under the technical and financial assistance from foreign countries and international organizations such as JICA, WHO and UNICEF.

Provincial WES in Champasak has 16 staff including 8 staff for Rural Clean Water Supply Sub-Section and 3 staff for Environmental Sanitation Sub-Section as shown in Figures 3.3.6a and 3.3.6b. Provincial WES in Saravan Province has 14 staff including 9 staff for Rural Clean Water Supply Sub-Section and 3 staff for Environmental Sanitation Sub-Section.

District Public Health Office is delivering medical services and health promotion and preventive services in each District. Organization chart of District Public Health office is presented in Figure 3.3.6c. Medical services are provided through a District Hospital and 22 Dispensaries located at Sub-District level. Health promotion and preventive services include rural water supply and sanitation, malaria control, mother and child care, and tuberclosis control. Each District Public Health Office has some WES staff, of which only one or two staff is responsible for rural water supply. Activities for rural water supply at District level is limited due to lack of staff and equipment.

(3) Budget for Provincial Health Departments

Annual budget of Public Health Department Office in Saravan Province was K 289.4 million in 1994 fiscal year (from October 1993 to September 1994) which was increased to Kip 472.8 million in fiscal year 1995. The 1995 budget consists of Kip 230.25 million for the Provincial Office and Kip 242.59 for 8 District offices. The budget for Provincial office includes Kip 1.5 million of the administration cost for water supply and sanitation program which will be used for transportation, per diem, and other allowances.

Annual budget of Public Health Department Office in Champasak Province increased from Kip 496 million in 1994 fiscal year to Kip 1,025 million in fiscal year 1995. The main reason for the increase is due to doubled increase in salary of staff. The 1995 budget consists of Kip 607.57 million for salary, Kip 50 million for the administration, Kip 107.58 for basic construction and the remaining for other expenses such as purchase of medicine, repair and purchase of equipment and social welfare. The administration cost includes Kip 2.5 million for water supply and sanitation activities which will be used for transportation, per diem, and other allowances.

Budget for Champasak and Saravan PHDs are tabulated in Tables 3.3.6e and 3.3.6f.

3.4 Present Water Supply in the Villages

3.4.1 Water Service Level

The Village Survey conducted by the Study Team in April, 1994 indicated that about 80% of the villagers in the Study Area (200 villages) obtain water from traditional sources such as river, springs, ponds and shallow dug well which are often unreliable and polluted. There is only one piped water supply system at Laongam town, supplying water without treatment for 237 households. It is estimated that the coverage for tube well with hand pump is 17% in Champasak Province and 19% in Saravan Provinces. Present water source situation in Champasak and

Saravan Provinces is presented in Figures 3.4.1a and 3.4.1b. Present water source situation by District is presented in Figure 3.4.1c.

Users of river water alone accounted for 58% in Champasak Province and 66% in Saravan Province. The Xedong river and its tributaries are mostly utilized in both two provinces. The Xedon river is effluent and usable all the year round, however, it becomes turbid in the rainy season. Its tributaries are intermittent and dry up in the dry season. The Mekong river is also utilized for domestic water in several villages in Champasak province.

Use of river and spring are found in Bachian district of Champasak province and Lao-ngam district of Saravan province. These disticts are located in the western Basaltic slope of the Boloven Plateau where the tributaries of the Xedon river originate. Many springs are found in the valley.

Several villages are utilizing the pond as a main water source although combined with other water sources such as river, dug well and tube well with hand pump. However, water supply of 2 villages, namely B.Bak and B.Samkhanaboua mainly rely on pond though they have several tube wells with Lucky hand pumps. Three villages are utilizing canal water combined with use of hand pump wells. Combined use of surface water and groundwater is found in many villages.

Groundwater is being utilized by means of dug well and tube well. The dug wells, generally less than 10 m in depth, are consturcted by digging. Diameters of dug wells are usually 0.5 to 2 m. The dug well is lined with a casing of wood staves, brick or concrete. Most of dug wells, however, have either no casing nor concrete seal and well cover. Generally, hand pump is not installed. Some of dug wells are no more than irregular hole in the ground. Many holes are found in the river bed where river water dries up in the dry season.

Tube wells are constructed by drilling. Depth of these wells are from 20 m to 50m and the well diameter is 50 to 150 mm. Some tube wells were constructed by the USAID in 1960is. They are equipped with Dempster hand pump and still being used in some villages, but the others are either broken or not functionning. Recently, the PHD is constructing the tube well and installing Tara or Inidia Mark III hand pumps upon request from the village. A number of Lucky hand pumps are bein used in the tube wells and some of dug wells.

3.4.2 Target Villages in Champasak Province

Target villages in Champasak Province are 100 having a total population of 53,297 as of April 1994. These villages are distributed in five Districts as depicted in Figure 3.4.2. Data on existing water source by District are tabulated in Table 3.4.2.

(1) Sanasomboon District

Target villages in Sanasomboon District are 36 with a total population of 24,780. Of the target villages, most of the villages are located along the route No. 13 and the remaining villages are located along the Mekong river and its tributaries.

Population served by the river, dug-wells, and handpumps account for 13,743 (56%), 4,067 (16%), and 6,059 (24%), respectively. River is the main source of domestic water, supplemented by handpumps and dug-wells.

In the villages located along the route No. 13, main water source is handpumps supplemented by the tributary of the Mekong. However, most of handpumps are not sustainable enough to supply water during the dry season. Therfore, the inhabitants of these villages are suffering from shortage of water during the dry season.

(2) Bachiang District

Target villages in Bachiang District are 25 with a total population of 8,195. Of the target villages, most of the villages are located along the route No. 20 which is the all weather asphalted road connecting Pakse and Saravan. Some tributaries of the Mekong, such as Huay Cahmpi, Huay Palai and Huay Kapheu are crossing the road.

River and springs are the main source of water in this district. Population served by the river and springs account for 4,732 (58%) and 2,857 (35%), respectively. Some dug-wells are found in 5 villages.

(3) Pathoumphone District

Target villages in Pathoumphone District are 15 with a total population of 7,188. Of the target villages, most of the villages are located along the route No. 13 and the Mekong river.

Population served by the river, dug-wells, and handpumps account for 4,187 (59%), 2,669 (37%), and 230 (3%), respectively. River is the main source of domestic water, supplemented by dug-wells and handpumps.

(4) Sukhuma District

Target villages in Sukhuma District are 7 with a total population of 3,950. Of the target villages, most of the villages are located along the provincial road connecting Champasak town to Sukhuma town. These villages are located far from the Mekong river.

Population served by the river, dug-wells, handpumps and pond account for 621 (16%), 310 (8%), and 2,255 (57%), respectively. Handpumps and ponds are the main source of domestic water, supplemented by dug-wells. Although handpumps and ponds are the main source of water, they are not sustainable to supply enough water during dry season.

(5) Khong District

Target villages in KhongDistrict are 17 with a total population of 9,385. Of the target villages, only one village (Tapusy) is located on the Khong island and the remaing villages are located along the route No. 13 and the Mekong.

Population served by the river, dug-wells, and handpumps account for 7,509 (80%), 1,229 (13%), and 647 (7%), respectively. River is the main source of domestic water, supplemented by handpumps and dug-wells. Handpumps are found in 4 villages.

3.4.3 Target Villages in Saravan Province

Target villages in Saravan Province are 100 having a total population of 45,591 as of April 1994. These villages are distributed in five Districts as depicted in Figure 3.4.2. Data on existing water source by District in Saravan Province is tabulated in Table 3.4.3.

(1) Lakhongpheng District

Target villages in Lakhongpheng District are 16 with a total population of 5,768. All the villages are located along the route No. 13. Due to lack of dependable water source, the people in the villages meet serious shortage of water, particularly in the dry season.

Population served by the river, dug-wells, and handpumps account for 1,891 (33%), 812 (14%), and 2,885 (50%), respectively. Handpumps are the main source of domestic water, supplemented by river and dug-wells. Two villages utilize ponds for water.

(2) Khongxedon District

Target villages in Khongxedon District are 22 with a total population of 9,882. The villages are located along the route No. 13, the Mekong river and Xe Don river. Most of the villages have better access to dependable surface water, except some villages which are rather far from the Xe Don river.

Population served by the river and handpumps account for 6,126 (62%) and 3,574 (36%), respectively. River is the main source of domestic water, supplemented by handpumps. 6 villages utilize ponds for water.

(3) Vapy District

Target villages in Vapy District are 21 with a total population of 12,499. The villages are located along the route No. 16 and the Xe Don river. Almost all the villages have better access to dependable surface water.

Population served by the river, handpumps and ponds account for 10,434 (62%), 1,340 (36%), and 272 (2%), respectively. River is the main source of domestic water, supplemented by handpumps and ponds.

(4) Saravan District

Target villages in Saravan District are 30 with a total population of 13,031. The villages are located along the route No. 20 and No. 23. Due to long distance from the dependable river water, most of villages are suffering from shortage of water, particularly during dry season.

Population served by the river, dug-wells, handpumps and spring account for 9,229 (72%), 1,104 (8%), 726 (6%), 1,624 (12%), respectively. River is the main source of domestic water, supplemented by spring, handpumps and dug-wells.

(5) Laongam District

Target villages in Laongam District are 11 with a total population of 4,411. The villages are located along the route No. 20. Some tributaries of the Mekong river, such as Huay Tapoung and Xe Set river are crossing the road.

Population served by the river, spring, and others account for 2,676 (63%), 652 (15%), and 1,083 (25%), respectively. River is the main source of domestic water, supplemented by spring. Laongam town, which is the District capital, is served by piped water system.

Present water supply situation in 100 villages of Saravan Province is tabulated in Table 3.4.3.

3.4.4 Water Use in the Target Villages

(1) Access to Water Source

Figures 3.4.4a and 3.4.4b show the distribution of access to water source. As shown in the histogram, distance to main water source mostly ranges from 200 to 400 m in Champasak province. However, in Saravan province, the histogram shows more gentle figure and ranges from 200 to 1,000 m. According to the cumulative distribution curve, 60% distance is 350 m in Champasak province, while it is 450 m in Saravan province. A longest distance is seen in B Maisivilai in Champasak provice, where the village people resort to take water from Mekhong river about 2500 m far from the village.

(2) Water Quality

On-site measurement of water quality shows normal values for electric conductivity and pH. Muddy water is observed in several villages. Based on the bacteriological and chemical tests conducted at existing water source, several water sources have sanitary problems in water quality from the view point of the WHO dringking water standard (Refer to Chapter 6). Considering the present circumstances of the water sources, potential risk of biological pollution may always exist.

Although PHDC and PHDS are trying to increase the coverage rate of clean water supply by installing tubewells with handpumps, their activities are not functioning well due to a shortage of funds and lack of qualifed staff.

(3) Water Use

According to the survey of existing water sources in 200 villages, the volume of water changes

village to village and ranges from 36 liters/day/family to 270 liters/day/family. It shows a higest value in B.Beng where a pilot water supply system was constructed. However, in B.Houakoua where a Tara hand pump is being used as a water source, volume of water use is 154 liters/day/family. On the other hand, in B. Senvang-Noy, it shows only 55.5 liters/day/family. About 60 % of water is used for washing and bathing in B. Houakoua while it is 36 % in B. Senvang-Noy. Since washing and bathing are usually done in the river side, little amount of water is collected and carried to their home (Figures 3.4.4c and 3.4.4d).

Table 3.1.1 Population in Lao PDR

	1985	Growth	Population	Growth	1994
	Census	Rate	Count '90	Rate	Estimate
Laos	3,584,803	0.029	4,140,000	0.029	4,641,537
and the second second					
Vientiane Mun.	377,409	0.042	464,000	0.029	520,211
Phongsaly	122,984	0.028	141,000	0.029	158,081
Luangnamtha	97,028	0.042	119,000	0.029	133,416
Oudomxay	187,115	0.086	283,000	0.029	317,284
Bokeo	54,925	0.031	64,000	0.029	71,753
Luangprabang	295,475	0.027	337,000	0.029	377,826
Huaphan	209,921	0.009	220,000	0.029	246,652
Xayaboury	223,611	-0.037	185,000	0.029	207,412
Xiengkhuang	161,589	0.023	181,000	0.029	202,927
Vientiane	264,277	0.029	305,000	0.029	341,949
Borikhamxay	122,300	0.032	143,000	0.029	160,324
Khammuane	213,452	0.028	245,000	0.029	274,680
Savannakhet	543,611	0.033	639,000	0.029	716,411
Saravan	187,515	0.037	225,000	0.029	252,257
Sekong	50,909	0.023	57,000	0.029	63,905
Champasack	403,041	0.024	453,000	0.029	507,878
Attapeu	69,631	0.026	79,000	0.029	88,570

Source: State Statistical Centre, Ministry of Economy, Planning and Finance Note: Vientiane Mun. = Vientiane Municipality

and the second second

Table 3.1.3a

Industry	1989	1000				• <u> </u>	
maasay		1990	1991	1992	1993	Growth	
	Mil. Kip	Mil. Kip	Mil. Kip			1989-1993	
Agriculture	214 662	2014					•
Agnounure	344,667	374,456	365,212	n.a.	n.a		
Agriculture	206,529	225,099	202 114				
Livestock/Fishery	122,244	129,859	203,114				
Forestry	15,894		138,071				
Totomy	12,694	19,498	24,027				
Mining & Manufact'g	75,439	87,305	113,333	n.a.	n.a.		
1. 							
Mining	976	896	816	• •	• •	•	
Manufacturing	51,940	59,662	80,140				
Construction	15,091	17,908	22,166			· .	
Utilities 1/	7,433	8,839	10,211		÷ .		
Services	149,542	145,724	149,807	n.a.	n.a.		
				· · · ·			
Transport/Commun.	36,181	31,687	31,736		. •		
Commerce	41,077	44,516	44,516				
Finance/Insurance	967	1,316	3,651				
Housing	11,147	11,480	13,179				
Public Services	36,490	35,800	35,800				
NGOs	23,266	20,440	20,440				
Others	413	484	485				
	ter de la composition				·		
Import Tax	5,053	5364	9000	n.a.	n.a.		
GDP Total	574,700	612,848	637,352	681,797	728,058	6.1	- :

3-25

Unit: Million Kips at 1990 constant prices

Source: Ministry of Economy, Planning and Finance

Note: 1/ Utilities include electricity, gas and water

Laos: Trade Balance

	1989	1990	1991	1992	1993
					÷
Trade Balance	· · ·				
Exports	63.3	78.7	96.6	132.6	158.6
Imports	210.7	201.6	228.0	265.6	344.5
Balance	-147.4	-122.9	-131.4	-133.0	-185.9
Composition of Major					at the Second
Composition of Major Exports (%)			· · · · · · · · · · · · · · · · · · ·		
Wood Products	24.6	23.6	42.3	32.2	24.0
Textiles	6.3	8.9	15.6	20.6	15.8
Electricity	23.7	24.4	22.0	12.8	11.5
Motorcycle	-	-		14.7	16.4
Coffee	13.9	10.9	3.2	2.5	n.a.
Others	31.5	32.2	16.9	17.2	32.3
Composition of Major					
Imports (%)			an a	e di statione de la compositione de La compositione de la compositione d	
Machinery/Raw Materials	6.9	14.5	26.9	35.7	53.7
Rice and other foods	15.1	9.1	12.5	11.9	8.9
Petroleum Products	15.1	14.1	9.3	9.2	5.6
Others	16.6	33.6	11.8	19.0	31.8

3-26

Unit: Million US Dollars

Source: Ministry of Economy, Planning and Finance

Table 3.1.4

Public Investment Plan for 1991-1995

		Unit: US\$ Million								
Sector	Total	Ratio	1991	1992	1993	1994	1995	Total		
Agriculture and Forestry	96.97	13.0%	22.10	25.97	21.12	16.37	11.40	96.97		
Manufacturing	22.57	3.0%	8,40	7.53	2.44	1.14	3.06	22,57		
Mines	9.78	1.3%	0.00	2.32	2.46	2.50	2.50	9.78		
Electricity	153.77	20.6%	17.45	14.48	25.19	39.69	56.96	153.77		
Communications	280.19	37.6%	30.38	67.13	55.17	65,18	62.33	280.19		
Telecommunications	33.39	4.5%	4.77	6.28	6.78	5.78	9.78	. 33.39		
Water Supply	26.39	3.5%	0.00	2.08	4,03	8.75	11.53	26.39		
Education	64.57	8,7%	4.93	11.93	15.90	17.91	13.90	64.57		
Public Health	41.90	5.6%	5.18	4.62	8.39	10.57	13.14	41.90		
Others	15.47	2.1%	2.97	3 37	2.21	3.32	3.60	15.47		
Total	745.00	100.0%	96,18	145.71	143.69	171.21	188.20	745.00		

Source: Committee for Planning and Cooperation

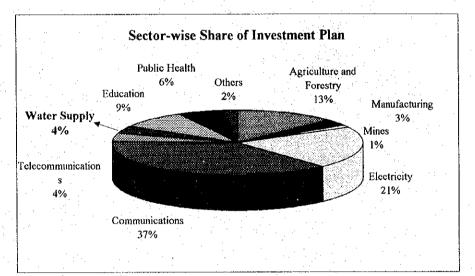


Table 3.1.6

Land Use in Champasak and Saravan Provinces

	Saravan Province	Percent (%)	Champasak Province	Percent (%)
Permanent Agriculture Land	71	7 🦾	183	13
Current Forest	562	54	879	61
Potential Forest	242	23	153	· 11
Other Wood Areas	129	12	133	. 9
Others	- 30	3	81	6
Total:	1,034	100	1,429	100

Source: Agriculture & Forestry Service of Champasak Province

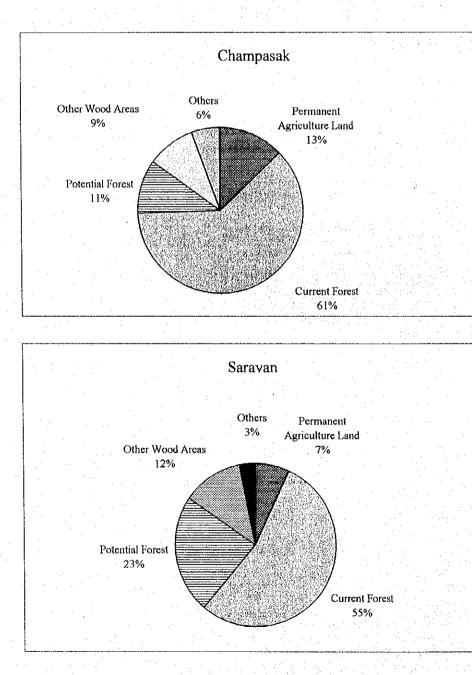


Table 3.3.1a

Population Statistics in Champasak and Saravan Provinces, 1985-1995

Name	District Population 1985 Census	Annual Growth Rate	District Population 1990 Count	Estimated Annual Growth	District Population 1994 estimate
1 D' 1	<u> </u>	1985-1990	- ••••	Rate '90-95	
A. Champasak Province					· · · · ·
Sanasomboun	43,660	1.91%	48,000	2.36%	52,694
Bachiang	24,112	6.48%	33,000	2.36%	36,227
Pathoumpone	34,226	2.11%	38,000	2.36%	41,716
Sukhuma	30,489	1.60%	33,000	2.36%	36,227
Khong	60,404	-0.13%	60,000	2.36%	65,868
Phontong	58,682	3.29%	69,000	2.36%	75,748
Champasak	42,265	0.35%	43,000	2.36%	47,205
Mounlaoamok	23,554	3.52%	28,000	2.36%	30,738
akhsong	37,130	4.38%	46,000	2.36%	50,499
Pakse	48,519	2.54%	55,000	2.36%	60,379
Sub- Total:	403,041	2.36%	453,000	2.36%	497,301
3. Saravan Province		· · ·			
akonepheng	23,167	2.33%	26,000	2,97%	29,229
Chongxedong	38,042	2.00%	42,000	2.97%	47,216
/apy	21,266	2.45%	24,000	2.97%	26,981
aravan	47,692	3.26%	56,000	2.97%	62,955
aongam	28,060	5.69%	37,000	2.97%	41,595
oumlam	12,528	2.25%	14,000	2.97%	15,739
la Oi	16,760	1.44%	18,000	2.97%	20,236
Samuoi	6,811	3.27%	8,000	2.97%	8,994
Sub-Total	194,326	2.97%	225,000	2.97%	252,945
l'otal	597,367	2.56%	678,000	2.56%	750,246

Source: Population of the Lao P.D.R, 1992, Ministry of Economy, Planning and Finance

(1) 100 Villages in Champasak Province

(2) 100 Villages in Saravane Province

2	Ymage	District	Household J		Mar		6ex	Village	Village	District	Hemehold	Pepulation 1994		Famala	в
2	Name B.Nakhara	Sanasomboon	1994	1994 863	Male F 405	438	Ratie 0.85	Cede S-1	Name B.NonSavang	Name Lashonchang	1994 105	<u>1994</u> 522	<u>Maix</u> 267	255 .	<u>R</u>
	B.Phonthat	Sanasomooon	28	135	67	68	0.99	S-2	B.Nadou	Lachotscheng	113	601	301	.01	
	B.Nontavin	Sanasomboon	122	615	279	336	0.83	S-3	B.Nadoumai	Lachomotomz	109	579	246	333	
	B.Nongohal	Sanasomboon	98	559	273	250	0.98	S-1	B Houry kipho	Labonroome	160	543	24)	302	
	B Souvenneide	Sameomooon	170	839	366	473	0.77	S-5	B.1 alchos: Tel	Lakbonoheng	50 29	289	123	167	
	B.Neoal	Sanasomboon -	118	629 378	304 173	325 205	0.94	S-6 S-7	B Lakhosi Nua B Khonsay	Lakhonohing Lakhonohing	29	- 130	.14	72	
	B.Nongdou B.Houaxe	Sanasomboou Sanasomboon	109	628	313	315	0.99	S-1	B Keuppadak	Lakhonpheng	68	366	248	218	
	B.Pongsan	Sanasombooa	70	337	167	170	0.98	\$ 9	B Nondinary	Lakhonphere	65	456	233	223	
	B.Dong	Sanasomboon	63	311	145	166	0.87	S-10	.B.Nekhandai	Lachonphing	53	322	167	155	
	B.Hangain	Sanasor, boon	62	354	176	178	0.99	\$-11	B.Phoudsochasg Noy	Lathoophing	85	426	213	213	
	B.Nongkluum	Summoraboon	93	419	187	232	611	S-12	B.Nongsano	Lakhoopheng	42	231	115	116	
	B.Khampong	Sanasomboon	153	987 256	450 86	537 170	0.84 0.51	S-13 S-14	B.Phoudsocheng Geal	Lakhonpheng	73	356 316	169	221	
	B Kharmgoun B Norgichen	Sanasomboon Sanasomboon	39 55	256	116	140	0.83	8-13	B. Thangbung B. Bowttephan	Ladoophing .	62	310	125	185	
	B.Louy	Sanasoniboon	32	150	63	85	0.76	<u>S-16</u>	B. Houarytchen	Lashenshma	34	196	92	94	
	B.Solo-Gnai	Saussomboon	225	1025	375	650	0.55		Lakhonaphene Dist.(16 Villa	gers):	1,162	5,768	2,651	3,117	
	B.Solo-Noy	Smoomocon	116	635	310	325	0.95	S-17	B.Hapong	Khongstedon	195	1182	571	611	
	B.Xonpaak	Samesomboon	225	1230	578	632	0.89	S-18	B.Vang Kan Hong	Khongxedon	54	315	160	135	
	B.Khamlouang	Saasomboon	52	266	128	138	0.93	\$-19	B Napleng Grai	Khongredon	103	515 #35	237	278 438	
	B. Sithouan B. Mouana	Senesoraboon	82 210	422	200 636	649	0.90 0.98	S-20 S-21	B Khong Ney B.Norgsaphing	Khongcedon Misongxedon	90	439	203	236	
	B.Okumuang	Sanasomboon Sanasomboon	- 150	1417	558	529	1.11	5-22	B.Nongkoxong	Khongxedon	63	346	154	192	
	B.Bourgicha	Sanasomoon	150	1010	223	787	0.28	S-23	B.Nongbowa	Knongxedon	34	178	86	92	
	B.Latrus (Nongmelt)	Sasasondoora	58	317	161	156	1.03	5-24	B.Doonsang	Khongxedon	80	398	174	224	
	B.Naiek	Samecomboon	250	1376	660	716	0 92	S-25	B. Kinxiou	Khongvedon	100	502	236	266	1.1
	B Dongkalong	Senesomooon	59	374	189	185	1.02	S-26	B.Thatho	Khongstedon	18	121		67	
	B.Nalong	Senatomboon	287	1696	922	774	1.19	S-27	B.Khok-Howaxang	Khengxedon	53	268	135	153	
	B Naxon	Sanasomboon	219	1396	616	722	0.94	S-28	B.Namouang	Khongredon	121	625	285	340	
	B.Thangleengrivitai	Sameoniboon	\$5	310	90	220	0.41	· S-19	 Khambong-Gnat None water 	Khongxedon Shoneya lon	102	573	271	302	
	B.Nonxai B.Dombek	Sanasomboon Sanasomboon	51 68	293	148 119	145 293	1.02 0.41	S-30 S-31	B.Nonsanlan B.Nonghalou	Khongxedon Khongxedon	26 24	171 132	63		
	B.Donphek B.Dua-Nua	Sanasomboon Sanasomboon	155	856	426	430	0.41	5-32	B.Thelouana	Khongxeden	47	264	128	140	
	B.Kengkes	Supersone con	. 133	498	246	252	0.98	\$-33	B.Nongleng	Khongxedos	43	327	153	174	
	B.Ngouadeng	Sanasomboon	163	1053	518	\$35	0.97	5-34	В. Ноцеулас	Khongxedon	85	495	222	273	
	B.Palicion	Sanatomboon	255	1497	704	793	0.89	S-35	B.Hatdou	Khongxedon	77	400	183	217	
	Sanasomboon Dist (36 Val	L):	4,446	24,780	11,469	13,311	0.66	S-36	B.Nakadao	Khongxedon	162	806	378	428	
	B Nongsta	Baching	70	368	152	216	0.70	S-37	D.Kouthemphong	Knongstedon	10	418	100	2.4	
	B.Sachlang	Bachiang	52 57	278	163	115	1.42	\$38	B.Koutlabong	Khongxedon		525 9,879	247	278	÷,
	B Makageo	Baching Backing	105	259 578	124 263	135 315	0.83	5-39	Khosuxedon Dist. (22 Villag B.Nonataona	¥φγ.	74	466	201	235	· · ·
	B.Nongbok-Noy B.Nongbok-Omi	Baching	117	646	271	375	0.72	5-40	B.Donkha	Viipy	128	817	395	422	
	B. Thoración	Beching	70	510	301	209	1.44	S-41	B Navat	Vapy	. 78	501	206	295	
	B.Kanggrao	Dechieng		300	138	162	0.85	\$-42	B Hourythou	Vapy	116	603	211	392	
	B. Thongs els	Bechiang	- 72	368	170	198	0.96	S-43	B.Vapy-Nus	Vapy	121	. 586	265	321	
	B Mouengkinsi	Beching	63	394	119	275	9.43	\$-44	B.Vapy-Ta	Vepy:	116	571	283	284	
	D. Pakonny	Bachierg	42	270	144	126	1.14	S-35	B.Nakang	Yapy	19	118	49	215	-
	B.Oucorasonic	Decharg	65	255	98 70	158	0.62	5-16 5-17	B.Bangida	Vepy	69	753	167	417	
ц. Н	B. Phasouana B. Lak-21	Beching Beching	37	137	. 70 332	87 235	1.45	5-48 S-48	D.Septet B.Mowine	Үнру ∨нру	139	885 -	419	466	
,	B.Phin	Berting	. 99	467	216	251	0.86	5-47	B.Hat	Viipy	55	469	196	271	
	B.L. 4.23	Baching	21	. 391	166	225	0.74	S-30	B.Samia	Vapy	156	893	449	444	
2	B-Luk-25	Baching	81	379	172	207	0.\$3	S-51	B.Khoumta-Lat	Vapy	49	223	105	118	
3	B.Nongdumicheo	Bachiang	33	117	43	74	0.58	5-52	B.Nonepho	Vapy	49	257	131	126	
I.	B.Senkep	Bachieng	24	136	65	75	0,81		Vapy District (E1 Villages):		1,358_	7,325	3,445	4,080	
5	B. Hoursten	Bachieng	65	320	125	195	9.64	S-S	B.Bungkhem	Saravan	. 235	1,571	751	7-10	
5	B.Tular (B.Lak-17) B.Norseal	Beching Baching	32	195 218	100 105	95 113	1.05 0.93	S-54 S-55	D.Nongsni D.Bungsni	Seravan Seravan	139	1,250 1,691	510 810	\$\$1 100	
	B.Nongmak-Euk	Bachlung	35		. 83	. 101	0.12	5-56	B.Chong	Surver		183	. 83	38	
	B.L.k.13							5-57							
	B.Nonbeurydua	Sachienag	23	184 120	63	37	1.11		8.Pitonkham	Saravan	13	. 72	34	.56	
		Sachung Baching					1.11	S-58				72 117		.53 ,49	
	B.Kagno	Beching Beching	23 58 58	120 334 283	63 178 135	37 156 148	1.14 0.91	S-38 S-39	B.Phonkham B.Koutmoung B.Nongbou-Noy	Saravan	13 21 13	117 190	34 61 41	49 10,024	
_	Siching Dist (25 Villages	Baching Baching 1):	23 56 58 1,546	120 334 283 8,095	63 178 135 3792	37 156 148 4_303	1.14 0.91 0.85	S-58 S-59 S-60	B. Pironkham B. Koutmoung B. Nongbou-Noy B. Dong-Nong	Santyan Santyan Santyan Santyan	13 21 13 64	117 190 1315	34 61 41 151	49 10,024 164	
	Biching Dist (23 Villages B.Lak-19	Bachiang Bachiang B): Pathoomphone	21 58 <u>58</u> 1,546 80	120 334 283 8,095 451	63 176 135 <u>3</u> 792 217	57 156 <u>148</u> <u>4,303</u> 2,34	1.14 0.91 0.88 0.93	S-58 S-59 S-60 S-61	B. Pironkham B. Koutmoung B. Nongbou-Noy B. Dong-Nong B. May-Sivile	Santovan Santovan Santovan Santovan Santovan	13 21 13 64 23	117 90 315 131	34 61 41 151 62	49 10,024 164 69	
,	Biching Dist (25 Villages B.Lak-19 B.Lak-20	Baching Baching (): Pathoomphone Pathoomphone	21 58 58 1,546 80 36	120 334 283 8,095 451 178	63 178 135 <u>3,792</u> 217 100	57 156 148 4,303 2,34 78	5.14 0.91 0.88 0.93 1.28	S-58 S-59 S-61 S-61 S-62	B. Pitonkham B. Koutmoung B. NongbourNoy B. Dong-Nong B. May Sivilai B. Nakathian	Sarayan Sarayan Sarayan Sarayan Sarayan Sarayan	13 21 13 64 23 92	117 90 315 135 556	34 61 41 131 62 236	49 10,024 164 69 300	
•	Biching Dist (25 Villages B.Lak-19 B.Lak-20 B.Mophou	Baching Baching Baching Pathoomphone Pathoomphone Pathoomphone	21 58 58 1,546 80 36 179	120 334 283 8,095 451 178 881	63 178 135 <u>3,792</u> 217 100 420	37 136 148 4,303 234 78 461	i.14 0.91 0.88 0.93 1.28 0.9i	S-58 S-59 S-60 S-61 S-63 S-63	B. Picenkham B. Koutmoung B. Nongbou-Nay B. Dong-Nong B. May Sivila B. Naturtisen B. Naturtisen B. Nothon	Sarayun Sarayun Sarayun Sarayun Sarayun Sarayun Sarayun Sarayun	13 21 13 64 23 92 100	117 90 315 131 555 628	34 61 41 151 62 256 287	49 10,024 164 69 300 341	
3 4 5	Siching Dit (25 Vilage B.Lak-19 B.Lak-20 B.Mophou B.Lak-24	Baching Baching (): Pathoomphone Pathoomphone	23 58 58 1,546 80 36 179 99	120 334 283 8,095 451 178 881 448	63 178 135 3,792 217 100 420 205	37 156 148 4,303 234 78 461 243	i.14 0.91 0.88 0.93 1.28 0.91 0.84	S-58 S-59 S-61 S-61 S-62 S-63 S-64	B. Pirotikham B. Koutmoung B. Nongbou-Noy B. Dong-Nong D. May-Sivilei B. Nakukilei B. Nakukilei B. Nethon B. Phonphei	Sarayan Sarayan Sarayan Sarayan Sarayan Sarayan	13 21 13 64 23 92	117 90 315 131 556 628 1034	34 61 41 131 62 236	49 10,024 164 69 300 341	
1	Biching Dist (25 Villages B.Lak-19 B.Lak-20 B.Mophou	Baching Baching Pathoomphone Pathoomphone Pathoomphone Pathoomphone	21 58 58 1,546 80 36 179	120 334 283 8,095 451 178 881	63 178 135 <u>3,792</u> 217 100 420	37 136 148 4,303 234 78 461	i.14 0.91 0.88 0.93 1.28 0.9i	S-58 S-59 S-60 S-61 S-63 S-63	B. Picenkham B. Koutmoung B. Nongbou-Nay B. Dong-Nong B. May Sivila B. Naturtisen B. Naturtisen B. Nothon	Sarayun Sarayun Sarayun Sarayun Sarayun Sarayun Sarayun Sarayun Sarayun	13 21 13 64 23 92 100 147	117 90 315 131 555 628	34 61 41 151 62 256 287 510	49 10,024 164 69 300 341 524	
	Siching Dist (25 Villager B. Lak-19 B. Lak-20 B. Mohbai B. Mak-24 B. Sanamitaysouk (L-25) B. Housikhous (L-29) B. Lak-31	Bachiang Bachiang Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone	21 58 58 1.546 80 36 179 99 59 53 53	120 334 283 5,095 451 176 881 448 309 270 289	63 178 135 3,792 217 100 420 205 159 133 140	57 156 148 4,303 234 78 461 243 150 137 149	5.14 0.91 0.88 0.93 1.28 0.91 0.91 1.06 0.97 0.94	5-58 5-59 5-61 5-62 5-63 5-63 5-64 5-65 5-65 5-66	B. Firotifsan B. Nong-Nong B. Dong-Nong D. May Siviel B. Matabian B. Natabian B. Natabian B. Nadon B. Nadon B. Nadon B. Nadonang B. Transmit Kao	Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan	13 21 13 64 23 92 100 147 27 39 75	117 90 315 131 556 628 1034 115 224 452	34 61 41 151 62 256 287 510 53 109 212	49 10,024 564 69 300 341 524 62 124 240	
	Siching Dist (25 Vilner) B. Lak-19 B. Mophon B. Mophon B. Lak-24 B. Sanarataysouk (L-25) B. Houskhous (L-39) B. Lak-34	Baching Baching Deficient Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone	21 58 58 1.546 80 36 179 99 59 59 59 59 59 59 59 59 59 59 59 59	120 334 283 451 178 881 448 309 270 289 256	63 178 135 3,792 217 100 420 205 159 133 140 131	57 156 148 4,303 2,34 78 461 243 150 137 149 125	5.14 0.91 0.88 0.93 1.28 0.94 1.06 0.97 0.94 1.05	5-58 5-60 5-61 5-63 5-64 5-65 5-64 5-65 5-66 5-65 5-66 5-67 5-68	B. Flootham B. Koutnoung B. Nong-Sou Noy B. Dong-Nong B. May Siviei B. Nakstien B. Nakstien	Sanivan Suayun Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan	13 21 13 64 23 92 100 147 27 39 75 75	117 90 315 131 556 628 1034 115 224 452 510	34 61 41 151 62 256 287 510 53 109 212 212	49 10,024 164 69 300 341 524 62 124 240 293	
	<u>Siching Dit (25 Vilger</u> B.Lak:20 B.Jak:20 B.Sauartsytouk (L-25) B.Housichous (L-25) B.Housichous (L-39) B.Lak:31 B.Lak:34 B.Kousiouty (L-36)	Baching Baching Deficient Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone	23 58 58 1,545 80 36 179 99 59 53 61 44 44	120 334 283 451 178 881 448 309 270 289 270 289 256 759	63 178 135 3,792 217 100 429 205 159 133 140 131 411	37 156 148 4,303 2,34 78 461 243 150 137 149 125 348	5.14 <u>0.91</u> 0.88 0.93 1.28 0.94 1.06 0.97 0.94 1.05 1.18	5-58 5-59 5-61 5-63 5-63 5-64 5-65 5-66 5-66 5-66 5-67 5-68 5-69	B. Floritham B. Nonghou Nay B. Dong-Neng B. May Shiel B. Malakian B. Naton B. Naton B. Naton B. Naton B. Naton B. Naton B. Naton B. Naton B. Naton B. Natong-Onal A. Napheng-Nay	Sanivan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan	13 21 13 64 23 92 100 147 27 39 75 70 18	117 90 315 556 628 1034 115 2244 452 \$10 117	34 61 41 151 62 256 287 510 53 109 212 213 55	49 10,024 164 69 300 341 524 62 124 240 293 62	
	Siching Dirf (25 Villeer B. Lak 20 B. Lak 20 B. Lak 20 B. Lak 20 B. Lak 20 B. Lak 24 B. Lak 31 B. Lak 34 B. Lak 34 B. Khoustong (L-36) B. Tomo-Nak	Bachiang Bachiang Dethoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone	21 38 98 1.546 80 36 36 39 99 59 53 61 44 148 148	120 334 283 5,095 451 178 881 448 309 270 289 270 289 2,56 759 620	63 178 135 3,792 217 100 420 205 159 133 140 131 411 233	57 156 148 4303 234 78 461 243 150 137 149 125 348 385	5.14 0.91 0.88 0.93 1.28 0.94 1.06 0.97 0.94 1.05 1.18 0.61	5-58 5-59 5-61 5-62 5-63 5-63 5-64 5-65 5-66 5-66 5-66 5-66 5-67 5-68 5-69 5-70	B. Flootham B. Kouthoung B. Nong-Sour Dong-Nong D. May Sivili B. Nakatian B. Nakatian	Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan	13 21 13 64 23 92 100 147 27 75 75 75 70 16 66	117 90 315 131 556 628 1034 115 224 452 250 117 117	34 61 151 62 256 287 510 53 109 212 215 55 190	49 10,024 164 69 300 341 524 62 124 293 62 260	
	<u>Siching Dit (25 Vilger</u> B.Lak:20 B.Jak:20 B.Sauartsytouk (L-25) B.Housichous (L-25) B.Housichous (L-39) B.Lak:31 B.Lak:34 B.Kousiouty (L-36)	Baching Baching Deficient Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone	23 58 58 1,545 80 36 179 99 59 53 61 44 44	120 334 283 451 178 881 448 309 270 289 270 289 256 759	63 178 135 3,792 217 100 429 205 159 133 140 131 411	37 156 148 4,303 2,34 78 461 243 150 137 149 125 348	5.14 <u>0.91</u> 0.88 0.93 1.28 0.94 1.06 0.97 0.94 1.05 1.18	5-58 5-59 5-61 5-63 5-63 5-64 5-65 5-66 5-66 5-66 5-67 5-68 5-69	B. Floritham B. Nonghou Nay B. Dong-Neng B. May Shiel B. Malakian B. Naton B. Naton B. Naton B. Naton B. Naton B. Naton B. Naton B. Naton B. Naton B. Natong-Onal A. Napheng-Nay	Sanivan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan Saniyan	13 21 13 64 23 92 100 147 27 39 75 70 18 66 66 13	117 90 315 131 556 628 1034 115 224 452 510 117 450 2739	34 61 41 151 62 256 287 510 53 109 212 213 55	49 10,024 164 69 300 341 524 62 124 240 293 62	
	Skhing Dit (23 Viller) B. Lak:20 B. Bak:20 B. Bak:20 B. Bak:20 B. Bak:24 B. Bak:24 B. Bak:24 B. Bak:24 B. Bak:24 B. Bak:24 B. B. Khoundoxy (L-26) B. Khoundoxy (L-26) B. Khoundoxy (L-26) B. Shoundoxy (L-26) B. Shoundoxy (L-26) B. Shoundoxy (L-26) B. Shoundoxy (L-26)	Bachiang Bachiang Dethoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone	23 38 58 1,546 80 36 179 99 99 53 53 61 44 44 148 1148 1156	120 334 283 4505 451 178 884 309 270 289 270 289 275 620 620 629	63 176 135 247 100 429 205 159 133 140 131 411 235 246 115	57 156 148 4303 234 78 461 243 150 137 137 137 137 137 137 348 348 348 348 348 349	5.14 0.91 0.88 0.93 1.28 0.94 1.06 0.97 0.94 1.05 1.18 0.64 9.62	\$-58 \$-59 \$-61 \$-62 \$-63 \$-64 \$-65 \$-64 \$-65 \$-64 \$-65 \$-67 \$-68 \$-599 \$-70 \$-71	B. Floridham B. Koutnoung B. Nong-Sung Dong-Ning B. May Shiel B. Nal-Nilan B. Nagbang-Noy B. Sackad Thi B. Dan-Oni	Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan Sanivan	13 21 13 64 23 92 100 147 27 75 75 75 70 16 66	117 90 315 131 556 628 1034 115 224 452 250 117 117	34 61 41 151 62 256 287 510 53 109 212 213 55 190 298	49 10,024 164 69 300 341 524 62 124 240 293 62 260 441 180	
	Siching Dist (25 Villeer) B. Lak: 20 B. Lak: 20 B. Mophou B. Sawaritaysock (L-25) B. Housichous (L-25) B. Housichous (L-27) B. Lak: 31 B. Lak: 34 B. Khousicotty (L-36) B. Tromo-Nak B. Tro-Trai	Bachiang Bachiang Definition Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone	213 38 38 38 36 36 39 99 59 53 33 61 44 148 117 155 43 43 110 83	120 334 283 451 178 881 448 309 270 289 270 289 270 620 629 629 629 629 643 465	63 178 135 3,792 217 100 420 205 159 133 140 131 401 235 240 115 312 218	57 136 438 233 78 461 243 150 137 149 125 348 385 389 135 321 250	1.14 0.91 0.88 0.93 1.28 0.94 1.05 1.06 0.97 0.94 1.05 1.18 0.64 0.65 0.65 0.65 0.87	\$-38 \$-59 \$-61 \$-64 \$-64 \$-64 \$-65 \$-64 \$-65 \$-66 \$-67 \$-68 \$-69 \$-70 \$-71 \$-72 \$-73 \$-74	B. Flootham B. Kostmoung B. Nongbour Noy B. Dong-Ning D. My Sivid B. Nalokian B. Nalokian B. Nalokian B. Nalokian B. Nalokian B. Nalokian B. Nalokian B. Nalokian B. Nalokian B. Najoheng-Noy B. Saokad-Tai B. Kongimu-Tai B. Kospimu-Tai B. Kospimu-Tai B. Nobon-Tai	Sannon Swinyan Sinyan	13 21 13 64 23 92 92 100 147 27 55 75 75 75 18 66 113 56 41 44	137 90 335 555 628 1034 115 224 452 510 117 450 739 365 212 250	34 61 41 151 62 256 287 510 510 212 213 55 500 212 213 55 500 298 185 104 110	49 10.024 164 69 300 341 524 62 124 240 295 62 260 441 180 111 140	
	Skilven Disk (23 Villeer) B. Lak: 19 B. Lak: 20 B. Bak: 20 B. Bak: 20 B. Bak: 20 B. Bak: 20 B. Bak: 30 B. Bak: 31 B. Bak: 31 B. Bak: 31 B. Bak: 31 B. Bak: 31 B. Bak: 34 B. Bak: 34 B. Bak: 34 B. Thorphong B. Thorph	Baching Baching Betternsphere Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone	23 38 38 1,346 80 36 179 59 59 59 50 61 44 148 117 155 43 110 85 111 112	120 334 2813 6,095 451 178 8819 448 309 270 289 2.56 679 620 629 629 629 633 468 661	63 178 133 3,792 247 100 420 205 159 133 140 131 411 235 246 115 312 218 307	57 156 148 430 224 78 461 243 150 137 149 125 3485 385 389 135 321 250 360	1.14 0.91 0.85 0.93 1.28 0.94 1.06 0.97 0.94 1.06 1.05 1.18 0.61 0.62 0.85 0.87 0.87	\$-58 \$-59 \$-61 \$-64 \$-64 \$-64 \$-64 \$-64 \$-64 \$-64 \$-65 \$-66 \$-67 \$-76 \$-71 \$-72 \$-73 \$-74 \$-75	B. Floratham B. Koutmoung B. Nong-Sou Noy B. Dong-Nong B. May Shiel B. Nalskien B. Nalskien B. Nalskien B. Nalskien B. Nalskien B. Nalskien B. Nalskien B. Najsberg-Noy B. Sackad-Tai B. Dan-Goni B. Kengino-Tai B. Nobon-Tai B. Thet-Noy B. Nalskiewo	Sativan Swayan Sativan	13 21 13 64 22 92 100 147 39 75 75 75 18 66 61 13 56 41 42 42 42 99	117 90 315 131 556 628 1034 115 224 452 510 117 450 739 365 212 250 717	34 61 61 151 62 285 53 100 212 213 55 100 298 298 185 104 110 332	49 10,024 164 69 300 341 524 62 124 240 295 62 260 244 180 111 140 335	
	Skiling Did (23 Villegr) B. Lak-19 B. Lak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. Browshow (1-25) B. Krowshow (1-25) B. Krowshow (1-25) B. Krowshow (1-25) B. Krowshow (1-25) B. Krowshow (1-25) B. Krowshow (1-25) B. Thoughen B. Thoughen B. Thoughen B. Nongdon B. Nongdon	Baching Baching Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone	213 55 58 58 58 59 59 59 59 50 50 50 50 50 50 50 50 50 50	120 334 283 75095 451 7759 200 200 200 200 200 200 200 200 200 20	63 178 3,792 217 100 420 100 420 100 131 1411 233 240 115 312 218 312 218 312 218	57 156 148 418 418 461 243 150 137 149 125 345 349 135 321 221 349 339 135 321 321 340 340 340 340 340 340 340 340	1.14 0.91 0.88 0.93 1.28 0.94 1.06 0.97 0.94 1.05 1.18 0.61 0.62 0.45 0.45 0.97 0.85 0.85 0.97	5-58 5-50 5-61 5-63 5-64 5-65 5-66 5-67 5-68 5-67 5-71 5-71 5-71 5-72 5-74 5-73 5-74 5-75 5-76	B. Flootham B. Kostmoving B. Nonghou Noy B. Dong-Ning D. Mry Shidi B. Nakhian B. Nakhian B. Nakhian B. Nakhian B. Nakhian B. Nakhiang B. Taramang Kao B. Nagheng-Noy B. Sackad-Tai B. Nakhian B. Nakhian B. Nakhian B. Nakhian B. Nakhian B. Kog	Santran Santran	13 21 13 64 22 100 147 27 39 75 75 70 18 66 61 13 35 64 41 46 99 96 3	117 90 315 131 556 628 1034 115 224 452 510 117 450 739 365 212 250 717 326	34 61 41 151 62 256 510 510 212 213 55 590 298 190 298 190 190 298 191 101 110 110	49 10,024 164 69 300 341 524 240 293 62 260 441 180 111 149 335 165	
	Bicking Disk (23 Villeger B. Lak-10 B. Lak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. Bak-30 B. Bak-31 B. Browshowa (C-39) B. Lak-31 B. Stak-34 B. Stak-34 B. Stak-34 B. Stak-34 B. Stak-34 B. Thongbor B. Thongbor B. Shapten Pethousphore Disk (J. S.) B. Shapten	Bachiarg <u>Bachiarg</u> Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Pathoomphone Subtama	213 38 58 58 80 36 39 39 39 39 39 39 39 39 39 39 39 39 39	120 334 2813 66095 451 178 8895 270 289 270 289 256 759 600 603 468 468 468 468 7,108 307	63 178 133 3,792 247 100 420 205 159 133 140 131 401 131 411 233 249 115 312 218 307 3,343 197	57 156 1430 234 78 440 243 150 137 149 125 348 385 385 385 321 250 366 3.765 200	1.14 0.91 0.88 0.91 1.28 0.91 0.84 1.06 0.94 1.05 1.18 0.61 0.64 1.05 1.18 0.61 0.62 0.85 0.97 0.85 0.85 0.99	\$-58 \$-59 \$-60 \$-61 \$-64 \$-70 \$-71 \$-71 \$-72 \$-73 \$-74 \$-73 \$-74 \$-75 \$-75 \$-73 \$-74 \$-75 \$-74 \$-73 \$-74 \$-73 \$-74 \$-75 \$-74 \$-75 \$-74 \$-73 \$-74 \$-75 \$-74 \$-75 \$-74 \$-74 \$-75 \$-76 \$-75 \$-76 \$-77 \$-75 \$-76 \$-76 \$-77 \$-75 \$-76 \$-76 \$-77 \$-76 \$-77 \$-76 \$-77 \$-77 \$-76 \$-77 \$-76 \$-76 \$-77 \$-76 \$-77 \$-77 \$-76 \$-77	B. Flootham B. Kouthoung B. Nong-bui Noy B. Dong-Nong B. May Shiel B. Majohi B. Nakshim B. Nakshim	Sanivan Sanivan	13 21 13 64 22 92 92 100 147 35 75 76 16 66 113 56 143 42 46 59 63 164	137 50 315 536 628 10.54 115 224 432 300 117 320 305 202 305 202 200 739 365 212 2200 373 326 384	34 61 61 151 285 287 530 212 213 53 53 53 53 100 100 298 185 104 110 302 345 214 35 35 35 35 35 35 36 38 36 38 37 37 28 37 37 28 37 37 28 37 37 37 37 37 37 37 37 37 37 37 37 37	49 10,024 69 300 341 524 62 124 240 293 62 260 244 180 111 180 111 140 335, 165 512	
	Skilven Disk (23 Villeer) B. Lak-19 B. Lak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. B. Bak-20 B. B. B. B. B. Southoury (L-36) B. Thoughour Crist B. Naghour Performage/one Crist (LS V B. Chaftangago B. Stak	Bachiarg Bachiarg Pathoomphone Pathoompho	23 58 58 59 60 59 59 59 59 59 59 59 59 59 59 59 59 59	120 334 283 5,095 451 178 881 448 3099 270 289 270 629 285 620 639 468 657 7,108 659 290 633 468 657 7,108	63 175 135 3,792 217 100 420 205 159 133 140 131 411 233 240 115 312 218 307 3,343 197 195	57 156 143 4303 234 78 461 243 150 137 149 125 348 345 349 135 321 259 360 3765 2200 113	1.14 <u>0.91</u> 0.93 0.93 1.28 0.94 1.05 1.15 1.05 1.15 0.64 0.62 0.85 0.87 0.87 0.87 0.85 0.89 0.89 0.89 0.89 0.89 0.89 0.89 0.91 0.91 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.95 0.94 0.95 0.95 0.94 0.95	5-18 5-59 5-60 5-62 5-63 5-64 5-64 5-65 5-66 5-70 5-71 5-71 5-73 5-74 5-74 5-74 5-75 5-76 5-76 5-76 5-76 5-76 5-72 5-74 5-75 5-76 5-72 5-75 5	B. Flootham B. Koutnoung B. Nong-Sou Noy B. Dong-Ning B. May Sivisi B. Nal-Nisim B. Nal-Nisim B. Nal-Nisim B. Nal-Nisim B. Nal-Nisim B. Nal-Nisim B. Nal-Nisim B. Nal-Nal-Naj B. Dan-Goai B. Kaegairo-Tai B. Nal-Coai B. Nal-C	Sativan Swityan Swityan Sativan	13 21 13 64 22 1000 147 27 39 75 70 16 16 13 56 13 56 13 56 63 164 120	117 50 315 535 628 1034 115 224 432 510 117 450 739 365 212 250 373 326 325 210 326 325 321 326 325 326 326 327 326 326 327 326 327 326 327 326 327 326 327 326 327 326 327 326 327 326 327 327 326 327 327 327 327 327 327 327 327 327 327	34 61 61 62 256 287 510 212 213 213 213 213 213 213 213 213 214 213 214 214 215 214 215 214 215 214 215 215 215 215 215 215 215 215 215 215	49 10,024 164 69 500 341 524 62 124 240 295 62 260 295 62 260 241 180 111 140 335 165 512 415	
	Biching Disk (23 Villeger B. Lak-10 B. Lak-20 B. Lak-20 B. Lak-20 B. Lak-21 B. Boulthows (C-23) B. Lak-23 B. Brouchtows (C-23) B. Lak-31 B. Stowaltows (C-23) B. Lak-31 B. Showaltows (C-23) B. Tomo-Net B. Tomo-Net B. Tomo-Net B. Tomo-Net B. Tomoghon D. Nighto B. Childhamghon B. Childhamghon B. Smithamatou	Baching Baching Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Pathcomphone Subtama Subtama Subtama Subtama	23 38 98 1545 60 36 39 99 99 30 33 61 14 148 148 148 148 148 148 148 148 148	120 334 283 178 8895 451 178 881 468 309 270 289 270 289 270 289 670 629 629 629 629 629 629 629 629 629 629	63 178 135 3,792 247 1000 420 205 133 140 131 411 235 240 115 312 218 312 218 312 218 312 312 197 135 312 3343 197	57 1.26 1.28 4.503 2.54 78 4.61 2.43 1.50 1.37 1.49 1.25 3.45 3.89 1.35 3.21 2.50 3.60 3.765 2.00 1.13 3.45	1.14 0.83 0.93 1.28 0.94 1.05 1.18 0.94 1.05 1.18 0.62 0.85 0.97 0.85 0.85 0.89 0.89 0.89 0.99 0.99 0.99 0.99 0.85 0.99 0.97 0.94 0.51 0.94 0.91 0.97 0.94 0.94 0.97 0.94 0.94 0.97 0.94 0.94 0.97 0.94 0.97 0.94 0.95 0.97 0.94 0.97 0.94 0.95 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.94 0.62 0.97 0.97 0.94 0.97 0.94 0.97 0.97 0.94 0.97 0.94 0.97 0.94 0.97 0.97 0.94 0.97 0.97 0.94 0.62 0.97 0.97 0.97 0.94 0.62 0.97 0.97 0.98 0.97 0.97 0.97 0.94 0.62 0.97 0.97 0.97 0.97 0.97 0.97 0.94 0.62 0.97 0.97 0.98 0.85 0.85 0.99 0.97 0.99 0.97 0.97 0.97 0.94 0.85 0.97 0.07	5-18 5-59 5-60 5-61 5-62 5-65 5-65 5-66 5-65 5-66 5-67 5-76 5-77 5-71 5-72 5-73 5-74 5-75 5-76 5-78 5-78 5-78 5-78 5-78 5-78	B. Flootham B. Kouthoung B. Nong-Sour Noy B. Dong-Nong D. May Shiel B. Malakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisi B.	Sanivan Sanivan	13 21 13 64 22 20 20 147 27 36 75 76 18 66 113 53 44 44 46 99 63 3164 120 214	137 50 315 536 628 10.54 115 224 432 300 117 320 305 202 305 202 200 739 365 212 2200 373 326 384	34 61 41 131 62 285 287 510 51 212 213 35 100 212 213 35 100 110 110 110 372 365 32	49 10,024 69 300 341 524 62 124 240 295 62 250 441 180 111 140 135 165 512 415 512 40	
	Skilven Disk (23 Villeer) B. Lak: 19 B. Lak: 20 B. Bak: 20 B. Bak: 20 B. Bak: 20 B. Bak: 20 B. Bak: 20 B. Bak: 30 B. B. Bouldour, 20 B. Lak: 31 B. B. Moulloug (L-36) B. Thoroff Skill, 20 B. Thoroff	Bachiarg Bachiarg Pathoomphone Pathoompho	23 58 58 58 50 50 50 59 59 59 59 59 59 59 59 59 59 59 59 59	120 334 283 451 178 889 270 289 270 289 276 670 679 289 670 679 289 670 679 299 633 463 667 7,108 397 230 662 230 662 230 57 240 57 240 57 240 57 240 57 240 57 57 57 57 57 57 57 57 57 57 57 57 57	63 178 135 3,792 247 1000 420 205 133 140 131 411 235 240 115 312 218 312 218 312 218 312 312 197 135 312 3343 197	57 156 143 4303 234 78 461 243 150 137 149 125 348 345 349 135 321 259 360 3765 2200 113	1.14 <u>0.91</u> 0.93 0.93 1.28 0.94 1.05 1.15 1.05 1.15 0.64 0.62 0.85 0.87 0.87 0.87 0.85 0.89 0.89 0.89 0.89 0.89 0.89 0.89 0.91 0.91 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.94 0.95 0.95 0.94 0.95 0.95 0.94 0.95	5-18 5-59 5-60 5-62 5-63 5-64 5-64 5-65 5-66 5-70 5-71 5-71 5-73 5-74 5-74 5-74 5-75 5-76 5-76 5-76 5-76 5-76 5-72 5-74 5-75 5-76 5-72 5-75 5	B. Flootham B. Koutnoung B. Nong-Sou Noy B. Dong-Nong B. May Sivisi B. Nal-Nisim B. Nal-Nisim B. Nal-Nisim B. Nal-Nisim B. Nal-Nisim B. Themps Cond B. Naj-Neng-Noy B. Sackad-Tai B. Dan-Goni B. Koegsino-Tai B. Than-Noy B. Nal-Noy B. Nal-Nal-Noy B. Nal-Nal-Noy B. Nal-Nal-Nal-Nal-Nal-Nal-Nal-Nal-Nal-Nal-	Sarayan Sarayan	13 21 13 64 22 1000 147 27 39 75 70 16 16 13 56 13 56 13 56 63 164 120	917 900 313 356 628 1044 115 224 452 310 117 315 224 310 317 315 224 310 317 315 224 310 317 326 250 345 321 225 326 321 326 321 326 321 326 321 326 326 327 326 327 326 327 326 327 326 327 326 327 326 327 327 326 327 327 327 326 327 327 327 327 327 327 327 327 327 327	34 61 61 62 256 287 510 212 213 213 213 213 213 213 213 213 214 213 214 214 215 214 215 214 215 214 215 215 215 215 215 215 215 215 215 215	49 10,024 69 300 341 524 62 124 240 295 62 250 441 180 111 140 135 165 512 415 512 40	
	Biching Disk (23 Villeger B. Lak-10 B. Lak-20 B. Lak-20 B. Lak-20 B. Lak-21 B. Boulthows (C-23) B. Lak-23 B. Brouchtows (C-23) B. Lak-31 B. Stowaltows (C-23) B. Lak-31 B. Showaltows (C-23) B. Tomo-Net B. Tomo-Net B. Tomo-Net B. Tomo-Net B. Tomoghon D. Nighto B. Childhamghon B. Childhamghon B. Smithamatou	Bachiarg Dachiarg Dachiarg Pathoomphone	23 38 98 1545 60 36 39 99 99 30 33 61 14 148 148 148 148 148 148 148 148 148	120 334 283 451 178 889 270 289 270 289 276 670 679 289 670 679 289 670 679 299 633 463 667 7,108 397 230 662 230 662 230 57 240 57 240 57 240 57 240 57 240 57 57 57 57 57 57 57 57 57 57 57 57 57	63 178 135 135 135 217 100 429 205 139 133 140 131 411 411 411 235 246 115 3122 218 307 3343 197 135 335 147 155 155 155 155 155 155 155 15	57 136 148 4303 234 78 461 243 150 137 149 125 346 345 349 135 321 250 365 200 113 345 321 250 3765 200 113 345 345 325 200 1375 200 1375 200 1375 200 1375 200 1375 200 1375 200 1375 200 1375 200 1375 200 1375 200 1375 200 1375 200 1375 200 1375 149 149 150 1375 149 150 1375 149 155 149 155 166 1375 149 155 167 167 167 167 167 167 167 167	3.14 <u>0.91</u> 0.93 0.93 1.28 0.94 1.06 0.97 0.94 1.06 1.06 0.97 0.94 1.06 0.97 0.94 1.06 0.97 0.94 1.06 0.97 0.94 1.06 0.97 0.94 1.08 0.94 0.95 0.95 0.94 0.97 0.95 0.94 0.97 0.97 0.94 0.97 0.97 0.97 0.97 0.94 0.97 0.97 0.97 0.97 0.97 0.94 0.97 0.95	5-18 5-59 5-60 5-64 5-65 5-65 5-65 5-66 5-67 5-78 5-71 5-72 5-78 5-79 5-79 5-79 5-79 5-79 5-79 5-79 5-80	B. Flootham B. Kouthoung B. Nong-Sour Noy B. Dong-Nong D. May Shiel B. Malakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisim B. Nalakisi B.	Sanivan Sanivan	13 21 13 64 22 100 147 27 75 75 76 18 66 113 56 113 56 144 42 44 45 99 63 164 120 144 66	917 900 315 536 638 638 638 638 638 638 638 6	34 61 11 131 62 286 287 510 510 212 213 315 100 208 208 208 208 208 208 208 208 208 2	9 10,024 164 69 500 341 524 240 293 62 260 411 180 111 140 335, 165 512 415 60 206 247 87	
	Skiling Did (23 Villeg) B. Lak-19 B. Lak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. B. Bak-20 B. B. Roushow (L-25) B. Roush	Bachiarg Bachiarg Pathoomphone Pathoompho	23 38 38 39 39 30 30 39 39 39 39 39 39 39 39 39 39 39 39 39	120 283 405 178 889 270 270 270 270 270 270 270 270	63 178 178 135 3,792 247 100 420 205 159 133 140 131 411 411 411 411 411 411 411	57 136 138 4303 234 78 461 243 150 137 149 125 348 349 135 321 250 360 3765 2000 113 345 345	3.14 <u></u>	5-16 5-59 5-69 5-61 5-62 5-65 5-65 5-65 5-65 5-70 5-71 5-76 5-77 5-78 5-77 5-78 5-77 5-78 5-77 5-78 5-77 5-78 5-79 5-80 5-41 5-72 5-80 5-41 5-42 5-42 5-43 5-41 5-42 5-43 5-44 5-45 5-45 5-45 5-45 5-45 5-45	 B. Flootham B. Koathoung B. Nongbour Nay B. Dong-Neng D. My siNidi B. Nalskitim B. Nalskiti	Sativan Sativan	13 21 13 44 23 29 100 147 147 25 75 75 75 75 75 75 75 75 75 75 75 75 75	117 190 313 356 628 1054 115 124 432 224 310 117 326 3450 2250 2250 2250 212 2550 212 2550 117 326 3450 3470	34 61 41 131 62 286 287 510 510 212 213 55 190 213 190 198 198 104 110 110 372 365 352 298 298 298 298 298 209 200 200 200 200 200 200 200 200 200		
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	Skilven Disk (23 Villeer) B. Lak-19 B. Lak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. Bak-20 B. B. Bak-20 B. B. Bak-20 B. B. Houshbox (L-25) B.	Bachiarg Bachiarg Pathoomphone Pathoompho	23 35 36 36 36 36 39 39 39 39 39 39 39 39 39 39	120 334 283 86095 4511 178 8795 270 289 270 289 270 629 256 629 250 633 463 463 463 463 463 463 463	63 178 173 3,792 247 100 420 420 420 130 140 131 401 131 401 140 132 246 312 246 312 246 312 246 312 246 312 246 312 246 312 246 312 246 312 246 312 246 312 246 312 340 340 340 340 340 340 340 340	57 156 44 4503 234 4611 148 4503 234 461 137 78 461 137 78 149 125 137 149 125 137 138 150 137 148 150 137 148 150 137 148 150 137 150 137 148 150 137 150 137 150 137 125 138 150 137 125 138 150 137 125 138 150 137 125 138 150 137 125 138 150 137 125 138 150 137 125 138 150 137 125 138 150 137 125 138 150 137 149 150 150 150 150 150 150 150 150	1.14 6.93 6.83 6.93 1.28 6.93 1.28 6.93 1.28 6.93 1.28 6.93 1.28 6.94 1.05 6.97 6.97 6.97 6.97 6.97 6.97 6.97 6.97 6.97 6.93 6.93 6.93 6.93 6.94 6.93 6.94 6.94 6.95 6.97 6.97 6.97 6.95 6.95	5-18 5-79 5-60 5-61 5-62 5-66 5-66 5-66 5-66 5-70 5-71 5-71 5-73 5-74 5-75 5-79 5-80 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-84 5-75 5-79 5-80 5-84 5-75 5-79 5-80 5-84 5-75 5-79 5-80 5-84 5-75 5-76 5-75 5-76 5-75 5-76 5-76 5-76 5-77 5-78 5-79 5-86 5-77 5-78 5-86 5-77 5-78 5-78 5-79 5-86 5-86 5-86 5-86 5-76 5-86 5-76 5-86 5-76 5-86 5-76 5-86 5-76 5-86 5-76 5-86 5-76 5-86 5-76 5-86 5-76 5-76 5-86 5-77 5-77 5	 B. Flootham B. Kouthoung B. Dong-Ning B. Dong-Ning B. May Shidi B. Nalakisin B. Theoremark Nov B. Staelaadi Tii B. Dan-Grai B. Theoremail B. Nalakiso B. Koolon Tai B. Theoremail B. Theoremail B. Staelaadi Tii B. Solamiso B. Koo B. Frae-Orati B. Solamiso B. Nalakiso 	Sativan Sativan	13 21 13 64 13 23 29 100 147 147 39 57 70 16 16 103 56 44 44 45 99 63 164 120 120 14 60 88 89 63 164 120 120 14 77 76	117 190 315 133 356 628 1054 115 3244 452 310 117 326 326 349 340 348 348 348 311 117 326 341 348 348 348 348 348 348 348 348	34 61 61 286 287 530 212 213 353 208 213 213 208 208 208 209 208 209 209 209 209 200 200 200 200 200 200		
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Source: Village Survey, April 1991

Table 3.3.1c

Population in the Study Area and Prioritized Area

District Name	District Population (1994)	No. of Village within Study Area	Pepulation in Study Area (1994)	No. of Village within Prioritized Area	Population in Prioritized Area (1994)
A. Champasak Province				· · · · · ·	
Sanasomboun	52,694	36	24,780	8	3,705
Bachiang	36,227	25	8,095	5	1,719
Pathoumpone	41,716	15	7,108	3	1,186
Sukhuma	36,227	7	3,950	2	912
Khong	65,868	17	9,364	2	929
Sub-Total	232,732	100	53,297	20	8,451
		e de la companya de La companya de la comp			an an Thursday An Thursday an Anna
B. Saravan Province					an an an an an an an An an
					1.
Lakonepheng	27,884	16	5,768	2	774
Khongxedong	43,293	22	9,879	5	1,999
Vapy	26,912	14	7,525	4	2,427
Saravan	58,980	37	18,005	7	3,948
Laongam	41,849	11	4,411	2	849
Sub-Total	198,918	100	45,588	20	9,997
Total	431,650	200	98,885	40	18,448

Source: (1) District Population is based on Table 3.2.1a. (2) Village Population is based on the Village Survey, April 1994.

District (Growth	1994	1996	1998	2000	2002	2005
Name F	late	· ·				· · ·	
A. Champasak Province	•				· · ·		
Sanasomboun	2.36%	52,694	55,211	57,847	60,610	63,505	68,108
Bachiang	2.36%	36,227	37,957	39,770	41,669	43,659	46,824
Pathoumpone	2.36%	41 716	43,708	45,796	47,983	50,274	53,918
Sukhuma	2.36%	36,227	37,957	39,770	41,669	43,659	46,824
Khong	2.36%	65,868	69,013	72,309	75,762	79,381	85,134
Phontong	2.36%	75,748	79,365	83,156	87,127	91,288	97,905
Champasak	2.36%	47,205	49,460	51,822	54,296	56,889	61,012
Mounlaoamok	2.36%	30,738	32,206	33,744	35,356	37,044	39,729
Pakhsong	2.36%	50.499	52,910	55,437	58,085	60,858	65,270
Pakse	2.36%	60,379	63,262	66,283	69,449	72,766	78,040
	•						
Sub-Total:		497,301	521,051	545,934	572,007	599,324	642,76.
1							на страна и на При страна и на страна и на При страна и на
B. Saravan Province						가는 가 말 같 것	
Lakonepheng	2.97%	29,229	30,991	32,859	34,840	36,940	40,33
Khongxedong	2.97%	47,216	50,063	53,080	56,280	59,673	65,149
Vapy	2.97%	26,981	28,607	30,332	32,160	34,099	37,221
Saravan	2.97%	62,955	66,750	70,774	75,040	79,564	86,860
Laongam	2.97%	41,595	44,103	46,761	49,580	52,569	57.39
Toumlam	2.97%	15.739	16,688	17,693	18,760	19,891	21,710
Ta Oi	2.97%	20,236	21,455	22,749	24,120	25,574	27,92
Samuoi	2.97%	8,994	9,536	10,111	10,720	11,366	12,409
Sub-Total		252,945	268,193	284,360	301,502	319,677	349,01
Total		750,246	789,243	830,294	873,508	919,001	991,77

Table 3.3.1dPopulation Projections in Champasak and Saravan Provinces,
1994-2005

Source: Population of the Lao P.D.R, 1992, Ministry of Economy, Planning and Finance

Table 3.3.1e

1

Population Projections in the Study Area, 1994-2005

District	No. of Villages	Growth	1994	1996	1998	2000	2002	2005
Name	within District	Rate	· · ·		1 - A			•
A. Champasak I	rovince			· · · .				<u>.</u>
Sanasomboun	36	2.36%	24,780	25,963	27,203	28,503	29,864	32,028
Bachiang	25	2.36%	8,095	8,482	8,887	9,311	9,756	10,463
Pathoumpone	15	2.36%	7,108	7,447	7,803	8,176	8,566	9,187
Sukhuma	7	2.36%	3,950	4,139	4,336	4,543	4,760	5,105
Khong	. 17	2.36%	9,364	9,811	10,280	10,771	11,285	12,103
Sub- Total:	100		53,297	55,842	58,509	61,303	64,231	68,887
B. Saravan Prov	ince						· .	
Lakonepheng	16	2.97%	5,768	6,116	6,484	6,875	7,290	7,959
Khongxedong	22	2.97%	9,879	10,475	11,106	11,775	12,485	13,631
Vapy	14	2.97%	7,525	7,979	8,460	8,970	9,510	10,383
Saravan	37	2.97%	18,005	19,090	20,241	21,461	22,755	24,843
Laongam	11^{+1}	2.97%	4,411	4,677	4,959	5,258	5,575	6,086
Sub-Total	100	• •	45,588	48,336	51,250	54,339	57,615	62,903
Total	200	· · · · · · · · · · · · · · · · · · ·	98,885	104,178	109,759	115,643	121,846	131,789

Source: Population of the Lao P.D.R, 1992, Ministry of Economy, Planning and Finance

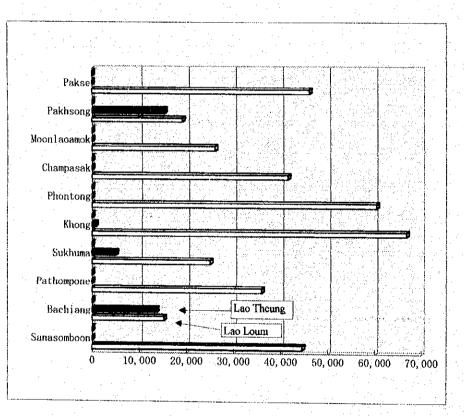
Table 3.3.2

Population of Ethnic Group in Champasak Province, 1991

	Lao Loum	Lao Theung	Lao Soung	District Population (1991e)
Sanasomboon	44,454	0	0	44,454
Bachiang	15,064	13,420	6	28,490
Pathompone	35,900	0	0	35,900
Sukhuma	24,996	5,037	0	30,033
Khong	66,811	757	0	67,568
Phontong	60,374	0	Û	60,374
Champasak	41,498	0	0	41,498
Mooniaoamok	26,058	0	0	26,058
Pakhsong	19,096	15,202	5	34,303
Pakse	46,002	0	0	56,365
Total	380,253	34,416	11	425,043

Source: Public Health Service of Champasak Province, 1994

Note: 1991e = estimated figure for 1991



				÷.,				× .	Line	Unit: T	on	
District		Wetland	Upland	Green	Gro	und-	Coffee	Card	amon	Soy-	Sugar-	Tobacco
	<i>1</i>	Rice	Rice	Bean	nut	· · .				bean	cane	
Sanasomboon		24,571	- 260	1	l	. 10	0		8	61	0	13
Bachiang		8,108	5,738	•	2	235	365		· 11	306	94	0
Pathompone		18,043	224	2	6	10	192		-4	: i - 1	240	0
Sukhuma		26,009	.0		8	18	0		0	0	156	8
Khong		29,317	- 0	1	5	38	0	1.1	0	29	1,053	- 249
Phontong		48,436	0	an a	0 .	0	. 0		.0	0	. 0	0
Champasak	· .	26,690	· ¹ 0	. 1	i -	. 7	. 0	•	0	9	149	4
Moonlaoamok		16,200	0	· 7	2	23	0		0	0	30	4
Pakse		6,327	0		0	0	0		0	0	. 0	0
Pakhsong		879	819	÷.	0	0	13,398	; ·	41	0	0	22
Total	· ·	203,701	6,222	14	4	341	13,955		23	406	1,722	299

Table 3.3.3a Agricultural Production in Champasak Province, 1994

Source: Agriculture & Forestry Service of Champasak Province, 1994

Production of Wetland Rice by District

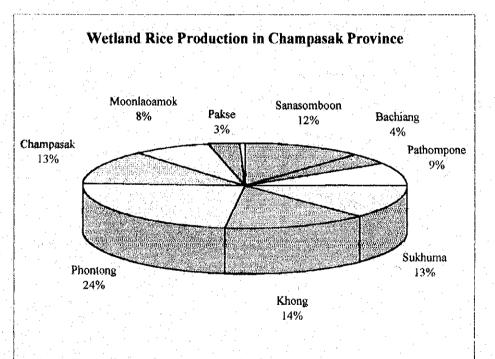
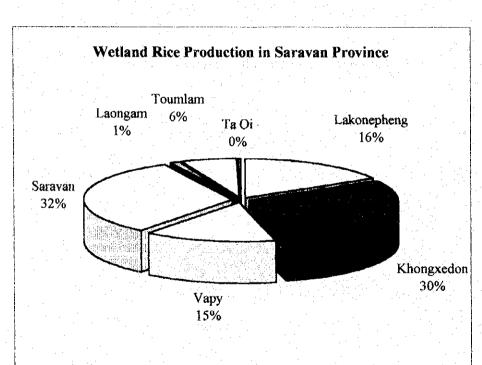


 Table 3.3.3b
 Agricultural Production in Saravan Province, 1994

Unit:	Ton
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District	Wetland Rice	Upland Rice	Soybean	Groundnut	Coffee	Cardamon	Banana
Lakonepheng	17,074	0	0	0	0	0	0
Khongxedon	30,863	353	. 0	0	0	0	0
Vapy	15,130	153	21	0	0	0	0
Saravan	33,224	1,839	0	152	- 11	11	197
Laongam	1,247	7,432	759	249	1,240	95	2,400
Toumlam	6,375	. 0	0	0	0	0	0
Ta Oi	117	1,320	0	0	0	0	0
Samuoi	111	1,080	0	0	0	0	0
Total	104,030	11,097	780	401	1,251	106	2,597

Source: Agriculture & Forestry Service of Saravan Province, 1994



Rural Income Survey, 20 Samples in Saravan Province, 1955

Table 3.3.4a

Kip
.E
Umit
Monetary
Unit: 1

b

Sample	Village	Family Adult	It Child		Land-	Rice	Other	Crops	Livestock	Ott-tarm	(rross	Farm		lotal	Net .	
Ŷ	Name	Size (15c	15over) (0-14)		holding	Income	Crops	Income	Income				Expenditure 1	Expenditure	income	
				÷	(Ha)		Income	Total			(Y)			(<u>a</u>)	(A)-(B)	
											-					
1.42	Elman-Tai		ę		ŝ	80.000						6,800	185,000		138,200	
5 ° C • S	House Tai	, e	(च	Ŷ	120,000						17,000	384,000		29,000	
2.02	House Tai	10	- =	œ	75	240,000		-		۱. ۱		12,200	700,000		477,800	
20-7 20-7	Honon-Tai	ġ		o v	3.2	40.000						6,300	900,000		793,700	
1 20	Benn	7 t-	۰. ۱ ۴	s ur	17	232,000					÷.	7,140	337,000		305,360	
200	Renut	. 2 4) E IV	ب		80.000					÷ .	4,800	105,000		90,200	
2.00	Renu	÷ (**	• ব	. 		24.000	0		•			6,600	259,000		346,400	
- 00 - 00	Benn	· {*	~	i Vî	2	136.000	. •					7,600	179,000		91,400	
0-00	Nakaso	1	i e	া ব	2.2	240,000			•	50,000	330,000	37,160	282,000		10,840	
Sa_10	Nakasan		9	Ś	1.7	320,000		0. 320,00	•••			23,060	328,000		38,940	
20-11	Nakasao	- 20 -		n	21	480,000		0 480,00				8,570	461,000		97,430	
Sa-17	Nakasao	so	7		2.5	480,000	0	0 480,00				15,600	544,000		43,400	
Sa_13	Phomai	. m	. ლ	0	7	320,000		0 320,00				38,300	450,000		41,700	
Sa-14	Phomon	500	ý	-0	4	320,000		0 320,00		•	-	12,800	830,000		797,200	
Sa 15	Phomai	i m	(m)	0	1.5	240,000		0 240,00				9,200	390,000		11,800	
Sa-16	Phomai	I	4	ጣ	0	240,000		0 240,00				8, 600	400, 000		46,400	
Sa-17	Chong	10	òo	2	5 5	560,000		0 560,00				17,000	516, 000		27,000	
2 ⁸ -18	Chone	i*•	Ť	ŝ	1.5	240.000		0 240,00			1	10,400	269, 000		81,600	
Sa. 19	Choire	ന	63		-	240,000		0 240,00				6, 800	300, 000		53,200	
Sa-20	Chone	20	C)	Ŷ	1.5	240,000		0 240,000	0 10, 600	. •	250,000	10, 200	225, 000	235,200	14,800	
Sub-tota		156	85	- 12	51.4	4,872,000	1,549,500	, e	-	1 3,940,00 <u>0</u>	11,846,500	266,130	8,044,000	60	3,536,370	
Average		7.8	4.25	3.55	2.57	243,600	77,475	5 321,075			592,325	13,307	402,200		176,819	
1												•				

Source: Rural Income Survey conducted by the Study Team, March 1995

Rurai Income Survey, 20 Samples in Champasak Province, 1995

Unit: Monetary Unit in Kip

	Sample	Village	Family Adult	Adulh	Child	Lund-	Rice	Other	Crops	Livestock	5		farm		Total T	Net
	No.	Name	Size	(15over)	(Ó-14)	beoleting (14a)	Income	Crops Income	Income Total	Income	Income	Income (A)	Expenditure	Expenditure Expenditure (B)	Apcnature (B)	income (A)-(B)
-													0.00		750 500	001 282
	Ch-1-	Nasemphan	01		τ. 	5 1.5	216,000	.	216,000			-	200.4			
	5	Nasenthan	: =		. v	4	288.000)	0. 288,000		-	-	78,000	ب سبو	1,416,000	412,000
		Nascupitat					192.000		1 192,000				33,800		187,800	534,200
	2-12	Normhan				у г 	120,000)	120.000	5,000			31,300	. '	161,300	113,700
		1 -11	2		1 0		48 000	t Lt					2,400		177,400	155,600
		12-VBU	р ч 		n v		160,000			. '			2,400		442,400	137,600
÷	6 r 6 r	1 2-48-1					0	250.000	е н с			-	22,000		1,722,000	-122,000
		12-4127	- 1					30.00		0	420.000		0		420,000	30,000
		Lak-21				7 - 7 - 7 -	0.0181	•••			85.000		1,200		57,200	75,8())
•		1.ak-24	רי די		- - -	- ~	48,000				150,000		4,000		129,000	69,000
	2 a 5 d	Lak-24	n k		n (*	 -	144 000)	144.000		•		2,600		63,200	210,800
		L/dk-24	, o		n vo	• • • •	740.000		_			,	4,000		820,000	356,000
	21-11-1 21-11-2	Lan-24) -	80.000		•				3,000		283,000	12,000
•		1 out	٢		 . v	2 - C	80,000			•			3,000		275,000	65,000
		Anon I	- V		'nr	2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	288.000		_				1,000		41,000	332,000
		LOUY I CHIN				- 02 - 02	0		0 6,000	0. 26,000	0 150,000	182,000	1,250	15,000	76,250	105,750
		Monthai	ч с.			,	576.000	. •					60,000		391,000	685,000
		Monophai		:		. c	176 000		c.				. 4,000		149,000	234,500
. [*]		Morechai			0 d	- C C C	192,000	10,000		-			18,100		138,100	006,79
	CH-12	Nonethai			. ~		0	1	1			730,000	0		641,000	000,68
•	Carb Total	1_			N N	36.8	2 896 000	1312.000	0. 4.208.000	0 1,006,500	7,107,600	12,322,100	276,550	8,064,600	8,341,150	3,980,950
- ¹ -,	uplu I -unc.		י ע ע		4	1 1.84	Î	65,600				616,105	13,828	. 403,230	417,058	199,048
1.11	VIVI apr															

3-38

Source: 40 Sample Households Interview Survey, March 1995.

Table 3.3.4b

Table 3.3.6a

16

Medical Services Infrastructure and Staff in Champasak Province, 1994

	No. of Bed	High Level Doctor	Medium Level Doctor	Nurse	Other Staff
Provincial] Hospital	250	41	97	117	154
Sanasomboon	25	1	12	39	36
Bachiang	30	· · · . · 1	9	40	26
Pathompone	. 25	4	10	47	41
Sukhuma	20	2	. 9	36	29
Khong	50	2	20	52	52
Phontong	26	5	. 19	52	77
Champasak	30	2	6	36	16
Moonlaoamok	30	2	10	26	154
Pakhsong	48	2	12	46	2
Pakse	5	4	18	39	137
Total	539	66	222	530	724

Source: Public Health Service of Champasak Province, 1994

Note: Each District has a District Hospital at District capital town and has several Dispensaries at Sub-District level. For example, Sanasomboon District has a District Hospital at Huaxe and 4 Dispensaries at Sub-District level.

Table 3.3.6bMedical Services Infrastructure and Staff
in Saravan Province, 1994

· · ·		No. of	High Level	Medium	Nurse	Other
		Bed	Doctor	Level Doctor		Staff
Prov. Hospital		250	- 41	97	117	154
Lakhonepheng		25	1	12	- 39	36
Khongxedon	· .	30	1	. 9	40	26
Vapy		25	- 4	10	47	41
Saravan		20	2	9	36	29
Laongam	÷.	50	2	20	52	52
Toumlam		26	5	19	52	77
Ta Oi		30	2	6	36	. 16
Samuoi		30	2	10	26	154
Total	•	486	60	192	445	585

Source: Public Health Service of Saravan Province, 1994

Note: Each District has a District Hospital at District capital town and has several Dispensaries at Sub-District level. For example, Khongxedon District has a District Hospital at Khongxedon and 5 Dispensaries at Sub-District level.

Table 3.3.6c

Leading Causes of Morbidity in Champasak Province, 1994

and the second		1 A.	and the second second			
	Malaria	Diarrhea	Influenza	Dysentry	Pneumonia	Tuberclosis
Prov. Hospital	1,575	132	11	31	154	37
Sanasomboon	398	85	26	134	36	60
Bachiang	236	40	13	41	26	4
Pathompone	402	28	38	19	41	. 4
Sukhuma	447	26	5	4	29	1
Khong	543	676	422	504	52	26
Phontong	212	350	115	34	77	1
Champasak	203	33	29	11	16	0
Moonlaoamok	988	121	142	198	154	3
Pakhsong	192	6	0	0	2	0.
Pakse	268	313	406	. 195	137	0
Total	5,464	1,810	1,207	1,171	724	136
Ranking	1	2	3	4	5	6

Source: Public Health Service of Champasak Province, 1994

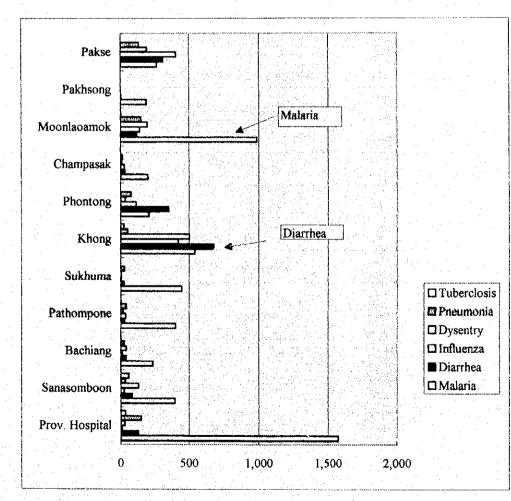


Table 3.3.6d

Leading Causes of Morbidity in Saravan Province, 1994

	Malaria	Diarrhea	Influenza	Dysentry	Pneumonia	Tuberclosis
Prov. Hospital	2,191	281	n.a.	75	523	59
Saravan	1,821	1,071	1,518	605	353	9
Laongam	364	62	n.a.	n.a.	114	n.a.
Vapy	925	634	n.a.	74	125	n.a.
Khongxedon	210	n.a.	n.a.	n.a.	n.a.	n.a.
Lakhongpheng	71	n.a.	n.a.	n.a.	n.a.	n.a.
Toumlam	267	344	n.a.	15	106	n.a.
Ta Oi	121	76	n.a.	22	34	n.a.
Samuoi	50	63	n.a.	30	72	n.a.
Total	6,020	2,531	1,518	821	1,327	68
Ranking	1	2	3	. 4	5	6

Source: Public Health Service of Saravan Province, 1994 Note: The above figures indicate the number of out-patients during Oct. 1993 to Sep. 1994

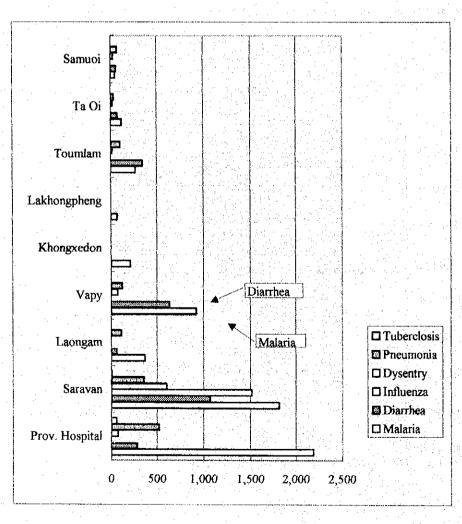


Table 3.3.6e

Budget for Provincial Health Department, Champasak, 1994-95

		Unit: Million	Kip
Description	1993-1994	1994-1995	Increase
	Budget	Budget	
1 Salary	260.00	607.57	347,57
2 Social Welfare	26.50	37.68	11.18
3 Administration	50.00	50.00	0.00
4 Reparing and Purchasing	41.30	44.00	2.70
4.1 Medical Equipment for Provincial Hospital	6.50	7,00	0.50
4.2 Medical Equipment for District Hospitals	6.80	7.00	0.20
4.3 Other reparing and Purchasing	28.00	30.00	2.00
5 Per Diem for Students	18.80	20.00	1.20
6 Medicine Purchasing	73.40	86.50	13.10
6.1 Medicine for Provincial Hospital	26.00	30.00	4.00
6.2 Medicine for District Hospitals	30.00	32.00	2.00
6.3 Medicine for Mother and Children	0.00	3.50	3.50
6.4 Medicine for Malaria Control	0.00	3:50	3.50
6.5 Medicine for Skin Disease	0.00	2.00	2.00
6.6 Medicine for T.B.	0.00	1.50	1.50
6.7 Patient's Health Improvement for Prov. H.	9.00	8,00	-1.00
6.8 Patient's Health Improvement for Dist. H.	8.40	6.00	-2.40
7 Basic Construction	26.00	179.30	153.30
7.1 Domestic Capital	26.00	20.90	-5,10
7.2 Foreign Capital	0.00	158.40	158.40
Total	496.00	1,025.05	529.05

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Source: Provincial Health Department, Champasak, 1995

Table 3.3.6f Budget for Provincial Health Department, Saravan, 1994-95

	Description	Amount	Salary	Social Welfare	Admini- stration	Equipment	Others
1.1	Provincial Health Department	160.85	128.73	6.92	16.90	0.00	55.94
1.2	Provincial Hospital	63.10	0.00	0.00	3.30	18.50	
1.3	Nursing School	6.30	0.00	0.00	0.30	6.00	0.00
	Sub-Total (Province)	230.25	128.73	6.92	20.50	24.50	97.24
2.1	Saravan	16.50	10.90	1.10	1.30	2.30	0.90
2.2	Laongam	36.60	27.50	1.40	2.00	4.40	
.3	Khongxedon	52.70	33.60	2.80	2.00	5.40	8.90
.4	Vapy	35,90	28.00	1.00	1.20	4.70	
.5	Lakhonepheng	52.70	17.20	1.00	1.00	5.70	27.80
.6	Toumlam	21.90	14.30	1.60	1.00	3.70	
:7	Ta Oi	14.84	10.90	0.69	0.50	2.15	0.60
.8	Samooi	11.45	7.80	0.40	0.50		0.60
	Sub-Total (District)	242.59	150.20	9.99	9.50	30.50	42.40
	Total	472.84	278.93	16.91	30.00	55.00	139.64

Unit: Million Kip

Source: Provincial Health Department, Saravan, 1995

Tuble 3.4.2 e in Die Exi W.

v	ing:	Village	District	Liouseiseisi	Pepulation.		Frida	Water Searce		-	Se	rved Po	puinting.			
	ede	Name	Name	1994	1994			Pend Spring	Other		Well F	wang P	and Spri		ther	Tetal
	64 1	B Nakham	Sanasomboon		863	100%	100*			×63 0	0.1	0 135	D 0	0 0	. 0	863 135
		B.Phontiat	Sanasomboon Sanasomboon		135 615		100*			0	· 0	615	ŏ	ô.	ŏ	615
		B Nonsavan B Nongpha	Sanasomboon		553	20%*	509			· 01	ò	442	ō	0	0	553
		B.Souvannakihä	Sanasomboon		839	100%				8,49	. 0	0	0	0	0	839
		B.Nanai	Sanasomboon		629	100*4				629	0	0	0	0	0	629
	C-7 I	B Nongdou	Sanasomboon		378		100%;	,		. 0 534	378 31	0 63	о. Б	0 0	· 0 0	378 628
		BHOBAXC	Sanasomboon Sanasomboon		628 337	85%	5% - 10% -100%	•			337	0.	0	õ	ő	337
		B Pongsan	Sanasomboon		311	90%	10%6		1.1	280	-31	0	0	0	. 0	311
		B.Dong B.Hangam	Sanasomboon		- 354		100%				354	0	0	0	0	354
		B Nongkham	Sanasomboon		419		. 60*6 40°	•		Ð	251	168	Ģ	0 .	0	419
		0.Klamping	Sanasomboon		987		85% 10	•	5%*	0	839	- 99	0.	0 0	19 19	987 256
		B.Khamngouz	Sanasonnoon		256	95%	59.e			243 0	13 256	.0 0	. 0	0	ŏ	256
		B Nongkhen	Sanasoinboon		256	100%	100%			150	. 0	ů	0	ō.	0	150
		B Louy B Solv-Gnai	Sanasomboon Sanasombooit		1025	90%	104	\$		923	0	103	0	6 ·	0	1,025
		B.Solo-Noy	Sanasomboon		635	100%				635	0	Ø	0	0	0	635
		B. Xonphak	Sanasemboor	1 226	1230	75%	25	·		923	0	308	0	0 0	0	1,230
		B Khamlouang	Sanasonaboor		266	70%+	30%			186	80 • • ô	253	0	0	0	260 422
		B Sithouan	Sanasonaboor		422	40% 100%	60	io .		169 1,285	0	0	0	õ	č	1,285
		B. Mouang B.Oloumuang	Sanasomboor Sanasomboor		1117.	80%	15% 5			894	168	56	0	0	0	1,117
		B Boungkha	Sanasomboor		1010	95%	5			960	0	51	0	0	0	1,010
		B Latsua (Nongmek)	Sanasomboor		317	95%	5%#			301	16	·. 0	0	0	0	317
		B Nalak	Sanasomboor	n 250	1376		30* 0			0	413	963	٥.	0	0	1,376
	C-27	B Dongkalong	Sanasombooi	1 59	374		80% 20			0	299	75	0	0	· 0	
	C-28	B Nalong	Sanasomboor		1696	35%	65			594	0 601	1,162 797	0	0	0	1,0%
		B.Naxon	Sanasomboo		1398		43% 57		85%	. 0	0	47	0	ŏ	264	310
		B Thangbengsivilai	Sanasomboor		310 293	30%	15		0370		Ö	205	0	0.	0	293
		B.Nenzat B.Donphek	Sanasomboor Sanasomboor		.4)2		100			õ	ő	452	0	0	. 0	417
	C-33	B.Dua-Nus	Sanasombool		856	98%		5.		839	Q	17	Q	0	Ð	850
	C-34	B.Kengkeo	Savasoniboo	n 96	498	100%				498	0	0	0	0	. 0	-499
	C-35	B Ngouadeng	Sanasomboo	ກ 183	1053	100%				1,053	Ó	0 150	0 0	0 0	0 599	1,05: 1,49
	<u>C-36</u>	B.Pakson	Sanasembeoa	<u>я 255</u>	3497	50%	10	%	40%	13,743	4,067	150 6,059		0	912	24,78
	0.05	Sanasomboon District	Pashi	1 146	<u>24,780</u> 368	100%				368	4,057	0,039	. 0	<u>0</u>	0	36
	C-37 C-38	B Nongsai B Bachiang	Bachiang Bachiang	70 52	.308	4058		1%			164	i õ	3	0.	9	27
	C-38 C-39	B. Bachang B. Makageo	Bachiang	57	259	100%				259	0	0	0	0	0	25
	C-50	B.Nongbok-Noy	Bachiang	105	578	10052	i .			578	0	0	Û	0	0	\$7
	C-41	B Nongbok-Gnai	Bachiang	117	646	100%			1.1	646	0	0	8	0	. 0	64
	C-4₽	B.Thongkim	Bachiang	. 70	518	100%	5			510	0	0	0	0. 300	0	51 30
-	C-43	B.Kenggnao	Bachiang	54	300			1009		0	0	0 0	0	184	៍	36
	C-44	B Thongsala	Bachiang	<u>n</u>	368 394	50%		509		. 184 158	79	ŏ	ċ	158	Ŭ,	39
	C-45	B Mouangkhai	Bachiang	63 - 42	270			229		59	151	ŏ	õ	59	0	27
-	C-46 C-47	B.Pakonay B.Oudomsouk	Bachiang Bachiang	65				425		150	Ģ	Q		1.50	57	35
	C-43	B.Phasonain	Bachiang	37	157			50*		. 79	0	0	0	79	0	15
	C-49	B.1.ak-21	Báchlang	127	567	42%	•	423		238	0	0	0	238	91	56
	C-50	B.Phin	Bacmang	- 99	467			1009		0	0	0	0	467 104	0. Ú	46 39
۰.	C-51	BLak-23	Bachiang	71	391			505		196 - 190	· 0	· 0 0	0 0	196 190	0	37
	C-52	B.Lak-25	Bachiang	83	379			50%	ð .	59	59	0	ŏ.	170 ·	ŏ	៍ ព័
	C-53	B Nongkhamkhao	Bachiang	33 24				50%		68	· 0	õ	ů.	- 68	. 0	13
	C-54 C-55	B.Senkeo B.Houayten	Bachiang Bachiang	65				505		160	0	0	Ð	160	0	32
÷.,	C-56	B.Talan (B.Lak-17)	Bachiang	32				505	6	. 98	0	0	Ŭ,	98	• 0	19
	C-51	B.Nonsaat	Bachiang	36	21			501		109	0		-0	109	0	21
÷.	C-58	B Nongmak-Euk	Bachiang	35				- 50	*	92		. 0	0	92 0	0	. 12
	C-59	B.Lak-13	Bachiang	23				- 11 A						, ů	ő	31
	C-60	B.Nenhouaydua	Bachiang	- 58 - 58			•	. 100/	*	0			ŏ	283	0	28
_	C-61	B Kagno Bachiang District:	Bachiang	1,546						4,703		0	3 3	2,829	48	8,19
<u> </u>	C-61	B.Lak-19	Pathoomph				5 30%			. 316	135			. 0	. 0	- 4
	C-63	B.Lak-20	Patheomph					50%		73				0	0	11
	C-64	B Mophou	Patheoinph					1%	1.1	872				· 0 0	. D	
	C-65	B.Lak-24	Pathoomph							448				ō.	. 0	
	C-66	B.Sanasixaysouk (L-2						0%1		135			-	ð	· č	
	C-67.	B.Houakhous (L-29) B.Lak-31	Pathoomph Pathoomph					0%		. 116		.58	. 0	0.	· 0	2
	C-68 C-69	B.Lak-34 B.Lak-34	Pathooniph					14 J		103	154	0	0	0	• 0	
	C-70	B.Khoustonay (L-36)	Pathoomph	on 14	8 75	9. 100	% ·		-	759		. 0	0	. 0	0	
	C-71	8.Tomo-Nak	Pathoomph							. 180				Û D	. 0 0	
	C-72	B.Tao-Tai	Pathoomph					5%		9/ 150				0.	. 0	
	C-73	B Nakham-Noy	Pathoomph Pathoomph				9786	196	29				0	Q,	· i3	1, 6
	C-74 C-75	B.Thangbeng B.Nonskhe	Pathoomph Pathoomph					2%		3	7. A21	9	0	0	0	
	C-76	B Napho	Pathoomph	io <u>5</u> 11	2 66	7 100				.66				<u> </u>	0	
5		Pathoemphone Distri		1,38					.	1,18				0	·· 13 0	
-	C-77	B.Chikthangngo	Sukhuma	6			596	5% 5% 95%) 20) (0	. 0	
	C-78	B Bak	Sukhuma	4	3 23 3 68			5% 95% 10% 80%						ç	ő) 6
j.	C-791	B Samkhanaboua B Khonohanno	Sukhuma Sukhuma	11				10% 10%			D 290) · 436	6 0	Ð	. 0	1. 7
	C-80 C-81	B.Phonpheung B.Pako	Sukhuma	10				10%		3.5	в — С) 238	1 0	0	Q	
	C-61 C-82	B.Thapcham	Sukhuma	- 14		в ^і	. Ц	10%	· . '			793		0	0	
	Č 83	B.Kouttaboun	Sukhuma	10	<u>9 5</u>		<u>%</u>	\$04.		26		263		0		
		Sukhuma District		70					·	<u></u>) <u>2,255</u>) (0	°	
	C-64	B Boun-Tai	Khong	12	12 8. 19 5	2 100 7 100				51		a (ŏ		b :
	C-85	BKing	Khong	. 8				30%		59		0 25		Ū	Ċ	০ হ
	C-86 C-87	B.Phonsaat B.Nrayeng	Khong Khong		15 2			• •		5	7 22	9 6	3 0	0	9	
	C 88	B.Maisivilai	Khong		VO 3					36		в - 6		D		0 1
	C-89	B Nasenphan	Kheng	i 1	12 5	53	·0%				0, 39			0	•(•
	0.90		Khong	te di 👔	97 4			10		11				· Ü		0 . 0 - 3
	C-91	B.Xongpuay	Khong		46 2			3	1.	25		0	0 0 0 0	¢.		0 1
	C-92	B Nasomhong	Khong				7% 5 0%			32			8. U D. O	0		¢ .
	C-93		Khong		BU 4 75 51	15 LB 50 G	076 876	2%		L,12		0:2		Ū.		0 1
	C-94		Khong			05 10		* *	1.11		5		ō ō	0		0 ·
	C 95		Khong			70 10			·	3	0	9 - H	0 0	. 0		e .
		D.FIKBUCHE	Knong				14% ·		1.1	8	56	0	0 0	0		0
•	C-96	R Kadan										. i .	0 0	¢		0 .
	C-97			1997 - P. I.	35 7	80 9	8% Z%	1								A 11
	C-97 C-98	B Khinak	Khong Khong		65 3		0%			; : 3'	7}	Q .	0 0	0		0
	C-97	B Khinak B Settaolek	Khong		65 3 18 1	71 10 13					7) 0 I)	3	0 0 0 0			0 <u>0</u> 0 9,

Source: Village Survey, April 1994

3-45

Table 3.4.3

Code	Village Name	District Name	Household Po 1994	ipulation 1984 River	Well		e Soor	ring Ötha	r Ree	We	P#			eniatio eria O		Teta
	B NonSavang	Lakhoupheng	105	522 60%		355	1	55			0 1	83 ·	0	Q.	26	* 52
	B Nadou	Lakhonpheng	113	602 1043		90%			6			42	0	U	0	60
S-1 1	B.Nadounai	Laktionpheng	109	579 407		60%			23			117	0	U	0	- 579
	B.Houayi:apho	Lakhonpheng	160	543 20%		60%	20%		10			126	109	0	0	54 28
	B.Lakhosi-Tei	Lakhonpheng	50	289 60%		30%	•		-17 13		9 0	87 19	0	0	Ó.	13
	li Lathosi-Nua	Lathonphrag	29	130 100%				+	12		0	. v 7	ő	ő	. o.	- 13
	B.Khonsay	Lakhonpheng	24	134 95%		5% 15%			10			.55	Ő	ŏ	ő	36
	B Kengpadek	Lakhonpheng	68 85	366 45% 436 10%		12%) \$0%)	ļo*a		10 4			16	46	ů.	. 0	-j5
	B.Nondinxay D.M.Dondai	Lakhoupheng	53	322 85%		15%	5 A		27		0	48	Ő	ő	Ō.	. 32
	B.Nakhandai B Phoudaocheng-Noy	Lakhonpheng Lakhonpheng	85	436 10%		50%			- 4			213	ō	Ö Ö	0	42
	B.Nongasto	Lationpheng	42	231	65%	35%				0 15		81	- a	ō	0	23
	B.Phoudaocheng-Gnai	Lakhonpheng		356		100%						356	0	ġ.	Ú	35
	B.Thangberg	Lakhonpheng		316	100%					0 31	6	:0	0	0	ø	31
	B.Bouttaphan	Lakhonpheng		310 50%	•	50%			15	5	0	155	0	0	0	31
	B Houaythen	Lakhonpheng		186 35	2	65%						121)	<u> </u>	0	
	Lakhoncoheng District:		1,169	5,768		•		:	1,89			585	154	0.	26	5,76
	B.Napong	Khongwedon	198	1,182 55		95**						123	9	0	<u></u> 0	1,18
	B. Vang Kan Hong	Khongxedon	54	315 759		25%			23		0	79	0	0	0	31
	B Napheng Guai	Khongxedon	103	515 459		50%	5%		23			258	26	0	io.	. 51 83
	B Khong-Noy	Khongxedon	158	835 100*	•	0.00	5%		83		0.	0 417	0 22	0.	Ű	- 43
	B.Nongsaphang	Khongaedon	90	439		95%	229		. 3		0	117	0	ů	ŏ	34
	B.Nongkoxong	Khongredon	63 34	345 100%					13		о.	ŏ	ð	ě	ŏ	. 17
	B.Nonghoua	Khongsedon		398 100%					- 39		0	0	0	ŏ	Ŭ.	- 39
	B.Donnuang	Khongxedon	· 80 · 100	505 80%		20%			40			ioi	ő	ŏ	ŏ.	- 50
	B.Hinxiou B.Hinxiou	Khongsedon Khongsedon	28	121 1809		20%			: 12		Ð	0	, ů	ō,	ŏ	- 13
	B.Thakho B.Khok-Houavang	Khongxedon	53	288 5%		90%	5%			4		259	34	. 0	· 0	21
	B.Nanouang	Khongxedon	121	625	· .	98%	2%	÷.,		0		613	13	0	Ō	6
	B.Khanahong-Guai	Khongsedon	102	573 1005	.				57		ġ.	Ů	.0	Û	0	S
	B.Nonsanian	Khongxedon	26	171-1009					31		0	0	0	0	ø	1
S-31	B.Nonghalou	Khongxedon	24	152 1009				•	- 12		Ö	0	Ó	0	0	·· 1:
	B. Thelewang	Khongwood	47	268 100	• 19				24		Ŭ,	Ŭ	0	. 0	0	2
S-33	B.Nongteng	Khongxedon	43	327 1004					3:		0	0.	0	• 0	.0	3
	B.Housysao	Khongxedon	85	495 1009					4		Q	0	0	0	0	4
S-35	B.Hatdou	Khongkedon	. 77	400 100	÷ •	· .		•	40		0	U	0	0	- 0	4
\$-36	B Nakadao	Khongxedon	162	806		90%	10%	1.1.1		0		725	81	Q.	0	. 3
	B.Koutlamphong	Khongkedon	70	418 1009					1		0	0	0	0	0 . Ú	- 4
\$ 38	B.Kouttabeng	Khongsedon	80	\$25 95	<u> </u>		5%		4		03	<u>. 0</u> 574	26 181	0	. 0	
	Khongxedon District.		1,798	9,882			16%		6,1	19	0 2	0 514	47	0	0	يو <u>م.</u> 4
	B.Nongrigong	Vapy	74 128	466 909 817	·• ·	80%	2005			Ú		654	163	Ű.	ŏ	8
S-40	B.Donkha	Vapy	78	501		. 90%6	10%			õ	õ	451	50	õ	Ũ	· š
	B.Naxal	Vapy Vapy	. 116	603 1064	4	20170	1070		6	ວັ	õ.	0	0	ě	÷ŏ	. 6
	B Houaykhou B. Vapy-Nua	Vapy Vapy	121	586 100						\$6	ů.	· õ	à	ů.	÷ģ.	s
	B. Vapy-Tai	уару Удру	116	571 1667	-				5		0	- 0	0	0	0	5
S-45	B.Nakang	Vapy	19	118 50			10%	1	. 1	06	0	0	12	. 0	0	i i
S-45		Vary	69	383 100					. 3	83	0	0	. 0	Ð	0	3
8-47	B.Sapliat	Vapy	139	753 100					. 7	53	0	0	Ú	0	0	
5-48	B Mouang	Vapy	159	885 100	%				. 8	85	0	- 6	0	0	. 0	
S-49	D. Hat	Vapy	85	469 100	76					69	0	υ	0	0	0	
\$-50	B. Sania	Vapy	156	S93 100	%					93	0.	0	Ø		- 0	
8-51	B Khounta Laf	Vapy	49	223		60%		40		0	0	134	0		89	2
	B Neusano	Vapy		257		3052	· · · · · · -	70		<u>%</u>	0	77 315	272	<u>0</u>	180	
B-53	Vajw District District:	Saravan	1,358 235	7,525					<u> </u>		01	· 0	0		0	
	B.Bangkhem B.Mongsai	Saravan	130	1,250 95		2%			1,1		38	· 25	ő		0	
	B.Burgan	Serevan	300	1,691 100					1,6		ò	0	· · • •		0	
\$-56		Sarayan	31	183 20		έ.					46	0	0	0	.0	i]1
\$-57		Saravan	13	72 100	56				2	72	0	0	· 0	0	0	с Ц.
S-58		Saravan	21	117 100	%				. 1	17	0	0			0	
S-59	B.Nongbou-Noy	Saravan	13	90 100			÷ .	\$		90	0	0			0	
S-60	B Doug-Nong	Setavan	64	315 100			1.1			15	Û	Û			0	
S-61		Saravan	23	131 100		110				31	0	0			0	
	B.Nakathion	Saravan	92	556 100						56	0.	0			0	
	B.Kation	Saravan	100 117	628 100						28	0. 0	0	0 . 0		0) () [(
	B.Phonphai	Saravan	147	- 1,034 100 115 100		1.11			1,0	15 15	.0 :0-	· 0			- v	
	B.Nadon B.Nadonkhoana	Saravan	39	224		100%	1	18.4		.0	0	224			Ö	
	5 B. Nadonkhoang 9 B. Thannuang-Kao	Saravan Saravan	. 75	452 ¥	1%	- 90%				45	0	407	ŏ		Ö	
\$-68		Saravan	70	510 100						10	0	0			· 0	
5-69		Saravan	18	117 10						17.	0	0			· 0	
) B.Saokadi-Tei	Saravan	66	450 10X				1.1		150	0	0			0	
	B.Dan-Onai	Saravan	113	739 100						139	Ó,	0			• 0	
5-11	2 B Kengsim-Iai	Saravan	56	365-100	150				1.1	165	Û	0			. 9	
S-72										212	Ó	0			0) (
\$-72	B.Nobon-Tai	Saravan	42	212 10)%ir										. 0	
\$-72 S-73 S-74	B.That-Noy	Samwan	46	250 10)%6)%6		: +	•		250	0	.0				
\$-72 S-73 S-74 S-74	B.That-Noy B.Nakasao	Saravan Serayan	46 99	250 10 717 54)96)96 Me	5%	45%	• • •		250 959	÷ø	36	323	E . U	. 0	5
8-72 S-73 S-74 S-74 S-75	i B.That-Noy 5 B.Nakasao 6 B.Ko	Saravan Saravan Saravan	46 59 63	250 10 717 54 326 10)86)96 198 198		45%			250 159 326	0	36 0	i 323	i.u	U C))
S-72 S-73 S-74 S-74 S-75 S-77	t B.That-Noy 5 B.Nakasao 6 B.Ko 7 B.Phao-Gnai	Sanayan Sanayan Sanayan Sanayan	46 59 63 164	250 10 717 5 326 10 884 6	986 996 986 986 986 409	6	45%	· · · ·		250 159 326 530	0 0 354	36 0	5 323) (} (0 0 0	0 0 0)))
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8-72 S-73 S-74 S-74 S-76 S-76 S-76 S-78	 B. That-Noy B. Nakaseo B.Ko B.Phao-Onai B.Soung B.Thongkapök 	Saravan Serayan Saravan Saravan Saravan Saravan Saravan	46 59 63 164 120 14	250 10 717 5 326 10 884 6 780 112 10	096 096 096 096 096 409 596 959 096	16 16	· .			250 359 326 530 - 39 112	0 354 741 0	36 0 0 0	5 <u>323</u>) () () () (0 0 0 0 0 0 0	0 0 0	
8-72 5-73 5-74 5-75 5-76 5-77 5-75 5-75 5-80	 B. That-Noy B. Nakaseo B. Ko B. Phao-Ornai B. Soung B. Thongkapok B. Naxai-Gnai 	Sanivan Serayan Sarayan Sarayan Sarayan Sarayan Sarayan	46 59 63 164 120 14 60	250 10 717 5 326 10 884 6 780 112 10 396 8	096 096 096 096 409 096 409 096 096 096	15%	· .	98%		250 359 326 530 39 112 337	0 354 741	36 0 0	5 <u>323</u>) (0) (0) (0) (0	1 0 3 0 3 0 3 0 9 0		
8-72 8-73 8-74 8-76 8-76 8-76 8-75 8-75 8-80 8-81	4 B.That-Noy 5 B.Nakayao 6 B.Ko 7 B.Phao-Grasi 8 B.Soung 9 B.Thongkapok 9 B.Thongkapok 0 B.Naxai-Gnai 4 B.Naxai-Noy	Sanavan Senayan Saravan Saravan Saravan Saravan Saravan Saravan	46 99 63 164 120 14 60 88	250 10 717 5 326 10 884 6 780 112 10 396 8 471	096 096 096 096 409 096 409 096 096 596 29	15%	· .	98%		250 359 326 530 - 39 112	0 354 741 0 0	36 0 0 0 0 59	323 0 0 0 0 0 0 0 0 0 0 0 0 0 0) 0) 0) 0) 0) 0) 0		
S-72 S-73 S-74 S-75 S-76 S-76 S-76 S-75 S-86 S-80 S-81 S-82	 B.That-Noy B.Makasso B.Makasso B.Koo B.Fao-Grasi B.Soung B.Thongkapok B.Naxai-Grasi I.B.Naxai-Noy B.Maknao 	Sanivan Serayan Sarayan Sarayan Sarayan Sarayan Sarayan	46 59 63 164 120 14 60	250 10 717 5 326 10 884 6 780 112 10 396 8	096 096 096 096 096 409 096 096 29 096	15%	· .	93°%		250 359 326 530 39 112 337 U	0 354 741 0 0 9	36 0 0 0 0 0 59 0	323 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	i 0 0 0 0 0 0 0 0 0 1 0 1 62 0 0))))
\$-72 5-73 5-74 5-72 5-77 5-77 5-77 5-75 5-80 5-81 5-81 5-83 5-83	4 B.That-Noy 5 B.Nakayao 6 B.Ko 7 B.Phao-Grasi 8 B.Soung 9 B.Thongkapok 9 B.Thongkapok 0 B.Naxai-Gnai 4 B.Naxai-Noy	Sanavan Senayan Saravan Saravan Saravan Saravan Saravan Saravan Saravan	46 99 63 164 120 14 60 88 30	250 10 717 5 326 10 884 6 780 112 10 396 8 471 178 10)96)96)96)96)96 596 959)96)96)96)96	15%	· .	98%		250 326 530 39 112 337 0 178	U 0 354 741 0 0 9 0	36 0 0 0 0 0 59 0 0	323 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
8-72 S-73 S-74 S-74 S-74 S-75 S-75 S-75 S-75 S-80 S-81 S-81 S-83 S-83 S-83 S-84	 B.That-Noy B.Nakayaso B.Nakayaso B.Nao-Grasi B.Soung B.Thongkapok B.Naxai-Grasi B.Naxai-Grasi B.Naxai-Noy Z. Makanao B.Dongko-Nua 	Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan	46 59 63 164 120 14 60 88 30 62	250 100 717 50 326 100 884 6 780 112 10 396 8 471 178 10 318 10	196 196 196 196 196 196 196 196 196 196	15%	· .	9X°%		250 326 530 39 112 337 0 178 318 580 385	U 0 354 741 0 9 0 9 0 0 0 0	36 0 0 0 0 0 59 0 0 0 0 0 0 0 0 0 0	323 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	0 0)))))))))))))))))))
8-72 5-73 5-74 5-74 5-74 5-74 5-74 5-74 5-75 5-86 5-81 5-81 5-81 5-81 5-81 5-81 5-81 5-81	4 B.That-Noy 5 B.Nakasao 6 B.Ko 7 B.Phao-Gnai 8 B.Soung 9 B.Thongkopök 0 B.Naxai-Gnai 1 B.Naxai-Noy 2 B.Maknao 3 B.Dongko-Nua 4 B.Beng	Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan	46 59 63 164 120 14 60 88 30 62 107	250 10 717 5 326 10 884 6 780 112 10 396 8 471 178 10 318 10 589 10	196 196 196 196 196 196 196 196 196 196	15%	· .	98%		250 359 326 530 39 112 337 12 337 178 318 589	0 354 741 0 9 0 0 0 0 0 0 0	36 0 0 0 0 0 59 0 0 0 0 0 0	323 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 613		
\$-72 \$-73 \$-74 \$-75 \$-74 \$-75 \$-86 \$-88	4 B.That-Noy 5 B.Nakasao 6 B.Ko 7 B.Phao-Onai 8 B.Souray 9 B.Thongkapok 0 B.Navai-Grnai 1 B.Navai-Grnai 1 B.Navai-Nua 2 B.Matanao 3 B.Dongko-Nua 4 B.Beng 5 B.Khiangahoukliong	Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan Saravan	46 59 63 164 120 14 60 88 30 62 107 76 6120 107	250 10 717 54 326 10 884 6 780 112 10 396 8 471 178 10 318 10 580 10 385 10	196 196 196 196 196 196 196 196 196 196	15%	· .			250 359 326 530 39 112 337 0 178 318 589 385 0 0	U 0 354 741 0 9 0 9 0 0 0 0 0 0 0 0	36 0 0 0 59 0 0 0 0 0 0 0	5 323 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 613 0 549		
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Source: Village Survey, April 1994

Organization Chart of Ministry of Public Health Figure 3.2.1a

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Mother and Child Health	misure		Mational Medical
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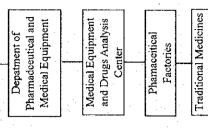
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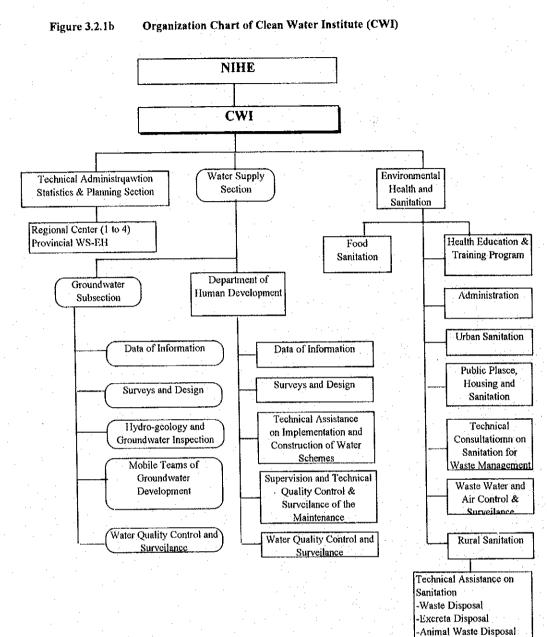
Tuberclosis Control Center

Dematology and Leprosy Center	Optical Health Center
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Note:

NIHE = National Institute of Hygiene and Epidemiology CWI = Clean Water Institute

Figure 3.3.5

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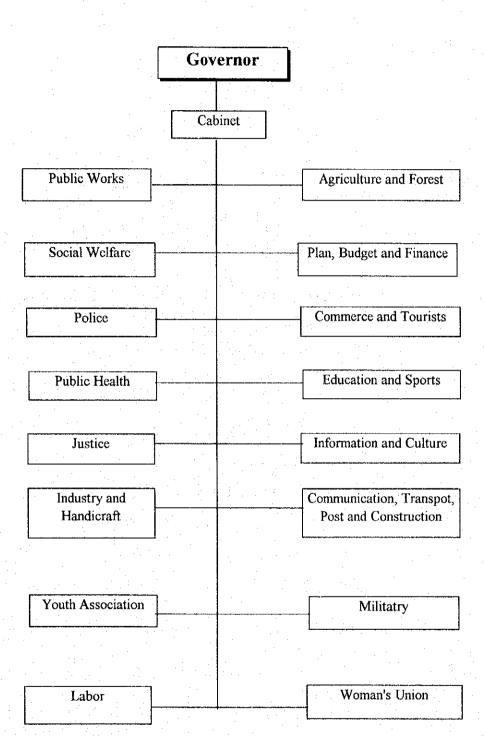


Figure 3.3.6a

Organization Chart of Provincial Health Department in Champasak Province

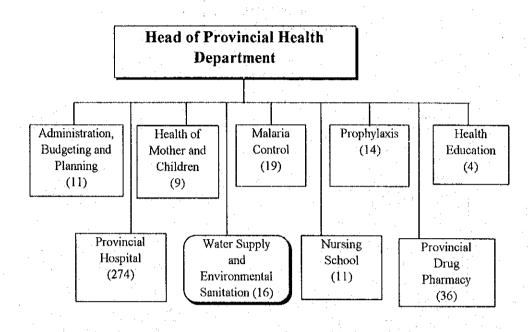
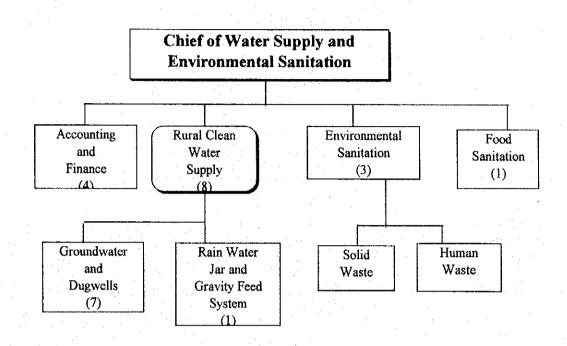
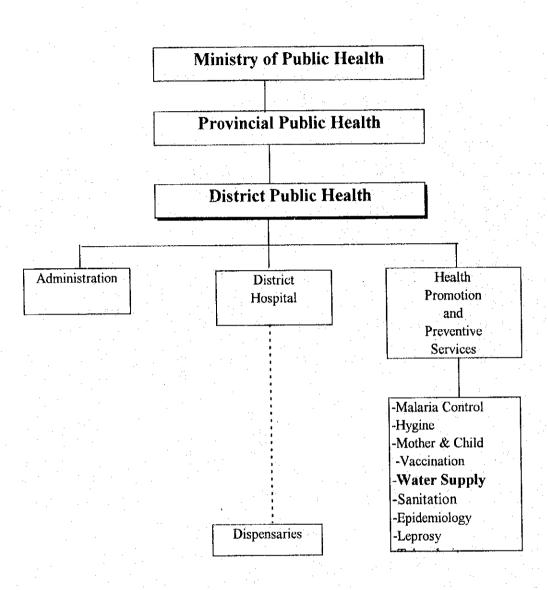


Figure 3.3.6b.

Organization Chart of Water Supply and Environmental Sanitaion Section in Champasak Province







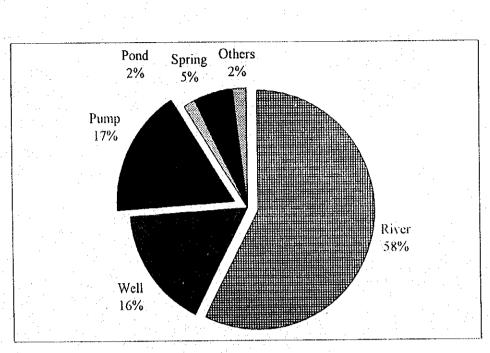
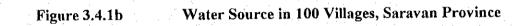
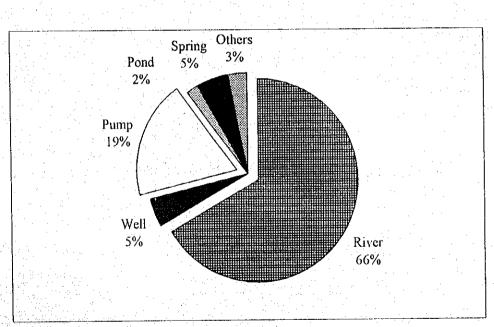


Figure 3.4.1a Water Source in 100 Villages, Champasak Province





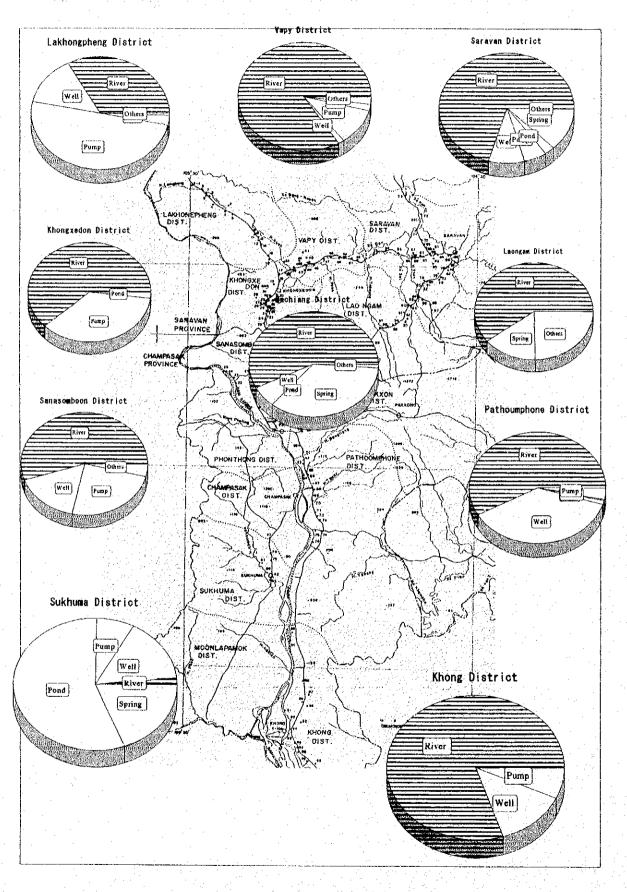
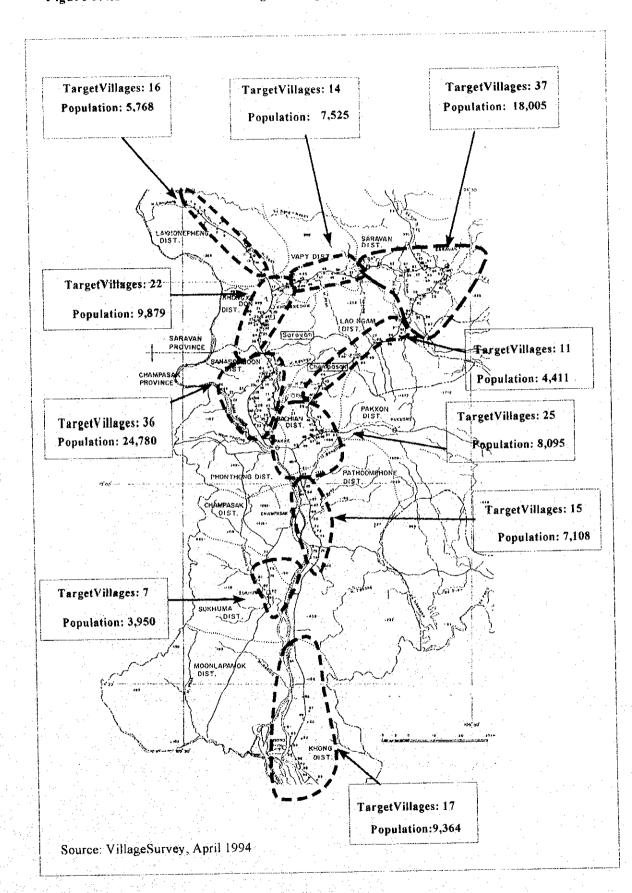
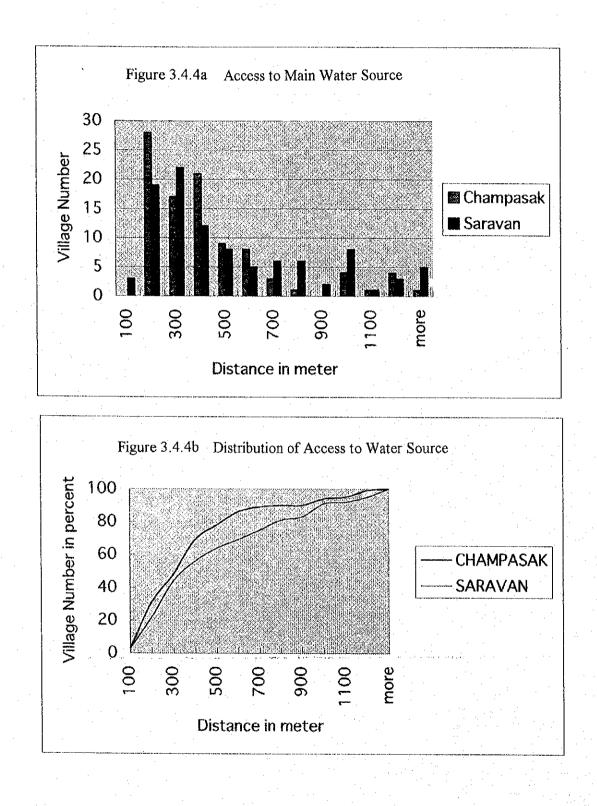


Figure 3.4.1c Existing Water Source by District in the Study Area (1994)

Figure 3.4.2 Location of Target Villages in the Study Area

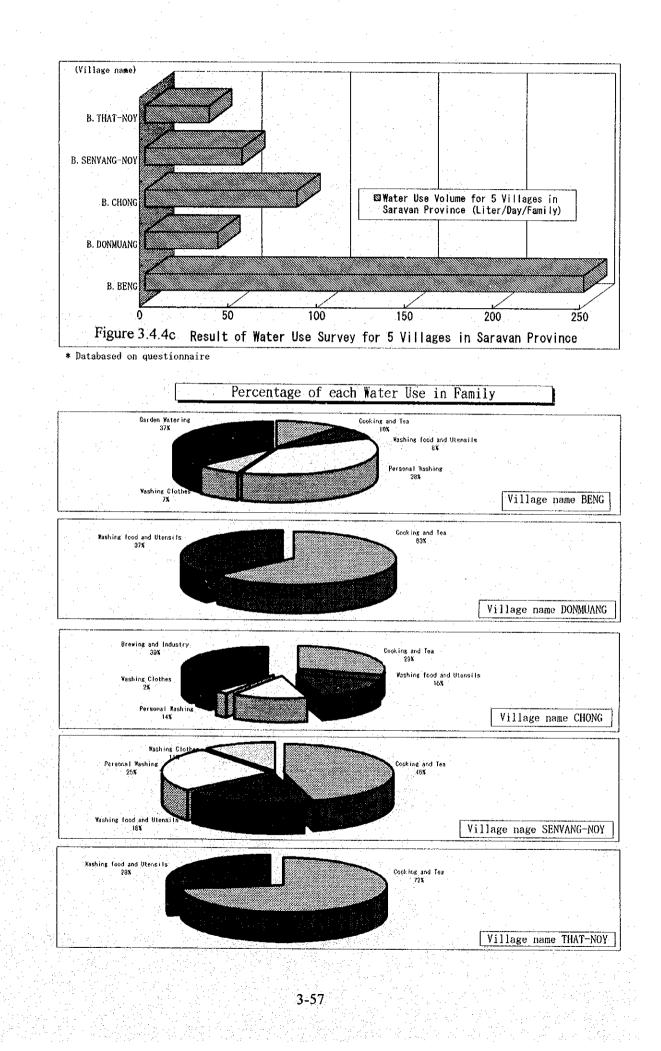


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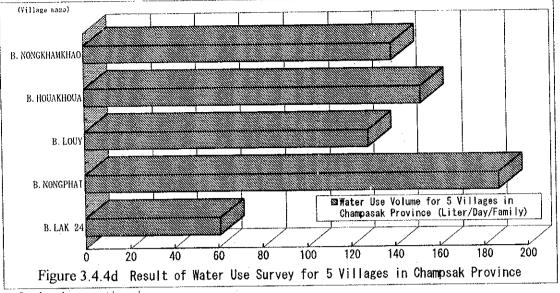


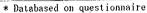
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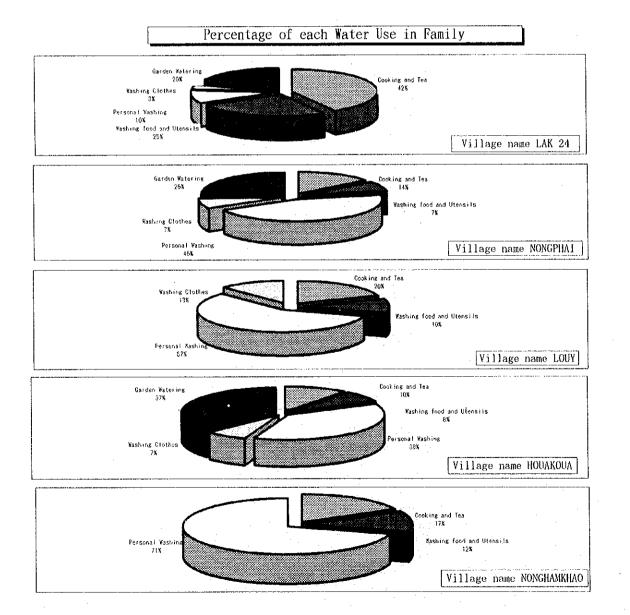
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CHAPTER 4 HYDROGEOLOGY

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CHAPTER 4 HYDROGEOLOGY

4.1 Geomorphology

The Study Area is divided into six physiographic areas, i.e., mountain, low plain, high plain, basalt slope, escarpment and plateau (see Figure 4.1.1).

Mountain

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Mountain area is located in the east and south of the Study Area. In the east, it covers a part of the Annamite Mountain Range. Its altitudes range from 1,000 m to 2,000 m, and it has many V-shaped valleys. The mountain area in the Cambodian border has a rather gentle slope, and the altitudes range from 300 m to 1,300 m.

Low Plain

Low plains are extensively distributed along the Mekong River and its tributaries, i.e., the Xedon River and the Xekong River. The plains are flat due to erosion, and their elevations range from 80 m to 180 m. Paddy fields are found in the plains. The low plains are contiguous to southern edge of the Savannakhet Plain, where the altitudes become higher.

Plateau

The Boloven Plateau with an elevation of about 1,300 m is located in the central part of the Study Area. The plateau consists of basalt. The surface of the plateau is gently undulated. No deep valley is formed, but many spatter cones are found on the plateau.

Basalt slope

Basalt Slope is a wide, gentle slope of the Boloven Plateau. Its elevations range from 120 m to 500 m, and its sediments are composed of basalt lava and volcanic ash ejected from the Boloven. Northwest of the Basalt Slope is being cultivated because of its fertile soil, plenty of rainfall, and accessibility to Pakse and Saravan.

Escarpment

Escarpment is located on the edge of plateau or high plain. West of the Study Area, the eastern edge of the Khorat Plateau, forms a long escarpment in the north-south direction and bounds the Champasak Plain. North of the Study Area, the escarpment of the Savannaket Plain trends in the east-west direction and divides the Champasak Plain. The elevations of these escarpments range from 400 m to 500 m. The escarpment with elevations of 500 m to 1,000 m surrounds the Bolaven Plateau.

Mesa topography which was formed by differential erosion is also found on the plateau. Most of the steep escarpments are densely covered by vegetation.

<u>High plain</u>

This topography includes the "plain" in the Bolaven Plateau and the "mesa" which is isolated from the low plain. The high plain consists of alternating beds of sandstone and shale. Its mountain ridge is flat like a table. Since its elevation exceeds 1,000 m, and it is surrounded by escarpment, the land is not used for cultivation.

4.2 Drainage

The main rivers of the Study Area are the Mekong River and its tributaries, namely, the Xedon River and the Xekong River. The Xedon River flows towards west, while the Xekong River flows towards south. These tributaries surround the Boloven Plateau.

Inside the Study Area, the Mekong River has a width of one to two kilometers. However, it is reticulated in the downstream and has a width of about 12 km at Khong Island south of the Study Area. Rocks crop out on the river bed, but the terrace sediments consisting of sand, gravel and silt are found on the river side. Wide alluvial plain is not found along the Mekong River, except in the Nong Hai Plain and Champasak Plain.

The Xedon River originates from the Boloven Plateau and the east mountain area. It flows westward north of the Boloven Plateau. It then flows southward at Konxedon and joins the Mekong River at Pakse. Alluvial sediments are found downstream of Konxedon.

The Xekong River originates from the eastern mountains and is joined by smaller rivers from the watershed of the Boloven Plateau. This river flows down to Cambodia.

The discharge is stable in small rivers draining the Boloven Plateau. This plateau is a huge recharge zone for surface water and groundwater. Rainfall infiltrates and flows through the basalt slope. Most streams and rivers are effluent due to groundwater discharge.

4.3 Geologic and Hydrogeologic Features

This section describes the geological and hydrogeologic features of the Study Area based on the field reconnaissance survey and analysis of existing borehole data. The stratigraphic classification presented in the UNICEP report (1990) was adapted basically but modified according to the results of the survey and analysis. A hydrogeological map was prepared as a result of the survey (Figures 4.3.1, 4.3.2 and 4.3.3).

The Paleozoic (PZ, C-P)

The Paleozoic group is distributed in the mountain areas from northwest of Saravan to east of Attopeu, with elevations ranging from 1,000 m to 1,200 m. The formation is composed of slightly folded, metamorphic tuffaceous sandstone, slate and tuff (PZ). These rocks are considered as the hydrogeologic basement due to its hard and compact occurrence.

The flysh type sediments composed of sandstone and slate are distributed in the south of Khong Island. This formation can be correlated with the upper Paleozoic age (C-P). Though it is compact and hard, the formation may be found to have few fissure water.

The Mesozoic (T, J, J-K)

The Mesozoic is composed of Manggian formation, Jurassic shale beds, Champa formation and Dognhen formation in ascending order. Dognhen formation is distributed in the Savannaket area and contains evaporites.

(1) Manggian formation (T)

The Manggian formation crops out in the south of Pathoumphon, i.e., on the left bank of the Mekong River and in the south and east of Attopeu. The erosion terrace along the Mekong River and the gently undulated hill are composed of this formation.

The faults (lineament) in the northwest to southeast direction and perpendicular (northeast to southwest) direction are found; however, no continuity to Jurassic formation is observed. Therefore, this formation may be correlated with the Permian to Triassic age.

This formation consists of hard rhyolitic tuff, quartz porphyry and welded tuff. Although, fissure water may exists, the groundwater potential is low. According to existing borehole data, electric conductivity is 400 to 900 μ S/cm and pH is 7.5 to 7.8. Depths of groundwater table is 8 m to 12 m.

(2) Jurassic shale bed (J)

This formation is distributed in the Champasak Plain with elevations of 100 m to 200 m. It can be correlated with the Khorat Subgroup in Thailand. Some outcrops in Saravan and Attopeu yielded fossils, indicating that this formation may be correlated with the lower Jurassic age (Workman, 1977).

The lithology of this formation shows an evidence of marine sediments, i.e., limestone and marl, in the vicinity of the basement rock. In the Champasak Plain, however, it principally consists of alternating beds of laminated sandstone with abundant muscovite and red sandy shale. Therefore, the formation is considered as continental sediments.

The formation is composed of rhythmical alternation of thin beds with thickness of 20 cm to 30 cm. Sandstone facies is prominent in the south of Konxedon, but shale is abundant in Saravan. Sandstone and shale are medium hard and well jointed with 20 cm to 50 cm spacing. The surface is weathered along the joint. Shale is cracked dispersedly.

The formation is folded in waves with inclinations of 5 to 20 degrees. The axis of fold is parallel to the boundary of the pre-Triassic basement, i.e., the axis trends northwest to southeast in Saravan, northeast to southwest in Attopeu and west-northwest to east-southeast in the south of Konxedon. The thickness of the formation is estimated to be about 1,000 m.

Groundwater exists in the weathered zone and fracture associated with joint and bedding. In the vicinity of Saravan, however, porous sandstone is intercalated in the formation. Groundwater may exist in the intergranular of the beds.

The USAID borehole data shows well yield of 7.8 l/sec at depths shallower than 50 m with casing diameter of 150 mm. The natural groundwater level ranges from 4 m to 12 m below ground surface. Considering that the fold structure is in waves, the deep groundwater in this formation may be confined. The Study Team measured the water quality of existing boreholes: electric conductivity was 300 to 700 μ S/cm and pH was 6.5 to 8.0.

(3) Champa formation (J-K)

The mountain ridge at the Thailand border, the flat table plateau on the right bank of the Xedon River and Boloven consist of Champa formation. The formation is also distributed on the mesa topography in the northwest of Saravan. The formation may be correlated with the Khorat Subgroup of the Lower Indosinian Group of Thailand.

The formation is composed of massive, well consolidated quartz sandstone and siltstone. These rocks are anti-erosional due to their property and texture. The flat surface of the plateau and the steep cliff are the distinctive features of this formation.

The boundary between Jurassic shale beds (J) is not clear, but Champa formation (J-K) can be distinguished from its abundant sandstone facies. Springs are found along the cliff, but only few villages are located in this area. Groundwater potential may be low, and groundwater exists in the fracture or weathered zone as perched water.

The field measurement of water quality at existing wells in the northwestern part of Saravan showed an electric conductivity of 700 to 1,000 μ S/cm, which is higher than in other areas. Water table was 5 m to 18 m below ground surface

The Tertiary

The Tertiary consists of basalt lava flows which are distributed in the Boloven Plateau. Basalt lava flows can be classified into three formations, i.e., vPg, vNg and vN-Q. However, the lithologies of lava flows are the same. The age of ejection of lava is unknown, but it is later than the Mesozoic since it overlies the Mesozoic in unconformity. Volcanic activity might have continued to Quaternary age as topography of younger volcanic ejecta is well preserved.

This rock is dark gray, hard alkali basalt with columnar joint and onion structure and abundant pores due to bubbling. Occurrence of basalt lava shows volcanic breccia and autobrecciated lava in many places.

vPg is distributed north and south of the Study Area, forming a gentle slope. Surface soil is blown out. Surface slope consists of lava with abundant joints and weathered boulders. Thickness of lava is estimated to be less than 40 m, and it is underlain by Jurassic shale.

Groundwater potential of vPg is very low, but artesian groundwater can be expected in the underlying Jurassic shale.

vNg overlies vPg and is extensively distributed on the Boloven Plateau, burying the space between mountain blocks. It is composed of Jurassic shale and Champa formation. Surface soil

is rather thick. Considering the areal extent of vNg, it may constitute a closed underground basin, thereby groundwater is expected.

Typical outcrop of vN-Q is seen in the vicinity of Paxong and Pakse. The formation is composed of lava flow, scoria and mudflow. Thickness of mudflow with boulders varies from a few meters to several tens of meters, and mudflow's surface is unconsolidated. vN-Q overlies vNg and vPg. These underlying formations have groundwater, and many springs originate from these basaltic formations in the vN-Q area. However, water table is shallow, and groundwater potential varies from place to place. Water quality of existing wells and springs show an electric conductivity of less than 50 μ S/cm and pH of 5 to 6.

The Quaternary

The Quaternary consists of talus deposit, fan deposit (Qt) and Alluvial sediments (Qal) along the river. These deposits are composed of sand, silt and clay. Qt is distributed under the cliff in Champasak and Konxedon. Qt is thin and underlain by Jurassic shale.

Qal is mainly distributed in the downstream of the Xedon River and on the right bank of the Mekong River with 4 m to 30 m thickness and consists of fine sand with gravel and silt and partly intercalating clay bed. The formation constitutes good aquifers, but groundwater table is affected by river water level. Since groundwater level declines up to the bottom of the aquifer during dry season, groundwater potential depends on the water level and lithology.

4.4 Hydrogeologic Structure

This section describes the hydrogeologic structure of the Study Area. The locations of hydrogeological cross-sections are presented in Figure 4.4.1 and the cross-sections are shown in Figure 4.4.2.

A-A Section

This section shows the east-west profile along Route 16 from Konxedon to Saravan. Jurassic shale is mainly distributed in this section and overlain by thin basalt lava flow (vPg) and Alluvial sediments. Jurassic shale is folding with an axis in the northwest to southeast direction and tilting at 10 to 20 degrees.

The edge of the older basalt lava flow is distributed and having a thickness of about 40 m. Alluvial sediments with thickness of about 10 m is distributed along the Xedon River and its tributaries. Jurassic shale crops out on the river bed. The main aquifers are the Alluvial sediments and the weathered zone of Jurassic shale. Jurassic shale may have confined groundwater in the syncline area and under the basalt lava flow.

B-B Section

This section shows a profile in the north-south direction at the central part of Saravan Province. The area is mainly composed of basalt slope underlain by Jurassic shale. Basalt lava flows cover the area. They consist of older vPg to younger vN-Q. Thickness of lava flow is estimated to be 40 m and 260 m in the vicinity of Route 16 and Route 20, respectively. Surface volcanic ash and mudflow may become water table aquifers, while the formation overlying the lava flow may have confined groundwater.

C-C Section

This section shows the hydrogeological profile from Chong Mek at Thailand border to Pakse and Paxong. Jurassic shale is extensively distributed, overlying the Paleozoic basement. Jurassic shale is faulted and overlain by basalt lava flow from east of Pakse. Groundwater is recharged in Boloven and flows down towards west. Unconfined groundwater exists in the mudflow of vN-Q in the basalt slope from Boloven to Pakse, but weathered zone of Jurassic shale becomes aquifer in the west of Pakse.

D-D Section

This section shows the profile of the southwestern slope of the Boloven Plateau. The escarpment consists of Jurassic shale, and Champa formation bounds the plateau and the basalt slope. The basalt slope extends downward from the escarpment at elevations 150 m to 300 m. The southern part is underlain by the Manggian formation which constitutes the basement in this area. Basalt lava is hard and constitutes aquifuge, but the underlying Jurassic formation may have confined groundwater.

E-E, F-F, G-G Sections

These sections represent the west-east hydrogeological profiles which cross the Mekong River. The Champasak Plain edges on the right bank of the Mekong River, while either the edge of lava flow or the Triassic Manggian formation is distributed on the left bank. Alluvial sediments with thickness of 10 m to 30 m are distributed along the Mekong River. The main aquifers are composed of Alluvial sediments (Qal) and the weathered zone of the Jurassic shale. Water table is shallow, and the unconfined groundwater flows down to the Mekong River.

4.5 Hydrogeologic Units

Based on its geology and topography, the Study Area can be classified into ten (10) hydrogeological units (Figure 4.5.1). A groundwater potential map is presented in Figure 4.5.2:

Qf: This unit of Alluvial sediments with thickness of 4 m to 30 m consists of sand, gravel and silt. The basement of Alluvial sediments is composed of Jurassic sandstone and red shale. The Alluvial aquifer is thin; thus, the groundwater can be taken from the underlying Jurassic formation.

Qt: This unit consists of talus and fan deposits. The flat erosion surface underlain by Jurassic shale is covered by thin deposition. The geologic structure is similar to Qf, but its aquifer is very thin. The shallow groundwater has low potential and seasonal fluctuation.

Ep: This unit is an erosion plain with no surface deposition. Jurassic shale crops out on the surface. The weathered zone of shale constitutes an aquifer. Groundwater table is shallow. Confined groundwater may exist in deeper layers.

Eh: This hilly unit is more undulated than Ep. The weathered zone constitutes an aquifer, but the groundwater table is deep.

Ba1: Basalt slope consists of vN-Q. This unit is underlain by thick volcanic ash and mudflow with boulders. The groundwater table is deep. Unconfined water or perched water exists in the sediments. The basalt lava constitutes the hydrogeologic basement.

Ba2: Basalt slope consists of vNg. Thin volcanic deposits cover the surface. Unconfined or perched water exists in the sediments. The basalt lava constitutes the hydrogeologic basement, but confined groundwater may exist in the lower basalt lava.

Ba3: Basalt slope consists of vPg. No surface deposition is found on the slope. Groundwater may exist in the fissure. Underlying Jurassic shale may have confined groundwater.

Et: The area consists of acidic volcanic rocks of the Triassic age. The topography is an erosion terrace and plain. Thin deposits cover the surface. Groundwater may exist in the fissure.

P: This unit consists of gently undulated plain, and in the higher elevation, it is composed of hard formation (J-K). Groundwater may exist in the fissure.

M: Mountain area consists of hard and compact rock, which constitutes the hydrogeologic basement.

4.6 Test Well Drilling and Pumping Test

Test well drillings and pumping tests were conducted at twenty (20) villages in the Study Area (Figure 4.6.1). These villages were selected from 200 villages in Champasak and Saravan Provinces considering the hydrogeologic unit and conditions of existing water source. Detail of the selection procedure is explained in the Supporting Report. The planned number and depth of well are 18 wells for 50 m depth and 2 wells for 100 m depth. The drilling locations were determined by field geological and geophysical surveys considering the ease of access for village people. The quantity and testing items are presented in Table 4.6.1, and details of the well are presented in Table 4.6.2. Down-the-hole drilling method was used for all test wells. The total drilling depth is 1,146 m, and the total casing length is 1,090.5 m. The 150 mm diameter casing was used.

4.6.1 **Results of Drilling**

Table 4.6.2 and Figure 4.6.2 present the elevation of the ground surface, lithology, screen position, and specific capacity of the test wells.

4-7

C-4B. Nongphai

This well is located on the erosion hill and was drilled up to the depth of 50 m. The formation consists of hard, consolidated and alternating beds of sandy shale and sandstone of Jurassic age. From the surface to 5 m depth, it is covered by weathered sandstone. It consists of fine to medium sandstone from 5 m to 36 m and compact sandy shale from 36 m to 50 m. This sandstone contains groundwater and forms an aquifer. Groundwater level is 9 m below ground surface.

C-4B. Houaxe

The test well is located on the erosion hill at 115 m in elevation. The well was drilled up to the depth of 182 m because no good aquifers were encountered. The formation is composed of alternating beds of hard and consolidated sandstone, sandy shale and mudstone. The surface soil is composed of weathered sandstone. From 4 m to 35 m, it consists of very hard fine and medium sandstone. Compact sandy shale was encountered from 36 m to 110 m, and the alternating beds of sandstone and shale from 110 m to 182 m. No aquifers were encountered up to the depth of 60 m. Very poor aquifer was found at thin sandy bed at the depth of 60 m. Dark brownish gray, hard, medium sandstone was encountered at the depth of 109 m. This sandstone has thickness of 35 m and contains groundwater. However, groundwater is salinized. EC measured on-site showed more than 10,000 μ mho/cm. SP logging data also indicates low potential in this sandstone. The well was drilled up to the depth of 182 m in order to obtain more productive aquifer. Another screen was set between 156 m and 180 m. Groundwater level is about 18 m below ground surface.

C-16B. Louy

The well is located on the erosion hill of 150 m in elevation. The well depth is 48 m. The formation is composed of alternating beds of hard and consolidated sandstone, conglomerate, sandy shale and mudstone of Jurassic to Cretaceous age. The surface soil consists of clay bed containing gravel with thickness of 6 m. The surface soil is underlain by gravel and laterite at about 1 m thickness. The formation consists of gravel bed from 9 m to 23 m and alternating beds of sandstone and mudstone. Groundwater is contained in the gravel and sandstone. Groundwater level is 7 m below ground surface.

C-44B. Thongsala

The well was drilled up to the depth of 43 m on the basalt slope at 220 m in elevation. The formation consists of very hard basalt lava and alternating beds of sandstone and sandy shale of Jurassic age. The surface soil is composed of the weathered basalt. The formation comprises of autobrecciated lava with rich pore spaces from the depth of 2 m to 23.5 m. It mainly consists of sandy shale intercalating sandstone from the depth of 23.5 m to 43 m. The autobrecciated lava forms an aquifer. Groundwater level is 9 m below ground surface.

C-49B. Lak-21

The well was drilled up to the depth of 60 m on the basalt slope at 442 m in elevation. The formation consists of mudflow deposits and highly weathered basalt lava. The surface soil is composed of the weathered clay of mudflow deposits. The formation comprises of clayey and

weakly consolidated mudflow deposits containing boulders, which is underlain by strongly weathered basalt. The basalt lava forms an aquifer, however, its productivity is not so high because of strong weathering. Groundwater level is 14 m below ground surface.

<u>C-65B. Lak-24</u>

The well is located on the erosional plain at 100 m in elevation. The well depth is 50 m. The formation consists of consolidated hard alternating beds of sandstone and reddish-purple mudstone. The surface soil is composed of a 2-m thick clay bed and underlying a 6-m thick laterite. The formation is composed of medium sandstone from the depth of 9 m to 23 m and compact sandy shale from 24 m to 44 m. The sandstone bed forms an aquifer, and groundwater level is 7 m below ground surface.

C-75 B. Nongkhe

It is located on the alluvial plain at 95 m in elevation. The well was drilled up to the depth of 50 m. The formation consists of sandy clay up to the depth of 11 m and reddish-purple mudstone of Jurassic age intercalating sandstone from the depth of 12 m to 50 m. The sandstone forms an aquifer. Groundwater level is 4 m below ground surface.

C-79 B. Samkhanaboua

The well is located on the erosion hill at elevation 96 m. The well depth is 45 m. The formation consists of sandy clay and reddish-purple shale of Jurassic age intercalating sandstone. The surface soil is composed of 7-m thick clay bed. The formation comprises of hard shale intercalating thin sandstone from the depth of 8 m to 45 m. The fissures of sandstone and shale contain groundwater and form an aquifer. Groundwater level is 7.5 m below ground surface.

C-88 B. Maisivilai

The well is located on the erosion hill and was drilled up to the depth of 50 m. The formation is composed of alternating beds of sandy shale, black shale and hard sandstone of Carboniferous to Permian age. The surface soil consists of weathered clay. The formation is mainly composed of black slate intercalating thin sandstone from the depth of 9 m to 50 m. Fissures and faults are abundant in the black slate. Groundwater may occur in these fissures and faults. Groundwater level is 9.5 m below ground surface.

C-89 B. Nasenphan

动动动物 经总理运转资料

The well depth is 50 m. It is located on the erosion hill at elevation 88 m. The formation consists of sandy clay and dacitic tuff of Triassic age. The surface soil is composed of weathered clay. The formation mainly comprises of hard massive tuff from the depth of 5 m to 50 m. Joints, fissures and faults are found abundantly, and they contain groundwater. Groundwater level is 5.8 m below ground surface.

S-4 B. Houaykapho

The well is located on the erosion hill at elevation 160 m. The depth of the well is 45 m. The formation consists of alternating beds of hard consolidated sandstone, sandy shale and mudstone from Jurassic to Cretaceous age. The surface soil is composed of 7-m thick weathered sandstone. The formation consists of sandstone from the depth of 8 m to 41 m and reddishpurple mudstone from 42 m to 45 m. A part of the sandstone constitutes an aquifer, and groundwater level is 9 m below ground surface.

S-12 B. Nongsano

It is located on the erosion hill at elevation 160 m. The well was drilled up to the depth of 50 m. The formation consists of alternating beds of hard and consolidated mudstone, sandstone and sandy shale of Jurassic age. The surface soil is composed of weathered mudstone. The formation comprises of reddish-purple mudstone from the depth of 7 m to 43 m and medium sandstone from 43 m to 50 m. The sandstone forms an aquifer, and the groundwater level is 6.5 m below ground surface.

S-24 B. Donmuang

The well is located on the terrace and was drilled up to the depth of 50 m. The formation consists of hard consolidated mudstone, sandstone and sandy shale of Jurassic age. The surface soil is composed of 10-m thick clay bed of fluvial deposit. The formation comprises of alternating beds of reddish-purple mudstone and sandstone from 11 m to 50 m. A part of the sandstone forms an aquifer. Groundwater level is 10 m below ground surface. S-38 Nongngong

The well is located on the erosional plain at elevation 140 m. The well depth is 50 m. The formation mainly consists of alternating beds of hard consolidated mudstone, sandstone and sandy shale. The surface soil consists of 6-m thick weathered sandstone. The formation is composed of alternating beds of reddish-purple mudstone, and medium sandstone. A part of the sandstone forms an aquifer. Groundwater level is about 8 m below ground surface.

S-50 B. Samia

The well is located on the terrace at elevation 145 m. The well depth is 50 m. The formation consists of alternating beds of hard consolidated mudstone, sandstone and sandy shale. The surface soil is composed of sand and clay beds of fluvial deposits. The formation comprises of alternating beds of reddish-purple mudstone and sandstone from the depth of 12 m to 50 m. Groundwater is contained in the sand bed of the fluvial deposits and Jurassic sandstone. Groundwater level is about 7 m below ground surface.

S-56 B. Chong

The well is located on the basalt slope at elevation 170 m. The well depth is 50 m. The formation consists of hard basalt lava and alternating beds of sandstone and mudstone of Jurassic age. The surface soil is composed of 6-m thick weathered basalt lava. The formation comprises of

autobrecciated basalt lava with abundant pore spaces from the depth of 7 m to 15 m. It consists of alternating beds of reddish-purple mudstone and sandstone from the depth of 16 m to 50 m. The autobrecciated basalt lava and sandstone form an aquifer. Groundwater level is 5 m below ground surface.

S-64 B. Phonphai

It is located on the erosional plain at elevation 190 m. The well depth is 50 m. The formation consists of alternating beds of hard consolidated mudstone, sandstone and sandy shale. The surface soil is composed of weathered sandstone. From the depth of 3 m to 50 m, the formation comprises of alternating beds of reddish-purple mudstone and medium sandstone. A part of the sandstone forms an aquifer. Groundwater level is 10 m below ground surface.

S-75 B. Nakasao

The test well is located on the erosional plain at elevation 194 m. The well depth is 50 m. The formation consists of hard consolidated alternating beds of mudstone, sandstone and sandy shale of Jurassic age. The surface soil is composed of weathered sandstone. From the depth of 4 m to 50 m, the formation is composed of alternating beds of reddish-purple mudstone and fine sandstone. A part of the sandstone forms an aquifer. Groundwater level is 5 m below ground surface.

S-84 B. Beng

The test well is located on the basalt at the elevation 308 m. The well depth is 66 m. The formation consists of hard basalt lava and sandstone of Jurassic or Cretaceous age. The surface soil is composed of weathered basalt. The formation comprises of basalt lava, autobrecciated lava with abundant pores and fissures from the depth of 4 m to 57 m. From 58 m to 66 m, medium sandstone exists. The autobrecciated basalt lava forms a good aquifer. Groundwater level is 19 m below ground surface.

S-100 B. Hountai

a)

The well is located on the basalt slope at elevation 520 m. The well depth is 54 m. The formation consists of loam (mudflow deposits) and strongly weathered basalt lava. From the surface to 10 m, it is composed of weathered mudflow deposits. Weakly consolidated weathered basalt is found from the depth of 11 m to 38 m. Hard basalt underlies from the depth of 38 m to 54 m. The basalt lava forms an aquifer, however, its productivity is not so high because of weathering. Groundwater level is 20 m below ground surface.

Groundwater levels in the test wells

Groundwater levels were measured periodically during the dry season from December, 1994 to January, 1995. The results of measurements are presented in Table 4.6.3 and Figure 4.6.3. The observation of groundwater levels suggests the following:

Groundwater levels of the test wells range from 4 m to 21 m.

- b) On the basalt slope of the Bolaven Plateau (C-44, 49, S-84, 100), it ranges from 8 m to 21 m.
- c) Groundwater levels on the erosion hill and plain are generally shallower than on the basalt slope. It ranges from 4 m to 10 m.
- d) Groundwater levels have declined during the above mentioned measurement period.

The rate of decline is 0.06 m/day in the basalt slope, while it shows 0.02 m/day in the erosion hill and plain. The lowest groundwater level in the dry season can be estimated by multiplying this rate by the number of remaining days of the dry season.

4.6.2 Pumping tests

The step-drawdown, constant discharge and recovery tests were performed in order to obtain the aquifer constants. The pumping tests data were analyzed by using Theis, Jacob and Jager methods (Table 4.6.4).

(1) Transmissivity and storativity

Table 4.6.5 presents the aquifer constants Transmissivity (T), Permeability (k) and Storativity (S) by method of analysis. The mean constant was calculated by using the results of analysis by leakage method and recovery method. The mean aquifer constants of other test wells, which were not analyzed by the leakage method, were calculated using all values obtained by other methods of analysis.

The transimissivity changes from place to place, ranging from 0.8 m²/day to 1,500 m²/day (Figure 4.6.8). It shows 1,500 m²/day in B. Beng and 800 m²/day in B. Thongsala. Both villages are located on the basalt slope in the Bolaven Plateau. The lowest transmissivity is found at B. Hountai and Nongphai, 0.8 m²/day. In Nogkhe and B. Phonphai, it is 200 m²/day, while it ranges from 1.5 to 40 m²/day in other villages.

(2) Specific capacity

The specific capacity (Sc) is the expression of the unit discharge per one meter drawdown. The productivity of the aquifer and the well can be easily evaluated from the specific capacity. It was calculated by using the drawdown and the pumping rate at stable conditions during the pumping test.

The highest specific capacity is found in B. Thongsala and B. Beng, ranging from 1,700 to 1,900 $m^3/day/m$, while the lowest is 1 $m^3/day/m$ in B. Nongphai, showing a big regional difference. Rather high values are found in B. Nogkhe and B. Phonphai, 128 and 165 $m^3/day/m$, respectively. The specific capacity of other test wells ranges from 2.6 to 45 $m^3/day/m$.

(3) Optimum discharge

4-12

An optimum discharge rate of the test well was evaluated by using the step-drawdown test data (Table 4.6.5). Taking the critical water level found on the linear relation between pumping rate (Q) and drawdown (s), the critical pumping rate can be determined. In addition to this, stable water level and recovery time during pumping test were considered. An optimum discharge rate was calculated by multiplying the drawdown by the specific capacity.

The results show that the 3,800 m³/day of pumping is possible in B. Beng and 1,700 m³/day in B. Thongsala. The optimum pumping rate of more than 150 m³/day is found in B. Nongkhe, B. Chong and B. Phonphai. It ranges from 9 to 140 m³/day in the other 15 villages. The lowest optimum discharge is found at B. Nongphai, 9 m³/day. This well may be dried up by a hand pump.

(4) Aquifer and hydraulic constants

The hydraulic constants by aquifer is presented in Table 4.6.6 and Figure 4.6.4. The Study Area is geologically divided into 4 units: (a) Jurassic formations consisting of sandstone, red shale and mudstone, (b) basalt in the Bolaven Plateau, (c) acidic tuff of Triassic age and (d) slate and sandstone of Paleozoic age. Groundwater occurs mainly in the fractures of sandstone, basalt, acidic tuff and slate.

(a) Jurassic sandstone, red shale and mudstone (alternating beds)

The formation forms the basement of the plain along the Mekong River and the Xedon River and a small hill.

T: $0.78 \text{ to } 219 \text{ m}^2/\text{day}$ k: $1.59 \times 10^{-02} \text{ to } 3.26 \times 10^{-05} \text{ cm/sec}$ S:0.04 to 0.7Sc: $1.0 \text{ to } 165 \text{ m}^3/\text{day/m}$

(b) Basalt zone

The basalt lava, volcanic ash and loam are distributed in the north and west of the Bolaven Plateau.

T:0.74 to $1,500 \text{ m}^2/\text{day}$ k: $7.76 \ge 10^{-02}$ to $3.58 \ge 10^{-05}$ cm/secS:0.1 to 0.8Sc:2.9 to $1,900 \text{ m}^3/\text{day/m}$

The specific capacity values obtained in B. Beng and B. Thongsala ranges from 1,700 to 1,900 $m^3/day/m$. This formation intercalates two to three layers of basalt lava (autobrecciated lava, vNg). The other two wells show very small specific capacities, ranging from 2.9 to 19.7 $m^3/day/m$ in B. Lak 21 and B. Hountai. The basalt in this area is strongly weathered, and the weathered bed is thick. The aquifer constants varies widely from place to place in the basalt zone.

(c) Acidic tuff of Triassic age

This formation is distributed in the south of the Study Area, on the left bank of the Mekong River, and consists of acidic tuff (acidic welded tuff).

T: $3.04 \text{ m}^2/\text{day}$ k: $1.47 \times 10^{-04} \text{ cm/sec}$ S: 0.047Sc: $4.6 \text{ m}^3/\text{day/m}$

Groundwater occurs in the fractures of rocks. The specific capacity becomes higher in those areas where the faults and fractures are abundant.

(d) Paleozoic slate

This formation is distributed in the most southern part of the Study Area. The formation is composed of hard slate and sandstone partly intercalating calcareous rocks. Groundwater occurs in the fractures.

4-14

T: $23.1 \text{ m}^2/\text{day}$ k: $9.53 \times 10^{-04} \text{ cm/sec}$ S: 0.18Sc: $37 \text{ m}^3/\text{day/m}$

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Table 4.6.1 Quantities of Drilling and Test

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	1		TOTO WONTET TA		(G.L-m)*	(u)	(UU)		(E)	Total(s)	Total(s) Open. Area(X)				(e. L. −∎)	
C-4 R Nonpohar	1ari	5	Top-300 D. H.	50	<u> </u>			P. V. C.	11-31	20	6.7	Eh	Jura. sandstone	India X3	33	Feb/ 95
T.		120	Top-500 D.	182	19		150	Stee]	66-72, 90-96, 108-132, 156-180	60	15	Eh	JuraCreta. Sandstone	*	84	Feb/ 95
		150	150 Top-300. D. H.	48			1	P. V. C.	6-10.14-22.38-46	19	6.7	Eh	Jura. Sandstone. Conglo.	India N3	72	Feb/ 95
C-44 B. Thongsala	<u>s</u> 1a	220	220 Top-300. D. H.	43	13	25		P. V. C.	11-23.	12	6.1	Ba2	N-Q Basalt	India N3	21	Feb/ 95
1		442	442 Top-300 D H.	60				<u> </u>	23-35	12	6.7	Bal	N-Q Besalt	India N3	36	Feb/ 95
1		100	100 Top-500. D. H.	20					11-15, 19-23, 39-47	16	6.7	Ep	Jura. Sandstone	India N3	30	Feb/ 95
T -	e E	56 95	95 Top-500. D. H.	50	7.5			P V C	16-20, 28-36, 40-48	20	6.7	Qf	Q Sand, Jura. SandyShale	India N3	24	Feb/ 95
T	Inaboua	96	96 Top-300. D. H.	45	10	1 43	150	L	9-13. 17-29. 37-41	20	6. 7	Bp	Jura. Sandy Shale	India N3	30	Feb/ 95
C-88 B. Maisivilai	Vilai	85	Top-500, D. H.	50	16	50	150	P.V.C.	20-48	28	6.7	Et	Paleozoic Slate	India M3	33	Feb/ 95
1	han	88	88 Top-500. D. H.	50	7.4	1 50	150	P. V. C.	16-20, 28-48	24	6.7	Εţ	Triassic Acidic Tuff	India N3	30	Feb/' 95
	capho	160	(60 Top-300, D. H.	45	13	42		P. V. C.	12-28, 36-40	20	6.7	ЧЭ	JuraCreta. Sandstone	India N3.	27	Feb/ 95
1.7	oun	160	160 Top-300, D. H.	50	6	9 50	150	PVC	12-20. 24~28. 32-48	28	6.7	ųg	Jura. Sandstone	India M3	30	Feb/ 95
S-24 B. Donmuang	ung	130	130 Top-500. D. H.	50	13	3 50	150	P. V. C.	28-44	16	6.7	0t	Jura. Sandstone	India M3	24	Feb/' 95
	Song	140	140 Top-500. D. H.	50	10	49	150	P.V.C.	23-35, 39-43	16	6.7	ය	Jura. Sandstone	India K3	24	Feb/' 95
		145	145 Top-500, D. H.	50	10	1 49.5	150	P. V. C.	22. 5-43. 5	21	6.7	đ	Q Sand, Jura, Sandstone	India N3	12	Feb/ 95
S-56 B. Chong		170	70 Top-500. D. H.	20	7.5	5 49	150	P. V. C.	15-23, 31-43	20	6.7	Ba3	N-Q Basalt, Jura. Sandsto [India 183	India 13	27	Feb/* 95
S-64 B. Phonphai	ายไ	190	90 Top-500 D.H.	50	12-2	2 50	150	P. V. C.	20-24, 32-44	16	6.7	ß	Jura. Sandstone	India 13	30	Feb/* 95
S-75 B. Nakasao	g	194	194 Top-500. D. H.	23		r 50	150	P.V.C	12-16.28-48	24	6.7	B	Jura. Sandstone	India M3	27	Feb/ 95
S-84 B. Beng		308	308 Top-500. D. H.	66	24.4	60	150	Stee]	18-48	30	15	Ba2	N-Q Basalt	¥	51	Feb/ 95
S-100 B. Houn-Tai	ิลา	520	520 Tcp-500. D. H.	54	28.6	52	150	P.V.C.	9-21, 34-46	24	6.7	Bal	N-Q Hasalt.Loam	India N3	42	Feb/ 95
			D.H.=Down-the Hole Hanner .*Dryseason(Presumed) R.T.=Rotary Tricon. Bit.	Hole Hammer ricon. Bit.	.*Dryseason()	Presumed)				:		•	* GRUNDFOS SP5A-21. H=82m, 2. 2kw, 5m ² 3/h, 2830R/min *** GRUNDFOS SP14A-10, H=48m, 3. 7kw, 14m ² 3/h, 2830R/min	32m, 2. 2km, 5n 48m, 3. 7km, 1	∎^3/h, 2830R/≞ 4∎^3/h, 2830R	din /ain

Well Design Of Test Wells Table 4.6.2

4-16

Table 4.6.3(1) Groundwater Level of Test Wells (G.L.-m)

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	cifilment cifilment			-7.18								-8.37	-8.44		-8.59		-6.35	-6.87 -8.80	-6.31		-6.92					
	cision contraction			-7.18								-6.44	-6,49 -8.44		-6.60	-15.05	-18.43 -6.55	-15.47 -6.87 -8.80	-14.65 -6.33 -8.55		-14.22 -6.22					
	cifilment cifilment			-7.18								-8.37	-6,49 -8.44		-8.59		-6.35	-15.47 -6.87 -8.80	-14.65 -6.33 -8.55		-6.92					
	cifilment cifilment			-7.18								-6.44	-6,49 -8.44		-6.60	-15.05	-18.43 -6.55	-15.47 -6.87 -8.80	-14.65 -6.33 -8.55		-14.22 -6.22					
	cifilment cifilment			-7.18								-6.44	-6,49 -8.44		-6.60	-15.05	-18.43 -6.55	-15.47 -6.87 -8.80	-14.65 -5.29 -6.59		-14.22 -6.22					
	cifilment cifilment												-8.658.498.44		-6.80	-1.66	-9.75	-5.87 -5.87 -5.87	-14.65		-7.67					

4-17

ALC: NO

Table 4.6.3(2)Groundwater Level of Test Wells

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s To Natasan				7.27	3.55	-3.87	-3.87			-3.97	4 14	-4,36	· · · ·	-4.34	-4.37	-4.45		-4 40		4.83	
s-SHProphai					35°5-	19.19	-9.58			-0.88	-9.91	-9.97		-10.00	-10.10	-10.14		-10.04		-10.30	
s -55 (thang)							-4,30			1 .23	-4.33	£8: ₹		-4.76	-4 76	3 .4-		-4.17		4.5	
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4-18

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	Cenerator Date:Completed	3101	SKW 3	SKW C	5KW	5KM	5KW 5	SKW 3	3.5KW 3	3.5KW	SKW SK		5KW	3KW 3	Shar
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	Punp	GRUNDFOS 1.5HP	GRUNDFOS 2.2HP	GRUNDFOS 2.2HP	GRUNDFOS I.5HP	GRUNDFOS 2.2HP	GRUNDFOS 2.2HP	GRUNDFOS 2.2HP	GRUNDFOS 1.5HP	GRUNDFOS 1.5HP	GRUNDFOS 2.2HP		GRUNDFOS 2.2HP	GRUNDFOS 1.5HP	GRUNDFOS 2.2HP
	Aquifer-	Jura . Sands tone.	Jura-Creta.Sandstone	Jura.Sandst.Conglo.	N-Q Basalt.	13.45 N-Q Basalt.	Jura Sandstone.	3.06 Q. Jura.Sandy shale.	7.50 Jura.Sandy shale.	10.00 Paleozoic Slate.	Triassic Acidic Tuff		Jura-Creta.Sandstone	Jura.Sandstone.	Jura Sandstone.
	S.W. L. (GL-m)	IT UU 6	4	<u>† </u>	†~~~	13.45 N	7.12 []	3.06 0	7.50 J	10.00 P	5.78 T		8.67]	6.50 J	10.18
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Table 4.6.	Astronomican (market)				150	0eT	Det	net -	ACT -	Port I	150	net	127		
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	Elevation(m)		115	120	150	220	442			5	C20	82		191	09T
	Location	ON CHANPASAK	B: NONGPHAL	B.HOUAXE	B. LOUY	B. THONGSALA	C-49 B.LM-21	B-LAK-24	B. NONGKHE	C-79 B SAMEHANABOUA	C-68 % B.MAISIVILAL	NASENPHAN	SARAVAN	S-4 B.HOUATKAPHO	S-12 B. YONGSANO
	Nº o.	10 (V) (CH)	C-4 B-N	C-B B-H	C-16 B-1	C-44 B.1	C-49 B.1	C-65 8 B.1	C-75 8:)	C-7900 B.	C-88~ (1)	C-89 B_NASENPHAN	IVS SVI	S-4 3	S-12

04/Jan/95 02/Jan/95 02/Jan/95 31/Dec/94 30/Dec/94 31/Dec/94 27/Dec/9/

3KW 3KW 3KW 3KW 3KW

GRUNDFOS 2.2HF GRUNDFOS 1.5HP GRUNDFOS 1.5HP

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B.NONGNGONG

S-38 S-50

B. SAMLA S-56 B. CHONG

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20-24 32-44 12-16, 28-48 9-21.34-46

18-48

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B. PHONPHAT

S-64

S-75

TVL-NOH: B BON-LVI

S-84 B.BENG

Jura.Sandstone. Jura.Sandstone. N-Q Basalt. 19.40 N-0 Baselt

CRUNDFOS 1.5HP

GRUNDFOS 1.5HP

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ping Test Wells

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ſ	harge)	(day)	6	23	23	1 I'	127	3		69	129	32	놂	64	133		144	267		-17	- 1	20
	um disc	(m_3/day				1700+			380+										165+		3800+	
	Py(optimum discharge	, s ¥	9.4	23.6	73.0	128.0		37.5	383.6	69.0	<u>129. 2</u>	32. 5	34.6	640	133.7	111.0	144.0	267.0	165.3	17.7	3801.6	20.2
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	Sc	cm ^{3/s/cm}	0.12	0.30	1.88	200.00	2.28	0.38	14.80	3.47	4.27	0.54	2.00	1.85	5.16	1. 61	1.67	2.21	19.13	0.51	220.00	0.33
S	Pd	(cm)	2750	1650	006	10	1450	1350	223	240	390	950	1000	450	640	1370	1320	1495	115	1300	15	1000
Test Well	3	cm 3/s	333. 333	500	1690	2000	3300	510	3300	833. 333	1666.67	510	2000	833. 333	3300	2200	2200	3300	ľ	666.667	3300	333. 333
apacity of	3	1/min/m	0.73	1.82	11.27	1200.00	13.66	2.27	88 79		25.64	3.99	12.00	11 11	30.94	9.64	10.00	13.24	114.78	3.08	3	2.00
Specific Capacity of Test Wells	Drawdown	(m)	97.5			0.1	14.5	13.5		2.4		11		4.5	6.4		13.2	14.95	1.15	13	0.15	10
	a	l/min	90	30	101.4	120	198	30.61	198	20	1001	30.6	190	50	198	132	132	1961	139	40	198	20
Table 4.6.5	location		anhai	AXP AXP	Λ Λ	B. Thongsala	16	94	athe	B. Samkhanaholia	R Maicivilai	R Nacennhan	B Honavkanho	R Nongsano	B Dominang	B Nongngong	9 9 9 9	Du	B Phonnhai	oese	0	n-Tai
Table			R Nononhai	B Honaye	B Louv	B. Tho	B Lak 21	R Lak94	B Nonothe	R Sam	R Na	R No.	R Hou	R Non	B Don	R Non	R. Samia	R Chong	B Pho	R Nakasao	B Reng	S-100 B. Houn-Tai
	N		- V			C-44	-70		22-75	2-20	- 20		8-2	61-3	2-94 2-94	-22 26-2	S-50		8 -2 9 -2	5-2	28-2	<u>S-100</u>

4-20

Coefficients	
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Table	

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4. 80E+00 4. 14E+01 1. 79E+00 1. 54E+01 7. 81E-01 6. 74E+00	1. 98E-04 9. 96E-01	16.0 Eh	Jura. Sands tone.	Js
1. 79E+00 1. 54E+01 7. 81E-01 6. 74E+00 4. 00E_01 4. 00E_00	3. 00E-03 1. 75E-01	44.6 Qf	Jura. Sands tone.	Js
7.81E-01 6.74E+00	1. 12E-03 2. 89E-01	13.9 Ep	Jura. Sands tone.	Js
	3. 72E-04 4. 72E-02	14.4 of	Q Sand. Jura. Sandstone.	Qsjs
4. JUET VU	2. 49E-04 6. 37E-01	19.1 Ba3	N-Q Basalt. Jura. Sandstone.	BaJs
B. Phonphai 2. 54E+01 2. 19E+02 1. 5	59E-02 2.02E-01	165. 3 Ep	Jura. Sands tone.	Js
1.80E-01 1.56E+00	7.49E-05 2.97E-01	4.4 Ep	Jura. Sands tone.	Js
1. 74E+02 1. 50E+03 5.	80E-02 8.35E-01	1900. 8 Ba2	N-Q Basalt.	Ba
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