ 24 ເມສາ, 2008

ປະທານກອງປະຊຸມ
ຮັກສາການເຈົ້າແຂວງ ແຂວງຊຽງຂວາງ

ບັນທຶກກອງປະຊຸມ

PUBLIC CONSULTATION

1 Village Level

2 District Level

3 Provincial Level

(In English Version)

1 VILLAGE LEVEL

1.1 Bolikhamxay Province (Ban Hat Gniun, Bolikhan District)

Minute of Public Consultation at Village Level on October 29, 2007

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

1) The objectives of the meeting are to:

- Introduce to the background of project and its impacts
- Propose the resettlement sites
- Compile the comments and opinion and their attitudes on t he Nam Ngiep 1 project.

2) Participants

There are 50 participants attended this consultation meeting consisting of:

- 12 participants represented from Hatsaykham village
- 18 participants represented from Hat Gniun village
- participants represented from Bolikhan district
- participants represented WREA Bolikhamxay province
- participants represented from EGAT, Thailand
- participants represented from ERIC, Thailand
- participants represented from Energy Promotion Dept.
- participants represented from NCC Consultants

3) Summary of decisions

- The policy of Bolikhamxay Province want villagers of both Ban Hatsaykham and Ban Hat Gniun are stay together.
- Representatives of Ban Hatsaykham agree with resettlement plan. Nevertheless, they request to improve the livelihood and appropriate to the compensation.
- Ban Hat Gniun agrees to relocate of Ban Hatsaykham for stay together.
- Consultant reports all of suggestions to developer for continue level.

Ban Hat Gniun, October 29, 2007

Phuvieng Piakaew

Village Headman

(Signed and Sealed)

1.2 Vientiane Province (Ban Sopyouak, Hom District)

Minute of Public Consultation at Village Level on October 31, 2007

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

1) Ban Namyouak

I. Most of villagers do not relocated to Ban Pha-an, Ban Phukatha and Xiengsian-Xienglue area. But, developer provide the new resettlement site, villagers agree to relocate.

II. Developer must compensate for affected people. Then, the people will be provided the residences by themselves.

2) Ban Sopyouak

I. One household agree with resettlement plan of project

II. Most of villagers do not relocated to Bolikhamxay Province, Ban Pha-an and Ban Phukatha.

III. Refer to II, develop provide the new resettlement site. Then, the villagers request to visit the site. Whenever the new site is satisfied, villagers agree to relocate to the resettlement site.

3) Ban Sopphouan

Developer must compensate to affected people. Then, the people will be provided the residences by themselves.

4) Ban Houaypamom

The people in Ban Houaypamom suggest that the residences are located at a higher level than floodwater. Productive lands are moved to Samtoey area.

1.3 Vientiane Province (Ban Pha-an, Hom District)

Minute of Public Consultation at Village Level on November 15, 2008

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

Minutes of meeting
The public consultation meeting of Ban Pha-Ane
on hosting the resettlement of the Nam Ngiep 1 Hydropower Project

Date of Meeting: November 15, 2008

The meeting started at 9:00 at the Pha-Ane Elementary School, Ban Pha-Ane, Hom District, and Vientiane Province. Led by Tan Son Pedvee, chief of Pha-an village, there were 63 attendees. Among those were the deputy chief of the village, alliances, women union, board of the village, villagers and the consultants.

The purpose of the meeting was to conduct initial socio and economics data survey and to consult regarding hosting the resettlement of the Nam Ngiep 1 Hydropower Project; Ban Houypamom, Ban Sopphuane, Ban Sopyouak (Ban Nhong) and Ban Namyouak.

The meeting had agreed on the following:

1) Majority of the villagers agreed to have the resettlement site nearby their village, Ban Pha-Ane.
2) It was suggested that the regulation 09/ of the integration of small sized villages into a larger one should be followed. Consequently, the village name of Ban Pha-Ane should remain the same.
3) There should be development of infrastructure of the village: school, health center, road, electricity, clean water, village office, market, bus station, irrigation system etc. The livelihood of the community should also be elevated. On the other hand, housing, land clearance and productive land for the newcomers will be under responsibility of the project. In those regards, the host community will not request for any.
4) There should be land survey and land allocation to reflect actual circumstances. The boundary between Ban Pha-Ane and Ban Phukata should be clearly determined.
5) The conservation of the aquatic life and wildlife should be promoted.

The meeting was ended at 11:30.

Signature and Seal
Son Pedvee
Chief of Pha-Ane Village

Date November 15, 2008
Sangkhom Singharaj
Recorder

1.4 Vientiane Province (Ban Phukatha, Hom District)

Minute of Public Consultation at Village Level on November 15, 2008

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

Minutes of meeting
The public consultation meeting of Ban Phukata
on hosting the resettlement of the Nam Ngiep 1 Hydropower Project
Date of Meeting: November 15, 2008

The meeting started at 9:00 at the village hall of Ban Phukata. Led by Tan Ye Pao Song, chief of Phukata village of Hom District, there were 63 attendees and 10 of those were women. Among those were the deputy chief of the village, alliances, women union, board of the village, villagers and the consultants.

The meeting agreed on the following:

1) Agreed to have the affected people of the NNHP1 resettled to the area within the vicinity of the village;
2) Agreed to share the land for housing and land for agricultural purpose to the newcomers up to the capacity of the available space;
3) Requested the Project to adhere to agreements at earlier meetings at village and district levels;
4) The host village would like to have the right to use or share the infrastructures with the resettlers i.e. road, electricity, water supply, school, health center, village office, village hall, market, bus station etc. and to have the opportunities to attend the vocational training that may have;
5) Would like the resettlers to be integrated into the present village, Ban Phukata, as a single community, along with the policy of Lao PDR that encourages the integration of small villages into larger ones; and,
6) There must be unity, no division and respect honor among the villagers in the new community; the hosts and the newcomers.

The meeting was ended at 12:00.

Signature and Seal
Yea Pao Song
Chief of Phukata Village

Date November 15, 2008
Panya Srimongkol
Recorder

2 DISTRICT LEVEL

2.1 Bolikhamxay Province (Bolikhan District)

Minute of the Second Public Consultation at District Level on June 12, 2008

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

Led by T an Vongsay Thongsayinthipanya, deputy chief of Hom district and Tan Khampasong Vongtana, head of WRE provincial office of Vientiane province, the meeting comprised of relevant district authorities and representatives of the direct and indirect affected villages, and the consultants. In total there were 31 people in which 2 of those was women.

Summary of decisions:

1) After extensive consultation, representatives from both Hat Gniun unit and Hatsaykham unit of Ban Hat Gniun all agreed to have the Hatsaykham unit relocated closer to the Hat Gniun proximity.
2) The resettlement and compensation of Hatsaykham unit must be inline with the regulation number 192 of the Prime Minister Office issued on July 7, 2006.
3) Into Ban Hat Gniun, the Project should develop the followings:
    - Run the livelihood restoration program and support their basic life support i.e. food, for the affected people for 8 years;
    - Occupational training and village fund;
    - Expand the land for animal husbandry and agriculture;
    - Establish a local design irrigational system; and,
    - Build access road and allays of the village.
4) Into Ban Hat Gniun, the Project should build the followings:
    - Housing for the directed affected people based on agreement of the people and the resettlement committee. The housing should retain identity of the affected people;
    - A nursery school, primary school and secondary school as of the standard of Ministry of Education;
    - Market and bus station;
    - Village office;
    - Village meeting hall;
    - Health centre; and,
    - Electricity and clean water.
5) The villages downstream of the Project should receive the followings:
    - Sufficient clean water supply;

- Erosion protection of the river bank;
- Occupational training i.e. agriculture, animal husbandry, handicraft etc; and,
- The Project must warranty and compensate for either short-term or long-term damage if any from water releasing from the Project.

2.2 Vientiane Province (Hom District)

Minute of the Second Public Consultation at District Level on June 9, 2008

Lao People's Democratic Republic

Peace Independence Democracy Unity Prosperity

On June 09, Led by Tan Suna Pabeyyang, deputy chief of Hom district and Tan Kamlar Sengwong, deputy head of Vientiane provincial office, Tan Kamphua Pangpanhuk, head of WRE provincial office of Vientiane province, the meeting comprised of relevant district authorities and representatives of 4 affected villages: Ban Namyouak, Ban Sopyouak, Ban Sopphuane and Ban Houaypamom; and the consultants. In total there were 28 people in which 1 of those was woman.

Summary of decisions:

1) The resettlement site for the 4 affected villages: Ban Namyouak, Ban Sopyouak, Ban Sopphuane and Ban Houaypamom, of the Nam Ngiep 1 Hydropower Project will be in the area of Pha Aend, Nam Pung and Phu Kata. The area also links with Nam Thouay and Ban Nongkao area;
2) The project must provide infrastructure i.e. school, health center, market, clean water supply, electricity, village office and meeting hall to be inline with the economic and social development plan of the district ;
3) The project must set up occupational training i.e. handicraft, animal husbandry, laboring skill and tourism etc., to improve livelihood of the affected people step by step;
4) The meeting urged the setting up of relevant committee to educate the affected people to understand the economic and social development plan of GOL toward the plan to eradicate poverty by the year 2020;
5) The meeting suggested the province and the government of Lao PDR to revise and stop any project in the future plan that should have severe negative impacts to the resettlement site indicated above;
6) The meeting would like the developer to arrange a site visit upon other resettlement sites i.e. Nam Ngum 2 or Nam Theun 2 for the representatives of the affected people of the Project;
7) The meeting encouraged the Project to conduct the resettlement and compensation in line with the policy and regulation number 192 of Prime Minister Office issued on July 07, 2006.

Hom District, June 9, 2008

Tan Suna Pabeyyang

Chief of Hom district

(Signed and Sealed)

2.3 Vientaine Province (Hom District)

Minute of the Third Public Consultation at District Level on November 5, 2008

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

Minutes of meeting
The Public Consultation Meeting at District Level
on Hosting the Resettlement of the Nam Ngiep 1 Hydropower Project
Date of Meeting: November 4, 2008
Venue: Hom District's Meeting Hall

Leader: Mr. Vonsamai Lengsongpao, Chief of Hom District and Secretary of the Party at District level

Attendee: Related GoL authorities at District level, representatives of Ban Phukata and Ban Pha-an, chief of Ban Phukata and Chief of Ban Pha-an, a representative of EGAT and the consultants. 32 people in total

Purpose of the meeting: To consult the host communities of the resettlement of the Nam Ngiep 1 Hydropower Project

The meeting started at 09:00

The meeting agreed on the following:

Representatives of both villages agreed to have the 4 a ffected villages of Hom District: Ban Houypamom, Ban Sopphuane, Ban Sopyouak (Ban Nhong) and Ban Namyouak, to move in the vicinity of their villages: Ban Pha-an and Ban Phukata.

1) It was suggested that the regulation 09/ of the integration of small sized villages into a larger one should be followed. Consequently, those resettled villages should be integrated into the host communities, and the name of the present villages will remain the same.
2) The host community should have the right to use the basic public infrastructure that built into the resettlement. Accordingly, the project should responsible for housing and productive land of the newcomers. In these regards, the host community will not request for any.
3) There should be land survey and land allocation to reflect actual circumstances. The boundary between Ban Pha-Ane and Ban Phukata should be clearly determined.
4) The conservation of the aquatic life and wildlife should be promoted.
5) The meeting was concluded at 12:00.

2.4 Xieng Khoung Province (Thaviang sub-district, Thathom District)

Minute of the First Public Consultation at District Level on February 21, 2008

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

Participants

- The Chief of Thathom District
- Representatives from affected villages of Thathom District, 13 Villages
- Deputy of the Administrative Office of Xiengkhouang Province
- Department of Industry and Commerce, Xiengkhouang Province
- Department of Energy and Mines, Xiengkhouang Province
- Department of Agriculture and Forestry, Xiengkhouang Province
- Water Resource and Environmental Agency, Xiengkhouang Province
- Official Authorities nearby Thathom District
- Lao Holding State Enterprise, 4 people
- Electric Generating Authority of Thailand, 4 people
- The National Consulting Company of Lao PDR

  Total 78 people

Minutes:

1) 09.00 AM, an opening speech by Tan Bounphan Phommachan – chief of Thathom Distirct: The policy of the government of Lao PDR (GOL) on Lao economy and its relation to the Nam Ngiep 1 H ydropower Project were explained, NNHP1 has both positive and negative impacts to villages in Thaviang Sub-district list as following:

Area of which having directed impact:

- Ban Pou
- Ban Hatsamkhone
- Ban Phiengta
- Ban Nakang

Area of which having in-directed impact:

- Ban Xiengkhong
- Ban Viengthong
- Ban Nasong
- Ban Nasay

- Ban Phonengeng
- Ban Phonehom
- Ban Nahong
- Ban Dong
- Ban Namlong

2) Mr. Somsavanh Panmatha, a representative of the consultants on the Environmental and Social Impact Assessment, presented an overview of the project. The impacts of NNHP1 to the area of Thathom District, especially, the following:

- Agriculture land,
- Housing area,
- Forest area,
- Vegetable or fruit trees,
- Fisheries,
- Sources of income,
- Way of life or culture,
- Historical places,
- Archeological area

Afterward, plan for mitigation measure and affected asset redress are discussed. Significant activities before and after construction of the project were consulted. Certain issue, i.e. a possible plan for setting up the National Biodiversity Conservation Area (NCBA) in the watershed was informed.

3) Discussion and concerns from the participants:

- The secretary at the unit level of The Party. Chief of Ban Hatsamkhone proposed 4 issues: the compensation for affected assets; result of the survey for the potential resettlement site; selection of the resettlement site and the plan for occupation; life skills training for local labors
- A representative of Ban Pou: the replacement of the to be inundated agricultural land; possibility of the facility to support dry-season rice cultivation
- Chief of Ban Nakang: there are 2 households will be directly affected, what can be done to support the move of the household; transportation, demolishing of the house and supporting of utilities for the village?; someone who is not directly affected by the Project does not want to move out
- The secretary at unit level of The Party, Ban Phiengta: there will be can inundation of the access road to agricultural land, proposed the Project to build a small bridge.
- The secretary at unit level of The Party, Ban Pou: If there are resettlement and agricultural or asset compensation, will the same consultants conduct the study.
- Tan Counphan Phommachan, chief of the Thathom District, supported the voices of the villagers. He assured the public that if there is the resettlement, these

facilitees; access roads, school, community health center, village office, electricity, clean water and etc. will be put into consider.

4) Replying to the above concerns, by the consultants and Thathom Districts: Criteria of the compensation will be based on the "Regulation of the Resettlement and Compensation" issued by GOL. Practically, there will be a compensation committee comprise of representative at village level, district level, provincial level and related praties to finalize the criteria to be used. Moreover, the project developer is considering possible options to avoid any damage and avoid the need to resettle. For example, building a dike or barrage to block the water out of agricultural land consideration. All the proposed concerns will be recorded and proposed to the developers and concerned parties. At the next public consultation meeting at provincial level, these will also be discussed.

5) The meeting came to conclusion at 12:00 AM. Tan Bounphan Phommachan, chief of Thatom District gave a closing speech.

Thaviang, February 21, 2008

Bouanphan Phommachan

Chief of Thathom District

(Signed and Sealed)

2.5 Xieng Khoung Province (Thaviang sub-district, Thathom District)

Minute of the Second Public Consultation at District Level on July 2, 2008

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

Led by T an Thongpheng Oonyahuk, duputy chief of Thathom district and Tan Thoumma Xalermxay, head of WRE provincial office at Xieng Khouang, the meeting comprised of relevant district authorities and representatives of 4 a ffected villages: Ban Pou, Ban Hatsamkhone, Ban Piengta and Ban Nakang; and the consultants. In total there were 27 people in which 3 of those were women.

1) The meeting encouraged the Project to compensate the affected people resulting from the flooding at 320 m inline with the regulation 193/ Prime Minister Office (announced July, 07, 2006)

2) The affected villages; Ban Pou, Ban Hatsamkhone, Ban Piengta and Ban Nakang, proposed the Project to consider building the following infrastructure or activities for them:

   - Primary schools including their necessary components i.e. desks, chairs, blackboards and teaching materials
   - A secondary school including its necessary components i.e. desks, chairs, blackboards and teaching materials
   - Natural water pipe system with about 10-15 distributing unit in each village
   - Small or medium size local designed irrigation systems together with irrigation canals at Nam Pou, Nam Lae, Nam Bung, Nam Sai and Houay Kaba
   - Bridges over Nam Ngiep with the size that able to support the farming hand tractors for Ban Piengta and Ban Hatsamkhone
   - A 15 bed health center for Thaviang Sub-district and provide medical supplies for 8 years
   - Improve allay ways of each village into 4-6 meters width ways with gravel or laterite covered
   - Extend the existing electrical grid to cover every household of the villages
   - Compensate the lost of productive lands either by land for land, or by c ash according to the current market price
   - There is high possibility of flooding in some area outside the Project's pegging. The Project should revisit and conduct additional survey in Tung Lae and Tung Kai
   - Proposed the Project to support resettlement of Ban Nakang (currently under relocated by GOL government)
   - Set up oc cupational training i.e. handicraft, animal husbandry etc., set up village fund for the affected villages

3) The meeting proposed the setting up of a committee comprises of 3 di strict representatives, 7 sub-district representatives in order to oversee the proposal above and looking after the implementation of those. The project must provide the committee with an office in Thaviang also office supplies i.e. desks, chairs, storage shelves, a set of computer and printer, communication device and a motorcycle.

The description above concludes the proposals of the Project affected people in Thathom district. It was declared as a reference for consideration of the GOL at the next level and the developers to review, then, make decision and set up plans for the affected area.

ANNEX F

EMP SUB-PLANS

EMP sub-plans are proposed as guidelines for safety precautions during construction and for minimizing the environmental impact of the Project. These 17 EMP sub-plans include:

SP01. Erosion and sediment control

SP02. Spoil disposal

SP03. Quarry and construction layout management

SP04. Water quality monitoring

SP05. Chemical products and spillage management

SP06. Emergency plan for hazardous materials

SP07 Emission and dust control

SP08 Noise control

SP09 Cultural resources

SP10. Landscaping and revegetation

SP11. Vegetation clearing

SP12. Waste management and disposal

SP13. Environmental training for workers

SP14. Traffic and access

SP15. Unexploded ordnance (UXO) survey and disposal

SP16. Construction of work camps

SP17. Project personnel health program

1 EMP SUB-PLANS

SP01: EROSION AND SEDIMENT CONTROL

No.	Description of Measure
Design and implementation of erosion and sediment controls	
SP01.01	Erosion and Sediment Control Design Plans will be prepared prior to the commencement of works which will contain the following in greater detail: i. Conceptual design of erosion and sediment controls to be implemented on-site in accordance with the requirements of this sub-plan. ii. Water quality monitoring points in accordance with the requirements of SP04: Water Quality Monitoring (as required). Erosion and Sediment Control Plans will be included in the Environmental Management and Monitoring Plan prepared for each construction site.
SP01.02	The erosion and sediment control works will be implemented prior to the commencement of any construction works which may cause soil disturbance the site.
Measures to control erosion	
SP01.03	The extent of areas to be cleared will be minimized as far as deemed practical.
SP01.04	The use of existing cleared areas will be maximized.
SP01.05	Areas not required to be disturbed will be retained in their original condition.
SP01.06	'Sensitive erosion areas' are defined as follows: i. Areas with slopes > 30% ii. Areas within 30 m of a bank of a natural watercourse iii. Cut and fill slopes in areas of slope instability or erodible geology
SP01.07	The location of works in sensitive erosion areas will be minimized.
SP01.08	Where possible, works in sensitive erosion areas will be restricted to the dry season.
SP01.09	Clearing of sites will be undertaken in the same sequence as the initiation of construction sites in order to minimize disturbances.
Stockpile management measures	
SP01.10	Temporary topsoil stockpiles will be developed in accordance with the following: i. Stockpiles will be constructed with smooth slopes and free draining patterns. ii. Stockpiles will be located in existing cleared areas. iii. Stockpiles will be located at least 50 m from any watercourse or drainage line and not located in identified floodways. iv. Stockpiles will be deeply ripped to provide for moisture retention and re-growth. v. Stockpiles will be located on land with a gradient of < 20% vi. Stockpile height should not exceed 3 m and batter slopes will not exceed 1.5:1. The criteria may be evaluated considering the nature of the material. vii. In windy conditions, watering of stockpiles will be carried out if excessive dust generation is evident.

No.	Description of Measure
	viii. Diversion banks will be constructed uphill of stockpiles where there is a potential for run-off to erode the base of the stockpile. ix. Silt fences will be installed in between the stream and the stockpile to control runoff where necessary.
SP01.11	Topsoil spoil removed from the site will be piled and saved for the use of revegetation and eco-restoration activities.
SP01.12	Long term spoil placement sites will be managed in accordance with the requirements of SP2: Spoil Disposal.
Design specifications for erosion and sediment control	
SP01.13	All erosion and sediment controls will be designed to cater for a minimum of a 2 year ARI flood event.
SP01.14	Retention and preservation of existing vegetation along watercourses will be maximized to reduce flow velocities and act as a sediment filter.
SP01.15	'Clean' runoff from undisturbed areas will be diverted away from the construction site and into established watercourses.
SP01.16	Runoff from disturbed areas will be directed into sediment trapping or filtering devices.
SP01.17	Sediment trapping or filtering devices such as sediment fences, sediment basins or traps will be constructed to capture and treat sediment laden runoff from all disturbed areas.
SP01.18	Sediment collection devices (including sediment basins, silt fences and sediment traps) will be cleared when basin capacity is not more than 50% full of sediment. A marker will be installed in sediment collection basins to show when the basin is 50% full and requires emptying. Clearing out of the silt fence shall take place when they are 1/3 full of sediment; otherwise, replacement with functional silt fences shall occur within 24 hours.
SP01.19	Sediment collection devices will be sized to collect and treat run-off from the site as appropriate.
SP01.20	Water quality monitoring will be implemented, when necessary, as required to meet the requirements of SP04: Water Quality Monitoring. All discharge from sediment collection devices will pass through a vegetative or silt filter, prior to release to an established watercourse.
Maintenance and inspection of erosion and sediment controls	
SP01.21	All erosion and sediment controls will be visually inspected at least once a week during the dry season and every 24 hours during the wet season to ensure their ongoing effectiveness. Any required remediation or replacement works will be undertaken within 24 hours of detection.
SP01.22	At least one month prior to the anticipated commencement of the wet season, a review of the effectiveness and adequacy of the existing erosion and sediment controls will be made and any necessary modification and/or augmentation of controls carried out.

No.	Description of Measure
Revegetation of disturbed areas	
SP01.23	If construction works are temporarily stopped in an exposed area (for longer than 30 days), temporary stabilization of exposed surfaces will be undertaken.
Used of designated access roads	
SP01.24	Access to and within construction sites will be limited to designated access roads and internal haul roads.
Wastewater from tunneling works	
SP01.25	Wastewater generated during tunneling works – either from rain infiltration or groundwater seepage – will be treated in accordance with SP04: Water Quality Monitoring.

SP02: SPOIL DISPOSAL

No.	Description of Measure
Principles of spoil placement	
SP02.01	The spoil placement area will be developed in accordance with the following requirements: i. Constructed with smooth slopes and free draining patterns ii. Located in existing cleared areas, where practical iii. Stockpiles will be located as far as practical from any watercourse. iv. Located on land with a gradient of < 10% v. Height will not exceed 6 m and a 2 m berm will be provided at a height of approximately 3 m, and batter slopes will not exceed 1.5:1. This requirement may be re-evaluated considering the nature of the material. vi. Temporary seeding of stockpiles will be undertaken until the permanent revegetation works identified in SP10: Landscaping and Revegetation have been established. vii. In windy conditions, watering of stockpiles will be carried out if excessive dust generation is evident. viii. Diversion banks will be constructed uphill of stockpiles where there is a potential for run-off to erode the base of the stockpile. ix. Silt fences will be constructed downstream of stockpiles to control runoff. x. Spoil placement will not be located in identified floodways or flood storage areas.
Design of spoil disposal area	
SP02.02	All spoil from the PCA component of the works will be placed within the general boundaries of the spoil disposal area as identified in the relevant site specific plans. Spoil placement in other areas will not be permitted.
SP02.03	Prior to any placement of spoil, the detailed engineering design of the spoil disposal area will be completed. The design will provide details of the staged development of the spoil disposal area and will include details on the final landform to be achieved. The design will incorporate the following principles: i. Spoil placement activities will be contained within designated boundaries ii. Natural drainage patterns will be avoided where possible

No.	Description of Measure
	iii. Where natural drainage lines are affected, they will be reinstated following completion of the spoil placement iv. The final landform will be compatible with the existing and surrounding landforms and designed to minimize visual pollution
SP02.04	Prior to the placement of any spoil, an erosion and sediment control practice will be prepared for the spoil disposal area. The practice will be prepared in accordance with the requirements of SP01: Erosion and Sediment Control.
SP02.05	Boundaries of the spoil disposal area will be marked with temporary fencing or similar.
Transport of spoil	
SP02.06	Vehicles transporting spoil to the spoil disposal area will abide by the management measurements identified in SP14: On-site Traffic and Access Management.
Dust control	
SP02.07	Dust control measures will be implemented as identified in SP07: Emissions and Dust Control Plan.

SP03: QUARRY AND CONSTRUCTION LAYOUT MANAGEMENT

No.	Description of Measure
Detailed Site Layout Plan	
SP03.01	Prior to the commencement of any construction works, detailed site layout plans will be prepared for each site. The site layout plans will include details of the areas of disturbance for the activities and all infrastructure and equipment required for the activities, including erosion and sediment controls, and will be based on the following principles: - Clearing of vegetation will be minimized and the use of existing cleared areas will be maximized. - The separation distance between dust generating activities, construction camps and villages will be maximized as far as possible to reduce noise and dust impacts. - No components will be located within 30 m of a watercourse[1], and all construction work within 100 m of a watercourse will be minimized. In case the components need to be located within 30 m of the watercourse, appropriate environmental protection facilities must be provided. - All infrastructure and equipment will be sited to maximize screening from public vantage points.
Clearing and disposal of vegetation	
SP03.02	Clearing of vegetative groundcover will be restricted to that area required for test material excavation, internal access road development, establishment of the crushing plant and other required site infrastructure.

[1] As measured from the nearest bank.

No.	Description of Measure
SP03.03	All vegetation cleared from the sites will either be mulched on-site for re-use in landscaping or ground stabilization works, burnt on-site or disposed of in accordance with SP12: Waste Management. Any burning of vegetation on-site will be undertaken in accordance with the requirements of SP07: Emissions and Dust Control.
Topsoil management and erosion and sediment control	
SP03.04	Topsoil from the sites will be cleared and stockpiled for use in the final site rehabilitation activities.
SP03.05	Notwithstanding the requirements of SP01: Erosion and Sediment Control, sediment basins of adequate size to cater for all contaminated runoff from the site will be implemented at each of the sites where practical.
Quarry face stability	
SP03.06	The risk of quarry face instability and failure will be stabilized using appropriate methods such as: i. Implementation of slope drainage measures ii. Benching of slopes iii. De-scaling of excess material The proposed measures will be detailed in the site layout plan for the quarry.
Air quality management	
SP03.07	Dust suppression measures will be implemented on exposed areas during windy conditions, or when visual inspection indicates excessive dust generation. Dust suppression measures will be implemented in accordance with the requirements of SP07: Emissions and Dust Control, and will include watering of exposed surfaces and crusher operation
SP03.08	All construction vehicles and equipment will be maintained in accordance with the requirements of SP14: Traffic and Access.
SP03.09	Access to, from and within the sites will be along designated routes as required by SP14: On-Site Traffic and Access Management.
Internal access roads	
SP03.10	Internal access roads within the quarry sites will be designed in accordance with the requirements of SP14: Traffic and Access.
Waste management	
SP03.11	Waste from the sites will be managed in accordance with the requirements of SP12: Waste Management and Disposal.
SP03.12	An adequate number of pit latrine toilets will be provided at the sites for the use of construction personnel.
Noise and blasting controls	
SP03.13	Noise generated by activities at the sites will be managed in accordance with the requirements of SP08: Noise Control.

No.	Description of Measure
SP03.14	General construction works (excluding blasting) within a distance of 1km from villages and construction camps will be carried out between 06.00 and 18.00. Construction in all other areas may be undertaken 24 hours a day subject to suitable safety and lighting measures being implemented.
SP03.15	Blasting activities within a distance of 2 km from villages and construction camps will be carried out between 06.00 and 18.00. Blasting in all other areas may be undertaken 24 hours a day subject to suitable safety and lighting measures being implemented.
SP03.16	All construction personnel working in the vicinity of noisy construction activities (defined as those activities generating noise levels greater than 80 dB(A)), or any construction personnel who requests hearing protection, will be provided with hearing protection. Training will be provided to personnel in relation to the need for hearing protection to be used.
Water quality management	
SP03.17	Prior to release, effluent discharged from the crushing plant will be monitored in accordance with the requirements of SP4: Water Quality Monitoring.
SP03.18	Effluent from the sediment basins will be regularly monitored in accordance with the requirements of SP04: Water Quality Monitoring. Discharge will be immediately stopped if the quality is not conforming to the requirements.
Sub-camp construction	
SP03.19	The design of the construction work sub-camps will be carried out in accordance with the requirements of SP16: Construction Work Camps.
Use of quarry materials	
SP03.20	Materials, other than waste materials, which are sourced from the sites will only be used for the construction of the project.

SP04: WATER QUALITY MONITORING

No.	Description of Measure
Water quality monitoring schedule	
SP04.01	Water quality monitoring will be undertaken.
Water quality criteria	
SP04.02	The reasonable treatment, which is suited to site condition, will be implemented toward the target of the water quality criteria which are as set out in Annex C of CA (Appendix 2 - Standards). [the water quality criteria is under negotiation with GOL.]
Water quality monitoring locations	
SP04.03	The Erosion and Sediment Design Plans referred to in SP1: Erosion and Sediment Control will include details of upstream and downstream water quality monitoring locations.

No.	Description of Measure
	Upstream and downstream monitoring locations will be identified in accordance with Annex C of CA (Appendix 2 - Standards).
Notification of risks to humans or environment	
SP04.04	Based on the results of water quality monitoring, EMO will be notified within 48 hours of the discovery of a condition that could cause harm to humans or the environment.
Reporting requirements	
SP04.05	The results of water quality monitoring will be reported monthly.
Groundwater monitoring	
SP04.06	The presence of any groundwater wells or tube wells downstream of the waste disposal areas will be identified. If any wells are present, monthly monitoring of fecal coliform levels will be undertaken and reported in accordance with the above requirements.

SP05: CHEMICAL PRODUCTS AND SPILLAGE MANAGEMENT

No.	Description of Measure
SP05.01	Safe Storage & Handling for Explosives - Explosives will be stored in facilities located underground or sufficiently protected by bunding and will be located close to areas for use, where possible. - Site storage facilities will be kept locked, and access limited to authorized staff. The facilities will be located at least 50 m from camps. A log book at each facility will register movements of explosives (e.g., quantity, name of user and date). - Explosive boxes will be labelled with an "explosive sign", and explosive sign posters will be dispatched at each site storage facility. Fire fighting equipment will be kept available next to each storage facility.
Prevention of Pollution by Hazardous Materials (HazMat)	
SP05.02	Selection of safer chemical types - Chemicals to be stored and used on any construction site will be selected, where possible, in accordance with general best practices and recommendations for environmental conservation. - Pesticides for vector control (i.e., mosquitoes) and for vegetation control will be selected in accordance with the list of recommended pesticides provided by ESD.
SP05.03	Storage of Hazardous Materials - All fuels and oils are stored in a 6 m container that has a full perimeter bund 500 mm deep. The volume of the bund is in excess of 110% of the volume of the largest single container within the bund. Diesel is stored in a 2,000 L maximum storage tank within the container. Waste oil within the container is stored in a 1,000 L tank. Bunding is to be designed and constructed as per best practice guidelines. - All areas which pertain to the storage or the use of hazardous materials (e.g., workshops, garages and storage areas) should have their storm water drained and collected in hydrocarbon separator basins/pits before discharge. - Acids, coagulants and flocculants are all stored within a separate container that may comprise the water treatment facility. A similar bund is constructed around the perimeter to contain a spill if it were to take place. Acids are also stored at batching

No.	Description of Measure
	plant sites where they are used to buffer plant effluents before discharge in a stream. - Shotcrete accelerators, chemical resins and cement grouts will be stored together and will be protected from the weather. The storage location will be within a safe area of the sites; as such, any spill would be easily contained and not be affected by flooding occurrence. - Waste oil and other liquid hazardous materials waste will be collected by a liquid waste removal tanker and will be disposed of at a safe temporary disposal area for hazardous waste, as described in SP12: Waste Management.
SP05.04	Registration of Hazardous Materials - All chemicals and waste considered as potentially hazardous materials will be registered in order to follow up type, quantities stored, quantities used or generated. Movements from storage and to waste disposal site will be registered. Information will be logged in a register, which will be available in each hazardous materials storage area. - A register of fuel dispensed will be kept along with the records of fuel deliveries in order to reconcile the quantities used.
SP05.05	Labelling of Hazardous Materials Containers of hazardous chemical or waste must be labelled with: i. the words "Hazardous Waste" ii. name of the CC user or generator iii. the date of storage of the chemical, or initial date that waste accumulation began in the container iv. the name of the material and its physical state (solid or liquid) v. the hazard characteristics of the waste (ignitable, corrosive, toxic, reactive) vi. main danger for user (poison, burning, dangerous for eyes, skin, lungs, etc)
SP05.06	Handling Safety Procedures and Personal Protective Equipment Safety procedures applicable to the handling and use of hazardous materials will be established and become a part of the training program. Safety rules will be translated in Lao languages and printed on posters to be posted on the walls of the dedicated buildings where hazardous materials are to be used. Personal protective equipment (PPE) will be provided to concerned workers and the use of such equipment will be enforced.
SP05.07	Refuelling procedures All refuelling of heavy equipment and machinery will be undertaken by a service vehicle, with appropriate safeguards and protection measures to prevent any spillage or contamination by chemical wastes or maintenance oils, lubricants etc. Appropriate service vehicles are dedicated to the refuelling of heavy equipment and machinery. Safety procedures regarding fire and accidental spill management are posted on-site. "No Smoking" labels and posters will be placed wherever fuel is handled or stored.
SP05.08	Spill Response Kits Spill response kits will be used to contain any ground spills that may occur as a result of servicing or through other means. The spill response kits will be located at the workshop(s) where the servicing will take place and also at the refuelling point(s). All personnel involved with refuelling and with the servicing of equipment will be familiar with the use of the spill response kits and will be trained in the emergency procedures as described in the Emergency Response for Hazardous Materials Sub Plan.

No.	Description of Measure
SP05.09	Selection, Handling & Application of Pesticides Pesticides for vector control (mosquitoes) and for vegetation control will be utilized in accordance with: i. Authorized pesticides, in accordance with the list approved by ESD ii. Labelling and storage of pesticides, which will satisfy measures SP05.3, SP05.4 and SP05.5 of this sub-plan iii. The translation of all information related to toxicity of pesticides, including user instructions, to commonly used Lao language(s) Safe handling of pesticides will rely on training users; specific training programs and supporting communication materials will be supplied for this purpose.

SP06: EMERGENCY PLAN FOR HAZARDOUS MATERIALS

No.	Description of Measure
Storage of hazardous materials	
SP06.01	Hazardous materials will be stored on-site in accordance with the requirements of SP05: Chemical Products and Spillage Management.
Spill response procedures	
SP06.02	In the event of a spill of any hazardous material, work will be ceased in the immediate vicinity and the area will be cleared of all construction personnel except those involved in the clean-up activities, if necessary.
SP06.03	In the event of a spill of any hazardous material, the following response hierarchy will apply and will be used in the development of the detailed emergency response procedures: i. First priority is to seek medical attention for any injured personnel ii. Second priority is to prevent further injury to personnel iii. Third priority is to prevent environmental damage iv. Fourth priority is to clean-up spill v. Fifth priority is to remediate area of spill vi. Sixth priority is to complete reporting requirements
SP06.04	For spills of hazardous materials, appropriate treatment and disposal methods for the known range of hazardous materials will be applied by trained personnel.
Emergency contact details	
SP06.05	At each construction site, information on emergency response procedures, emergency contact numbers and communication and reporting procedures (to be implemented in case of an emergency situation) will be clearly displayed.
Training of personnel	
SP06.06	At each construction site where hazardous materials are used and where there exists a potential for a spill, there will be at least two employees on-site at all times who are trained in appropriate emergency response procedures and communication and reporting procedures to be implemented in case of an incident (refer to SP13: Environmental Training for Workers Plan).

No.	Description of Measure
SP06.07	All construction personnel will be trained in basic emergency response procedures including communication and reporting procedures to be implemented in case of an emergency situation.
Emergency incident communication processes	
SP06.08	In the event of an accidental release or spill of a hazardous material, the following communication processes will be implemented: i. ESD immediately notifies EMU and other relevant agencies ii. ESD immediately notifies emergency response team iii. ESD immediately notifies external emergency authorities (if required) Communication will initially be verbal, with written communication as soon as practical.
SP06.09	The communication processes identified in SP06.12 will include the following information in relation to accidental releases or spills: i. Location of spill ii. Nature of material spilt iii. Amount of material spilt iv. Clean-up processes to be implemented v. Any injuries to personnel vi. Need for emergency or external assistant vii. Any safety/evacuation requirements to be implemented on the construction site
SP06.10	Within 48 hours of the completion of a spill clean-up, a report will be submitted to the Owner. The report will be used to identify any required corrective or preventive actions and emergency response procedures and training programs will be modified accordingly.

SP07: EMISSIONS AND DUST CONTROL

No.	Description of Measure
Minimization of dust generation	
SP07.01	All vehicle movements will be confined to designated access routes and haul roads.
SP07.02	Management of short term and long term material stockpiles will be carried out in accordance with the requirements of SP1: Erosion and Sediment Control.
Dust suppression measures	
SP07.03	Watering of exposed surfaces will be implemented in the following situations: i. During windy conditions ii. When visual inspection indicates excessive dust generation iii. When dust generating activities are being carried out within 100 m of a village or construction work camp iv. During period of heavy traffic use on unsealed haul roads v. In response to complaints by external parties
SP07.04	If high dust levels are evident in the vicinity of the crushing plant on a regular basis within the first three (3) months of the construction works, water sprayers will be installed on the plant if feasible.

No.	Description of Measure
Vehicle maintenance	
SP07.05	A maintenance program for the construction vehicle fleet will be implemented which will include consideration of the following issues: i. General condition and safety of vehicles ii. Check of vehicle brakes and tires iii. Vehicle exhaust emissions (no visible fumes for > 10 seconds) iv. Vehicle noise emissions Each construction vehicle in the fleet will be inspected at least every 6 months and a written certificate provided by a qualified mechanic as to its fitness for service (refer to SP14: Traffic and Access Management).
SP07.06 Burning of waste	
SP07.07	The burning of waste materials will only take place under the following conditions: i. Only those materials identified as Group A1 waste (namely, combustible solid waste) in SP12: Waste Management will be burnt. ii. Burning will only be undertaken in the presence of a trained fire protection officer. iii. Prior to any burning, the ESD will be notified. iv. Burning will not be undertaken during severe wind conditions v. Appropriate fire protection equipment will be available on-site during the burn. vi. Burning will be undertaken at a safe distance from vegetated areas. vii. Burning will not be undertaken within 1 km of a village. viii. Following completion of the burn, the trained fire protection officer will inspect and certify that the fire has been extinguished
Odor control	
SP07.08	Measures to reduce odor from the waste disposal area will be implemented in accordance with the requirements of SP12: Waste Management.

SP08: NOISE CONTROL

No.	Description of Measure
Minimize noise generation at source	
SP08.01	For any particular construction activity, the quietest vehicles and/or equipment which are suitable for use for the construction activity will be selected for use.
SP08.02	All equipment and vehicles will be maintained in good mechanical condition and will be fitted with appropriate silencers, mufflers or acoustic covers.
SP08.03	Construction equipment and vehicles will be subjected to regular inspections to check noise emissions and noise control equipment in accordance with the requirements of SP14: Traffic and Access.
Reduce transmission of noise to receivers	
SP08.04	Stationary noise sources will be sited as far as possible from villages, construction camps and settlement areas.

No.	Description of Measure
SP08.05	Where possible, topographic features will be used to provide shielding between stationary noise sources and villages and construction camps.
SP08.06	All construction personnel working in the vicinity of noisy construction activities (defined as those activities generating noise levels greater than 80 dB(A)), or any construction personnel who requests hearing protection, will be provided with hearing protection. Training will be provided to personnel in relation to the need for hearing protection to be used.
SP08.07	No construction worker will be exposed to noise levels of 80 dB(A) or above for more than 8 hours within any 24 hour period.
Construction hours	
SP08.08	General construction works (excluding blasting) within a distance of 1km from villages or construction camps will be carried out between 06.00 and 18.00. Construction in all other areas may be undertaken 24 hours a day subject to suitable safety and lighting measures being implemented.
SP08.09	Blasting activities within a distance of 2 km from villages or construction camps will be carried out between 06.00 and 18.00. Residents will be provided with at least 24 hours notice that blasting is to take place and given information on the likely timing and number of blasts. Blasting in all other areas may be undertaken 24 hours a day subject to suitable safety and lighting measures being implemented.
SP08.010	The movement of vehicles to and from the construction site and within the construction site will only take place subject to the restrictions identified in SP8.08.
Response to complaints about noise generation	
SP08.011	If complaints are received about excessive noise levels in the vicinity of villages, the ESD will consult with the complainant to identify appropriate additional mitigation measures (e.g. additional shielding, change of equipment type, restriction of construction hours in particular area) to be implemented.
SP08.012	Monthly reports will be prepared identifying any complaints received in relation to construction noise and documenting the actions that were undertaken to resolve such complaints.

SP09: CULTURAL RESOURCES

No.	Description of Measure
Avoid impacts on significant cave network	
SP09.01	Construction activities will be undertaken in such a manner as to avoid any physical effect on known sites of cultural or religious significance.
Definition of physical cultural resources	
SP09.02	Physical cultural resources will be defined as:

No.	Description of Measure
	i. remains left by previous human inhabitants (e.g., shrines) ii. unique natural environmental features
Training of construction workers	
SP09.03	Staff in the ESD will be trained to identify potential sites or items of cultural significance. Construction workers will be trained in the appropriate reporting and communication procedures to be followed if they identify any potential sites or items and the importance of implementing these procedures.
Steps to be implemented if sites identified	
SP09.04	The following steps will be implemented to protect any previously unidentified sites of potential cultural significance: i. If a construction worker identifies a potential site or item of cultural significance, he/she will immediately notify the ESD. ii. The ESD will determine whether the site/item has potential significance iii. If the site/item is considered to have significance, the ESD will immediately cease work within a 50 m radius of the site iv. The ESD will immediately notify the Project Developer, Contractor, and any relevant government agencies v. The ESD will notify the Owner of the potential site as soon as practical vi. The report will be completed within 24 hours of a potential site being identified.
SP09.05	Temporary fencing or similar will be used to mark a 50 m radius from the site.
Directions from Owner	
SP09.06	No work will be carried out within a 50 m radius of a potential site until directed by the ESD.
SP09.07	Any directions or requirements from the ESD in relation to measures to protect the site will be recorded and communicated by the ESD to the construction workforce. All such requirements will be strictly adhered to.

SP10: LANDSCAPING AND REVEGETATION

No.	Description of Measure
Progressive revegetation of sites	
SP10.01	All disturbed areas will be progressively revegetated using temporary and/or permanent revegetation methods.
Species list to be prepared	
SP10.02	A qualified horticulturist will develop a species list to be used for temporary and permanent revegetation works.
Collection and storage of seeds and seedlings	
SP10.03	During the construction activities, collection of seeds and seedlings of plant species to be

No.	Description of Measure
	used in the permanent revegetation works will be carried out. Seeds and seedlings will be maintained and stored in suitable conditions until required for use in the revegetation works. Horticultural advice will be sought on suitable propagation and storage methods.
Temporary revegetation works	
SP10.04	Temporary revegetation methods will be used i. when the disturbed area will be subject to further disturbance(s) at some time in the construction works ii. when the disturbed area will be permanently revegetated in the future but wherein permanent works cannot be undertaken immediately (i.e., prior to commencement of wet season or unsuitable growing conditions) iii. when the disturbed area subject to revegetation is small and/or will be easily revegetated by natural processes iv. in areas where construction works are temporarily stopped for more than 30 days
SP10.05	Temporary revegetation works will involve seeding of disturbed areas using fast-growing, sterile grass species as defined in the species list. Hand or mechanical seeding methods will be used depending on the size of the area to be covered. The seeded area will be covered with weed-free, locally obtained straw or similar mulching product to enhance seed growth. Adequate watering will be applied to the seeded areas to enhance seed growth.
SP10.06	One month after the completion of temporary revegetation of a disturbed area, a visual inspection of the effectiveness of seeding will be carried out. If seeding of the area has been unsuccessful (i.e., continued erosion or lack of growth), the problem should be addressed by undertaking a newer, subsequent seeding process.
Permanent revegetation works	
SP10.07	Permanent revegetation will be used: i. When the area to be revegetated will not be disturbed by future construction activities ii. When the area to be revegetated is not identified for use as agricultural land use
SP10.08	Permanent revegetation will involve the following steps: i. Reinstatement of original land contours and drainage patterns, including filling of local depressions ii. Temporary fencing of area to be revegetated iii. Removal of weeds and/or temporary seeded vegetation using manual methods or herbicides iv. Spread topsoil taken from site during clearing activities v. Establish under-storey and over-storey vegetation using a combination of manual and mechanical planting methods vi. Application of mulch and fertilizers to enhance growth vii. Watering of vegetation as required to enhance growth
SP10.09	Fencing will be maintained around the area of permanent revegetation to exclude people and animals until the vegetation is well established and construction works in the immediate vicinity of the area have ceased.
SP10.10	At monthly intervals for the first 12 months and thereafter at quarterly or 3 month intervals, visual inspection of the revegetated areas will be undertaken to evaluate the condition of the

No.	Description of Measure
	vegetation. Based on the results of the inspection, appropriate maintenance activities will be identified and implemented. If necessary, a horticulturist or botanist will be consulted to identify suitable maintenance activities.
Avoidance of weed spread	
SP10.11	To avoid the spread of non-endemic species between different areas of the construction site, topsoil and vegetation (for mulching) removed from an area during site-clearing activities will—as far as practical—only be reused on that area.
Restoration of other land uses	
SP10.12	Land that was used for agricultural activities prior to disturbance from construction activities will be restored to a condition that will allow the agricultural land use to continue. This will include, as necessary: i. Re-spreading of topsoil ii. Installation of drains, channels, etc. iii. Erection of fencing or other structures

SP11: VEGETATION CLEARING

No.	Description of Measure
Identification of vegetation to be cleared	
SP11.01	The plan will be prepared including: i. Mapped boundaries of vegetation to be cleared, including identification of which clearing will be undertaken by the Forestry Department and which will be undertaken by the project. ii. Any areas of 'sensitive vegetation' located on-site which require specific protection (e.g. vegetation adjoining drainage channels). iii. Any required temporary timber storage sites for placing prior to its removal from site.
SP11.02	No clearing of vegetation outside of those areas identified in the plans will take place.
SP11.03	Where possible, corridors or tracts of vegetation will be left intact to form connections to larger areas of un-cleared vegetation to allow dispersal of fauna during clearing activities.
SP11.04	All areas of vegetation to be cleared and the boundaries of 'sensitive vegetation' areas will be marked with temporary fencing or similar (using different colors or types for each).
SP11.05	No construction works, storage of materials/equipment or access by construction personnel will be permitted in 'sensitive vegetation' areas.
Clearing methods	
SP11.06	Vegetation clearing will be undertaken by a combination of manual, mechanical and chemical methods, in accordance with the following principles: i. No chemical clearing methods (i.e., use of herbicides or defoliants) will be used within 50 m of any areas of vegetation not to be cleared, including areas of

No.	Description of Measure
	'sensitive vegetation' ii. No mechanical clearing methods (i.e., bulldozers or other equipment) will be allowed within 5 m of an area of 'sensitive vegetation'
SP11.07	Burning will not be used as a clearing method and burning of waste vegetation will only take place in accordance with the requirements of SP7: Dust and Emissions Control.
Use of herbicides	
SP11.08	Herbicide use and management will be undertaken in accordance with the requirements of SP05: Chemical Use and Management.
Tree cutting	
SP11.09	Only authorized agents will be permitted to cut trees.
Storage and disposal of timber products	
SP11.10	Any required temporary timber storage sites will be designed to ensure that they are stable and protected from the risk of fire.
SP11.11	Timber products that are not to be removed from site will be disposed of in accordance with the Forestry Department guidelines and the requirements of SP12: Waste Management and Disposal.
Impacts on agricultural land use	
SP11.12	All works will be designed and implemented in a manner that minimizes the impact on agricultural land use.

SP12: WASTE MANAGEMENT AND DISPOSAL

No.	Description of Measure
General requirements	
SP12.01	A sufficient number of containers or similar disposal receptacles will be made available at each construction site.
SP12.02	The containers (or similar disposal receptacles) will be marked clearly for "Hazardous Waste" and for "Non-Hazardous Waste" for separation and sorting of waste.
Hazardous waste disposal	
SP12.03	Hazardous waste will be disposed of according to the most appropriate and practical best practices.
Non-hazardous waste disposal	
SP12.04	Non-hazardous waste will be burned, if conforming to SP07 Emission and Dust Control, or collected regularly and transported to a designated waste disposal site, whichever is more

No.	Description of Measure
	appropriate.
SP12.05	When designated waste disposal areas are full or no longer used, they will be covered by soil at the appropriate depth from the ground surface.
Training of workers	
SP12.06	All workers responsible for handling hazardous waste will receive appropriate training in accordance with SP13: Environmental Training for Workers.

SP13: ENVIRONMENTAL TRAINING FOR WORKERS

No.	Description of Measure
SP13.01	All workers will complete the environmental training programs.
SP13.02	Where necessary, participants in job-specific training will be identified on the basis of their skills and capacity to undertake the training.
SP13.03	All training sessions will be conducted in Lao language for Lao personnel and as appropriate for foreign staff. All written materials will be provided in Lao language and other languages as appropriate.
SP13.04	A training register will be maintained that will contain details of the following: i. Name of training session ii. Date of training session iii. List of attendees and signatures iv. Name of trainer
SP13.05	Upon completion of each relevant training course, each participant will be issued with a certificate of successful completion. A copy of the certificate will also be placed on each participant's employment file.
SP13.06	The ESD will implement a rolling program of refresher courses in environmental, health and safety awareness issues through the use of 'tool-box' sessions at construction sites. The program will aim to visit every construction site for a 2-hour session at least one time within a 6-month period.
SP13.07	During audits of the construction areas, workers' knowledge of environmental, health and safety issues will be examined.
SP13.08	Workers who have undergone job-specific training will be examined every 6 months in relation to their knowledge and skills and are subject to re-training as required. Records of examination results and any re-training will be kept as part of the training register.
SP13.09	All new employees will complete relevant training prior to commencement of any activities on the construction site.
SP13.10	The key messages from the training sessions will be produced in both poster and leaflet form, in Lao and English language. Posters will be displayed prominently in construction work camps and construction areas and leaflets will be distributed to staff on a regular basis.

SP14: TRAFFIC AND ACCESS

No.	Description of Measure
Road signage and speed limits	
SP14.01	All roads within the construction area will be signposted with the following information in Lao and English: i. Speed limit ii. Any applicable load limit iii. Road features that may affect driving conditions (i.e., crests, hidden accesses, etc.) iv. Identification of road v. Direction to construction areas
SP14.02	Traffic speed regulation devices, such as speed humps, and signage will be installed at sensitive locations including in the vicinity of villages, construction camps and at busy intersections.
Maintenance of construction vehicles	
SP14.03	A maintenance program for the construction vehicle fleet will be implemented which will include consideration of the following issues: i. General condition and safety of vehicles ii. Check of vehicle brakes and tires iii. Vehicle exhaust emissions iv. Vehicle noise emissions and noise control measures Each construction vehicle in the fleet will be inspected at least every 6 months and a written certificate provided by a qualified mechanic as to its fitness for service.
Traffic movements on internal roads	
SP14.04	Visual inspection of traffic movements within the construction area will be carried out. If there is evidence that traffic congestion is occurring on the roads, appropriate management measures will be implemented.
SP14.05	Movement of construction vehicles and traffic on-site will be confined to the designated access road network. No movement of vehicles outside the designated access road network will be permitted.
Traffic movements on public roads	
SP14.06	Prior to the movement of special loads on public roads, including hazardous materials or large items of construction equipment, the ESD will be notified. All reasonable and practical measures required by the ESD will be implemented to ensure that the risk of harm to the community and environment is minimized during transportation of special loads.
SP14.07	Construction activities that use public and internal roads should be marked by safety fencing and appropriate warning signs in Lao and English.
Site access	
SP14.08	Access to the construction site will be controlled as detailed in the Site Security Plan.
Training	

No.	Description of Measure
SP14.09	Safety issues and regulations regarding traffic and site access will be included in the training plan for construction personnel (refer to SP13: Environmental Training for Workers).
Borrowed areas for road construction	
SP14.10	Any borrowed areas that are required to be developed for the road construction works will be subject to evaluation using the Rapid Assessment Checklist. The ESD will approve the location of any identified borrowed areas prior to their establishment.
SP14.11	Notwithstanding the above, material for construction of the roads should utilize construction spoil if possible.

SP15: UNEXPLODED ORDNANCE (UXO) SURVEY AND DISPOSAL

No.	Description of Measure
Appropriately qualified organisation to undertake work	
SP15.01	An appropriately qualified organization will be engaged to undertake survey and disposal of UXO in areas where project activity are to take place, prior to the commencement of any construction works on-site.
Planning for survey and disposal work	
SP15.02	The organization engaged to carry out the UXO survey and disposal works will submit the following information to the contractor prior to the commencement of survey or disposal works: i. Mapping showing confirmation of area to be subject to UXO survey and disposal ii. Detailed methodology of survey and disposal works including shallow and deep search methodologies iii. Schedule of works consistent with schedule of construction works iv. Quality Control (QC) Plan for the survey and disposal works v. Occupational Health and Safety (OH&S) Plan for the survey and disposal works addressing inclusion of medical staff and facilities as part of the project team and procedures for emergency evacuation from the project site vi. Staff Training Plan for the survey and disposal works
Vegetation clearing for UXO works	
SP15.03	Vegetation clearing required for the UXO survey activities will be undertaken in accordance with the requirements of SP11: Vegetation Clearing Management.
Requirements for survey and disposal	
SP15.04	The first priority method for disposal of UXO should be in-situ explosion. Where this is not possible, due to potential danger to personnel or nearby population or damage to infrastructure, alternative proven methods of disposal may be implemented.
SP15.05	Where disposal of UXO may cause physical damage to infrastructure, protective measures such as sandbagging, burial and trenching will be undertaken.

No.	Description of Measure
SP15.06	Storage and handling of explosives will be undertaken in accordance with the requirements of SP05: Chemical Waste/Spillage Management.
Marking of cleared areas and clearance reports	
SP15.07	All cleared areas will be semi-permanently marked with concrete posts or similar. Within 14 days of completion of the clearing work at a site, a clearance report will be prepared and will contain the following information: i. Description (using GPS coordinate system or similar) and mapping of boundaries of the cleared area – area identifiers will be in keeping with the overall identification process used for engineering design drawings ii. Description of the survey, disposal and QC processes that were implemented on the site iii. Description of UXO located, UXO destroyed and amount of scrap metal recovered iv. Report of any medical or environmental incidents occurring during site clearance v. Certification that the area has been cleared of UXO and is suitable for its intended purpose
Construction worker training	
SP15.08	As part of the construction worker training program contained in SP13: Environmental Training for Workers, construction workers will be trained in the potential risks associated with disturbance of UXO and procedures to be followed if potential items of UXO are identified during construction activities.
Notification of local communities	
SP15.09	A UXO consultation and notification program will be implemented in communities that are located in the vicinity of survey and disposal works at the time that the survey and disposal works are being undertaken. The UXO Awareness program will include the following: i.Consultation with local communities regarding the purpose and process of the proposed survey and disposal activities prior to the commencement of works. ii. Notification of local communities of the commencement and likely duration of UXO disposal activities in their area and any likely precautions that should be taken. iii. Information to communities about the location of cleared areas and the meaning of the cleared area markings or signage (i.e., the delineation between cleared and un-surveyed areas).
Reporting requirements	
SP15.10	Biannual reports will be prepared which contain the following information about activities during the period: i. Summary of all survey activities – areas, methods etc. ii. Summary of all clearing activities – UXO located, UXO destroyed etc iii. Summary of QC and OH&S Plan activities iv. Identification of all certified cleared areas v. Report of any medical or environmental incidents occurring vi. Summary of UXO awareness training activities carried out in local communities

SP16: CONSTRUCTION WORK CAMPS

No.	Description of Measure
Use of camps	
SP16.01	All workers who are based on the construction site will be accommodated by one of the construction camps.
SP16.02	Appropriate sanitation facilities will be installed in accordance with SP04: Water Quality Management.
Disease control, health and safety issues	
SP16.03	Buildings in Residence camps and sub-camps will be made 'mosquito-proof' as far as possible through ensuring adequate sealing of doors and windows, provision of suitable ventilation and as necessary, installing mosquito-nets and other prevention devices.
SP16.04	Medical, sanitary and disease prevention measures for each camp will be implemented in accordance with the requirements of SP17: Project Personnel Health Program.
SP16.05	Pesticide use in the camps and sub-camps will be carried out in accordance with the requirements of SP17: Project Personnel Health Program.
SP16.06	Waste generated at the construction camps will be managed in accordance with the requirements of SP12: Waste Management.
SP16.07	Construction workers will be trained in health and safety issues relating to the camps in accordance with the requirements of SP13: Environmental Training for Workers.
Camp access	
SP16.08	Access to construction camps will be controlled in accordance with the requirements of the Site Security Plan. In general, access to the camps will be restricted to construction workers and visitors with an authorized access pass.
Potable water supply	
SP16.09	All potable water storage facilities will be secured, with access limited to authorized personnel. Local rivers will be used as the source of the potable water supply. The intake for the potable water storage will be located a suitable distance upstream of any wastewater discharge point.
SP16.10	Water quality monitoring of the potable water storage in camps and sub-camps will be carried out in accordance with the requirements of SP04: Water Quality Monitoring.
Camp rules and regulations	
SP16.11	A set of rules and regulations applicable to camps and sub-camps will be developed. The rules and regulations will include: i. Prohibitions on hunting and poaching of wildlife, purchasing wildlife meat, fishing, gathering and harvesting medicinal or valued plants and trees, and possessing firearms, snares, traps and other hunting equipment ii. Access restrictions for non-construction personnel iii. Housecleaning and waste management requirements iv. Prohibitions v. Measures for preserving health and the dissemination of vectors and transmissible

No.	Description of Measure
	diseases
SP16.12	Residents of the camps shall be provided with written information and training on camp rules and regulations. Camp rules and regulations will be prominently displayed in the camp areas.

PROJECT PERSONNEL HEALTH PROGRAM

No.	Description of Measure
SP17.01	The "Health and Safety Manual" will be distributed to the personnel attending health and safety training in the language used by the workers during trainings. It contains the following contents: Health: i Anti malaria precautions ii Precautions for HIV / AIDS and other venereal diseases iii Diarrhea precautions iv Symptoms of other diseases typical of the area (such as dengue fever) v Recommendations regarding proper disposal of all wastes vi Use of proper drinking water vii Use of appropriate toilets Safety: i Use of Personal Protective Equipment (PPE) ii Use of specific equipment according to the safety procedures iii Use of appropriate clothing iv Use of appropriate ladders v Use of appropriate slinging vi Attention to signals of danger vii Attention to suspended weights viii Attention to unprotected pits ix Attention to buried cables x Attention to overhead power cables xi Attention to all flammable items xii Procedure for fire extinguishing xiii Miscellaneous safety issues
SP17.02	First aid teams will be specifically trained and assigned in groups of two to three persons to the different sites
SP17.03	Medical facilities, including items such as First Aid kits and bedding for patients, should be provided.
SP17.04	A doctor should be reached when an accident occurs.
SP17.05	In the event of a spill of any hazardous material, actions and responses will be taken according to SP06: Emergency Plan for Hazardous Materials.
SP17.06	Vector control of mosquitoes and other pests will be managed according to the following actions: i Effective storm water drainage systems implemented to avoid stagnant water ii Storm water drains and borrow pits will be kept free of vegetation iii Minimizing the presence stagnant water within containers and other pools of water iv Removal of discarded items that could contain water (see iii above)

No.	Description of Measure
	v Providing mosquito nets to buildings vi Safe application of pesticides when necessary
SP17.07	Solid waste that might attract pests such as domestic rubbish and food waste shall be managed properly.
SP17.08	The water supply and sewage system, especially in camp sites, will be maintained in good working condition through regular monitoring according to the required standards.
SP17.09	The use of pesticides to control pests will be limited to only those cases deemed necessary. Selection of the appropriate pesticide will happen according to the following requirements: i The pesticide should have negligible adverse human health effects. ii The pesticide should be effective against target species. iii The pesticide should have minimal effect on non-target species and the natural environment. iv The pesticide should be safe for the personnel applying them, as well as for inhabitants and domestic animals. Use and handling of pesticides will occur with observance of the appropriate rules and regulations.