Pursat River Basin Profile

1. Physiography

192. The Stung Pursat river catchment is located in the Pursat province in the southern part of the Tonle Sap Great Lake basin, and drains an area of 5,964 km2 (**Figure i**).

193. The Stung Pursat River originates in the drier eastern slopes of the Cardamom mountain and flows for approximately 150 km, ultimately draining into the Tonle Sap Great Lake. Two main tributaries, the Stung Peam and Stung Santre (Prey Khlong) rivers, flow in a northerly direction, and meet the Pursat River just above Bac Trakuon. The drainage area at Bac Trakuon, just below the confluence of the Pursat and the two tributaries is 4,245 km^2, and 4,596 km^2 farther downstream at the Khum Veal gauging station, located near the town of Pursat.

194. Elevations in the Pursat catchment range between six and 1,717 m above sea level (masl)[1]. More than 75% of the catchment encompasses terrain of hilly topography with an elevation greater than 30 masl, and is covered by forested land of varying densities. The remaining low-lying land is occupied by agriculture (**Figure ii**).

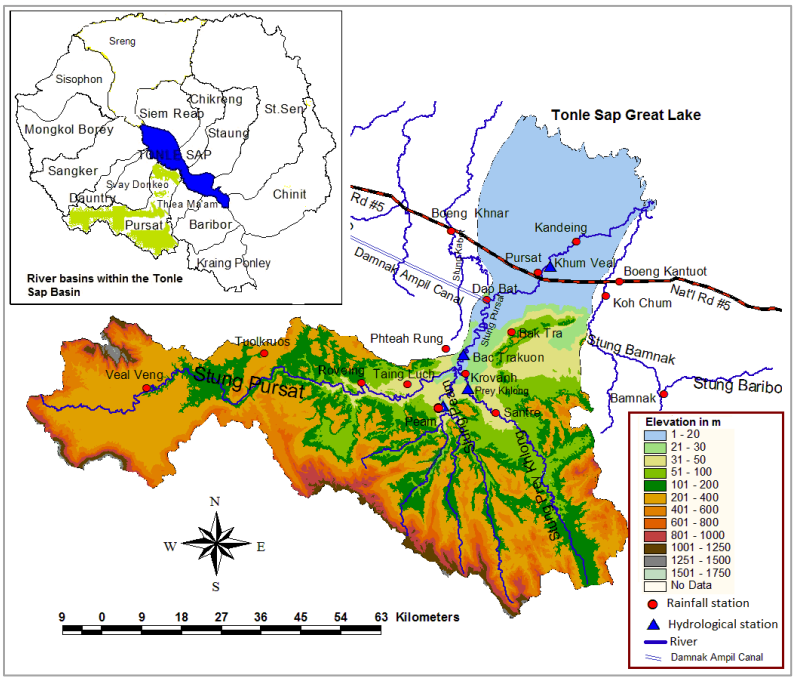


Figure i: Map of location of Stung Pursat river basin, elevation and hydromet monitoring stations

195. Major soil types in the Pursat catchment are: Dystric Leptosol, and Cambisol in the upper reaches; Gleyic, and Plintic Acrisols in the mid-elevation reaches and; Dystric Fluvisol, and Dystric Gleysol in the lower elevation reaches (**Figure iii**).

[1] Elevations referenced to mean sea level based on the Ha Tien datum, Viet Nam

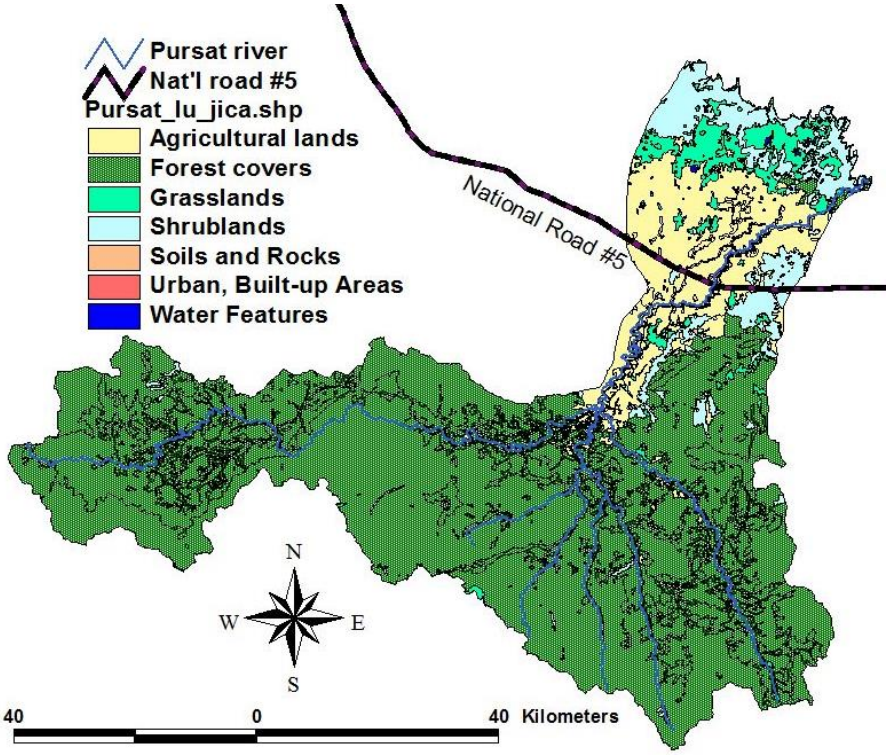


Figure ii: Map of Forest Cover of the Stung Pursat catchment (source: JICA Map 2005).

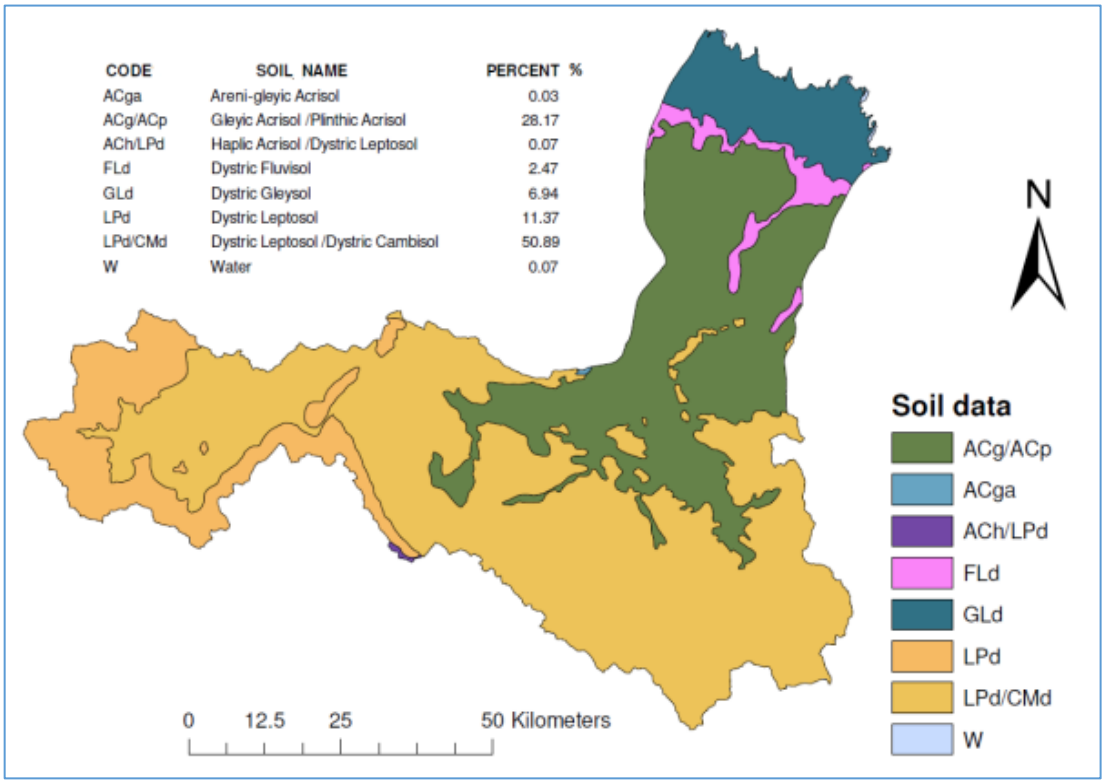


Figure iii: Soil map of the Pursat catchment (source: MRC 2002).

196. Based on the General Population Census of Cambodia 2008 (**Figure iv**), the population in the Stung Pursat river catchment is 203,522 persons (CNMC 2012: "Profile of Sub-area Tonle Sap"). The Stung Pursat river basin is shared by six districts: Veal Veng, Kravanh, Sampov Meas, Krakor, Bakan, and Kandieng. People living close to the lake earn their livelihood from fishing, while those further away depend on rice cultivation

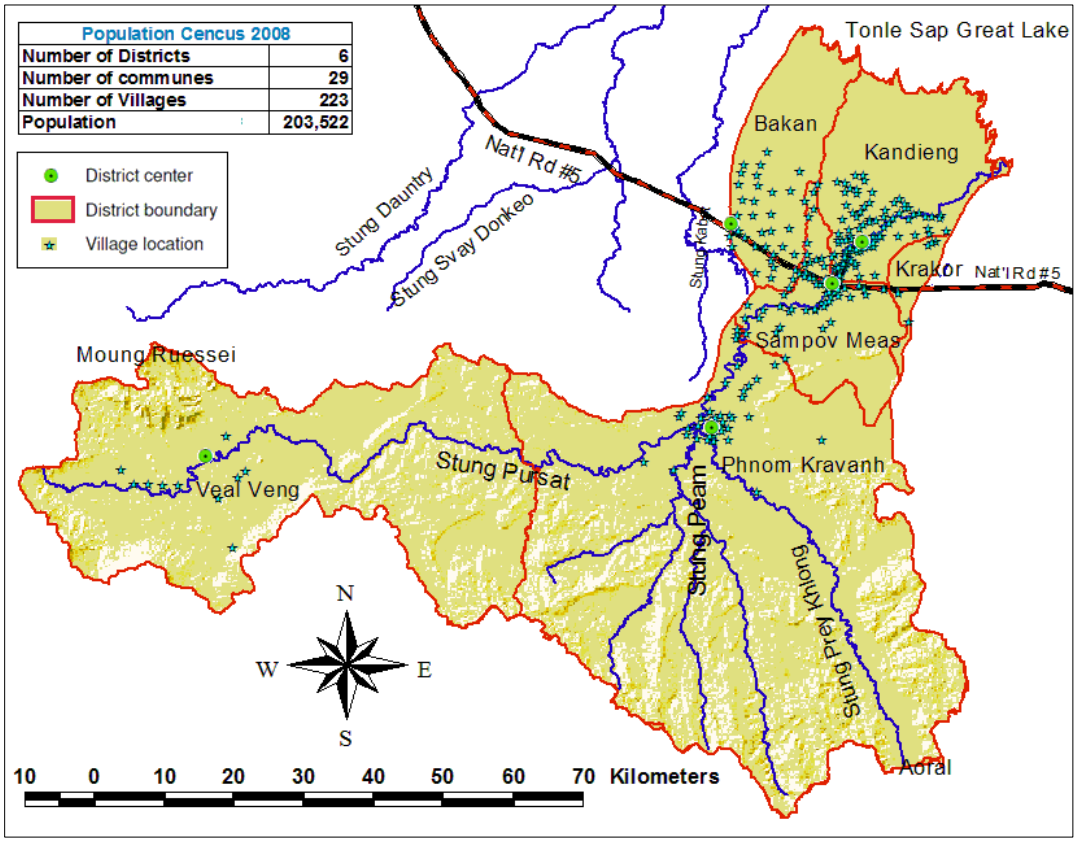


Figure iv: Map of Districts and village location share the Stung Pursat catchment (CNMC 2012)

2. Existing and planned water development structures

197. Similar to other catchment of the Tonle Sap Basin, the basin water resources is increasingly under stress with some irrigation projects already under construction and planning and hydropower projects. Those projects are mainly conceived and planned based on existing demised Pol Pot infrastructure. Recent focus on rice production export has put extra stress on water resources of this catchment while knowledge gaps are growing in all development sectors including capacity for planning and management.

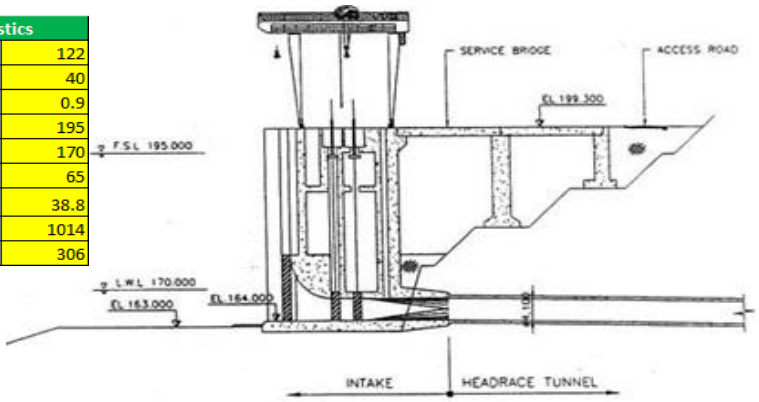
198. Irrigation system distribution is very complicated since there are 17 large and medium size existing and planned irrigation areas including 3 in the Svay Donkeo river basin (**Figure vi**). The location of all existing and planned water development structures in the Pursat river catchment is shown in **Figure vii** with the total command area of 55,509 ha (**Table i**)

199. At present, two dam projects (Dam No. 3 and No. 5) for creating two reservoirs by the development partners (China) have been implemented since 2010. Dam No. 3 has storage capacity of 25.5 MCM and

Dam No. 5 of 24.5 MCM. According to the Feasibility Study report on those dams, these two dams would realize double cropping of paddy for 6,200 ha and supply to the Damnak Ampil irrigation schemes.

200. Another water resource development project is Dam No. 1 (**Figure v**) under Ministry on Industry, Mines and Energy (MIME) and supported by Korean government, though it is still in pre-Feasibility Study stage. Dam No. 1 would have storage capacity of more than 1,000 MCM and aimed mainly at hydro-power

Hydropower dam #1 Characteristics	
RATED GROSS HEAD, M	122
INSTALLED CAPACITY, MW	40
OVERALL EFFICIENCY AT GROSS HEAD	0.9
FULL SUPPLY LEVEL, MAMSL	195
LOW SUPPLY LEVEL, MAMSL	170
TAILWATER LEVEL, MAMSL	65
DESIGN DISCHARGE, M^3/S	38.8
LIVE STORAGE, MCM	1014
DEAD STORAGE, MCM	306



generation.

Figure v: Hydropower dam No. 1 characteristics (MIME 2010)

201. Expecting the augmented river flow by the Dam No.1, the **Damnak Chheukrom** irrigation project has been studied with assistance of ADB and the construction has commenced in 2015. That project is expected to provide irrigation water for 16,100 ha on the left bank of the Pursat river.

The Damnak Ampil Diversion Weir: A diversion weir with automatic gates (rehabilitated in 2006) at Damnak Ampil was built during Khmer Rouge era across the Stung Pursat to divert water to feed the canal, which links between Stung Dauntry and Stung Pursat (**Figures v**). Part of it has been rehabilitated. The structure will also provide water to irrigation systems on the right bank of Stung Pursat. In total, the Damnak Ampil headworks will provide water to irrigation systems of 24,629 hectares covering sub-projects: Damnak Ampil extension of 15,000 ha, Damnak Ampil of 2519 ha, Wat Loung 2410 ha and O Rokar of 4700 ha. The canal cross section is trapezoidal with the bed width of 7 m and side slope of 2:3, and the longitudinal slope is about 0.0002. Water is distributed by a network of new and old second order gates and canals. Existing net storage capacity of the Stung Pursat at Damank Ampil reservoir is estimated at 860 million m^3. No recorded data for the canal or its diversion structure on the Pursat river was available. With reference to the information provided by the Pursat PDWRAM staff, the gates will automatically fall down (fully open) and let the water in Stung Pursat freely flows downstream the weir when the water level in the river reaches 17.0 m (local datum).

Table i: Total irrigation area of Existing and planned irrigation systems

Irrigation Scheme/Alternatives	Command Area (Ha)
Damnak Chheukrom scheme	16,100
Damnak Ampil headworks	24,629
Loloksar scheme	580
Kbal Hong (RB&LB)	3,200
Charek scheme	11,000
Total Irrigation areasin Pursat catchment	55,509

202. The downstream of the Damnak Ampil irrigation schemes are Lolok Sar, Kbal Hong and Charek. The last two schemes are located inside ring of the National Road no. 5. The Charek scheme has automatic gates constructed across the river and the gates automatically fall down in similar way to the gates at Damnak Ampil.

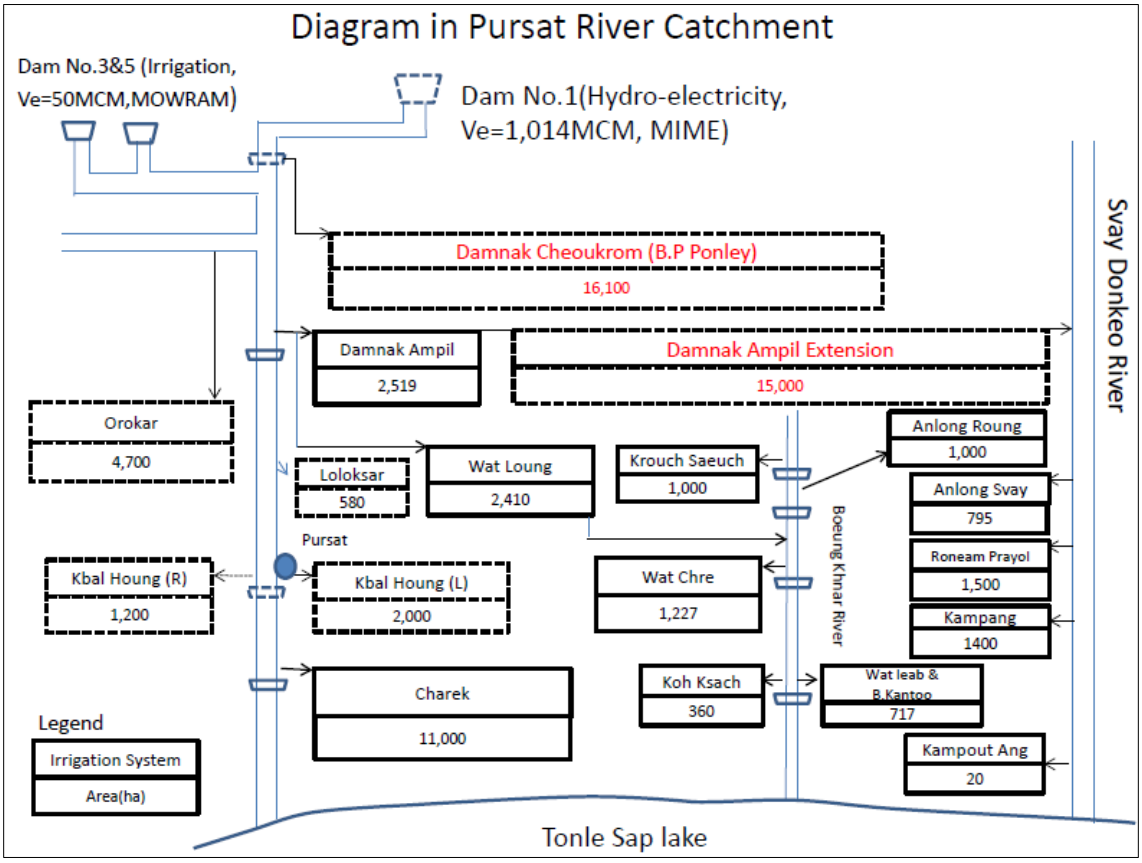


Figure vi: Water resources development in the Pursat river (SAPI, JICA 2011)

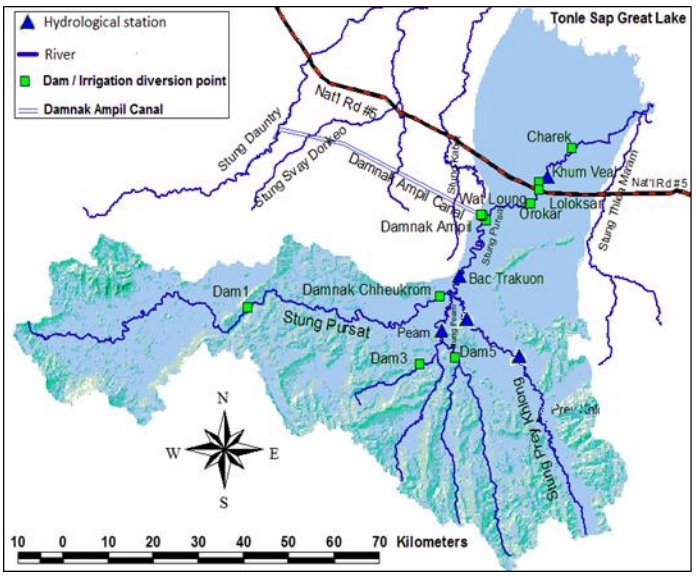


Figure vii: Location of Water resources development in the Pursat river (JICA 2013)

3. Climate

203. The Pursat basin climate is the same as Cambodia's climate, which is dominated by tropical monsoons with pronounced wet and dry seasons.

204. The alternating monsoon system controls the climate in Cambodia. In the wet season, the southwest monsoon, extends from May to November when occurs about 90% of the annual rainfall. The remaining months are influenced by the northeast monsoon, characterized by hot and relatively dry air with particularly high potential transpiration demands during March and April. The chain of the Elephant and the Cardamom mountain ranges to the west and southwest of the country modify the rainfall observed in the lowland area to the east that lies in their rain shadow. The strong influence of the Cardamom and other mountain areas exerts are factors in the much lower 900 to 1,800 mm of rain over most of the low land areas during normal years. This is because of the rain shadow effect. Several areas around the Great Lake suffer from persistent rain-shadow effects, which reduce the rainfall over the same area to the range from 800 to 1,500mm in dry year. During these dry years, the area suffering from rain-shadow effects broadens from small areas either side of the Great Lake, to extend over the whole Lake and peripheral low land areas.

205. Rainfall around the Pursat river basin area increases with elevation. The annual average rainfall spatially distributed over the study area ranges from 1200 mm to 1700 mm (**Figure viii**), but the annual amount varies considerably from year to year.

206. The maximum 24 hour rainfall is about 150 mm throughout the region. This is mostly convective rainfall. Occasionally a typhoon from the South China Sea or Gulf of Thailand might cross over land and affect the country. When this happens these storms bring strong wind and torrential rain.

207. Around the Great Lake, on average the monthly rainfall distribution indicates the presence of two peaks periods (**Figures ix** and **x**). The first peak occurs at the beginning of the wet season between May and June as the monsoon rains move north. There is then a period of lower rainfall between June and August whilst the monsoon returns south during August through October and it is at this time that rainfall is usually most heavy and when widespread flooding occurs.

208. Within this bimodal pattern, substantial rainfall variability often results in serious difficulties for rice farmers during the first few months of the wet season, when rainfall is most erratic, and early season droughts are common. In addition to the main dry season of January to March or April, and prior to the wettest period of end August to end November, there is a small dry season (July and/or early August), when dry spells or only light showers occur. Short droughts typically can last for about 15 days or more, but occasionally last up to 60 days after the first monsoon rains. The cessation of heavy rain at the end of the wet season can also be very abrupt and somewhat unpredictable.

209. The temperature regime is consistently high with little day or seasonal variation. Daily temperature varies between maximum of 36 °C, during the hottest months of April and May, to 17 °C in December-January the coldest months. Daily minimum temperature varies between 8 °C to 12 °C below the daily maximum. The annual average temperature is about 28 °C.

210. The relative humidity is quite different in the wet season compared to the dry season. The average annual relative humidity value is about 70 per cent throughout the country. The climate is consequently warm and humid.

Table ii below summarizes long-term average climate components observed at Pursat weather station together with Reference Evapotranspiration (ETo) computed by applying Penman-Monteith method.

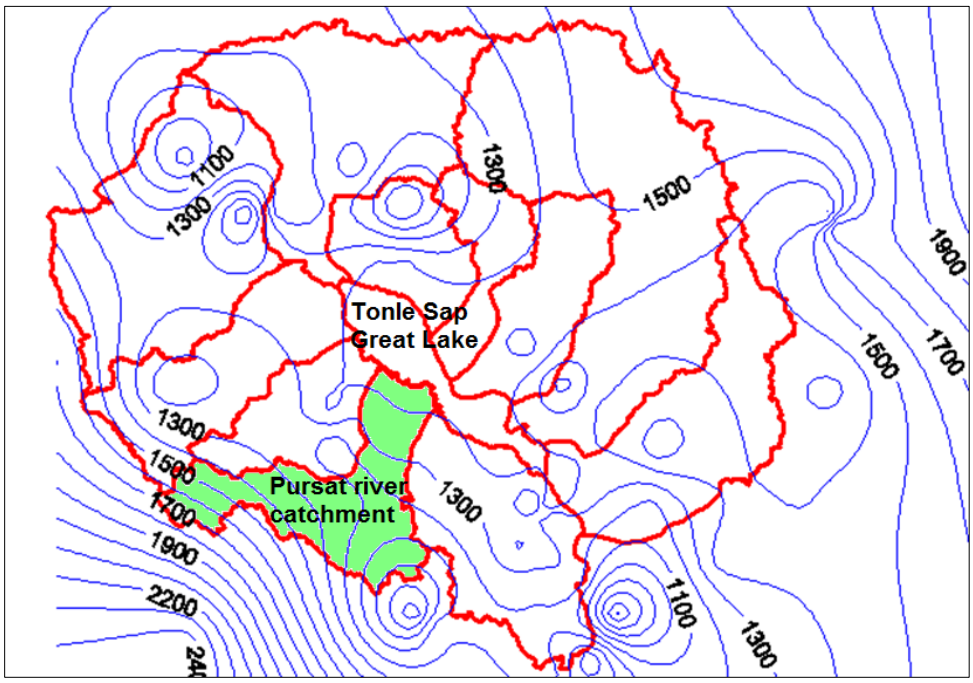


Figure viii: Annual rainfall distribution for the Tonle Sap catchment (1990-2011)

Table ii: Climate components at Pursat meteorological station

Climate Components	Unit	Months of the year												Annual
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Tmax	°C	33.3	34.5	35.7	36.3	36.1	35.3	34.7	34.4	33.2	32.4	32.1	31.6	34.1
Tmin	°C	19.5	20.5	21.8	24.4	24.5	24.7	23.7	24.1	23.4	23.1	21.4	16.9	22.3
Rhmean	%	65.8	63.0	64.6	65.5	67.1	68.0	67.9	71.0	73.9	75.8	74.2	71.0	69.0
U(x)	m/s	0.80	0.78	0.68	0.60	0.48	0.37	0.40	0.37	0.32	0.48	0.50	0.58	0.5
n	hour/day	9.5	9.0	8.8	7.7	7.3	5.6	6.4	5.0	5.5	6.6	7.4	8.5	7.3
Rs	Mj/m².day	12.2	13.7	16.2	15.6	15.6	14.6	15.4	13.7	12.9	12.7	12.8	13.8	14.1
Pan Evaporation	mm/day	3.7	4.4	4.5	4.6	4.0	4.0	3.4	3.4	3.0	3.1	3.1	3.4	3.7
ETO	mm/day	3.0	3.4	3.8	3.8	3.7	3.4	3.5	3.2	2.9	2.9	2.8	2.8	3.3

4. Hydrological characteristics

4.1. Data availability

211. Daily hydro-meteorological (hydromet) data have been collected from the DHRW and Pursat PDOWRAM. An overview of the rainfall, water level and discharge stations (**Figure i)** with data availability in the Pursat river basin are given in Table **iii** to Table **iv**.

212. A total number of 11 rainfall stations exists in the Pursat river basin, or on average 1 station per 540 km^2. The rainfall stations, however, are concentrated in middle and northern (downstream) part of the area, whereas in the upper part of the basin, any rainfall station is not available. The availability of rainfall data is very limited. The records of a number of stations start in the mid-nineties, and almost all have for a few years since 2000.

Table iii: Overview of rainfall stations with daily data availability within and around the Pursat river basin (Source: DWRW, Pursat PDOWRAM)

No.	River Catchment	ID	Station Name	X_COORD	Y_COORD	Daily Data Availability																		
						1990								2000										
						2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	10	11
1	Stung Kambot / Beung Khnar	120426	Beung Khnar	362188.5	1396436.4	F	F	+	+	+	F	F	F	+	+	+	+	+	+	+	+	+	F	F	F
2		120004	Phteah Rung	361016.4	1369770.9	F	F	F	F	F	F	F	F	+	+	+	+	+	+	+	+	+	F	F	F
3	Stung Pursat	120003	Bak Tra	375989.1	1373551.5	F	F	F	F	F	F	F	F	F	F	F	F	F	+	+	+	+	+	+	F
4		120304	Dap Bat	370246.6	1380894.0	F	F	F	F	F	F	F	F	+	+	+	F	+	+	+	+	+	+	+	F
5		120002	Kandeing	390515.1	1394023.5	F	F	F	F	F	F	F	F	F	F	F	F	F	+	+	+	+	F	+	F
6		120312	Kravanh	365457.0	1364266.0	F	F	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	F
7		120313	Peam	360322.6	1356910.4	F	F	F	F	F	F	F	F	+	+	+	+	+	+	+	+	+	+	+	F
8		120302	Pursat	381845.0	1386941.0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9		120005	Roveing	341975.0	1362273.0	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	+	+	F	+	F
10		120009	Santre	372359.7	1355371.0	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	+	+
11		120006	TaingLuch	352425.1	1361891.5	F	F	F	F	F	F	F	F	F	F	F	F	F	+	+	+	+	+	+	F
12		120301	Tuolkruos	320034.5	1368732.7	F	F	F	F	F	F	F	F	F	+	+	F	F	F	F	F	F	F	+	+
13		120007	VealVeng	293501.2	1361041.1	F	F	F	F	F	F	F	F	F	+	+	F	+	+	+	F	+	+	+	F
14	Stung Bamank / Thlea Ma'am	120406	Bamnak	410323.3	1359592.0	F	+	F	F	F	F	F	+	+	+	+	+	+	+	+	+	+	+	+	F
15		120320	Beung Kantout	400310.1	1384906.1	F	F	+	+	+	F	F	+	+	+	+	+	+	+	+	+	+	F	F	F
16		120001	Koh Chum	397229.9	1381664.0	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	+	+	+	+	F

+ Data available
F Data obtained from gap filling

213. The Stung Pursat is the only the Tonle Sap Great Lake catchment with more than one hydrological stations benefiting from NGOs direct support for a number of years. Water level data is available for 13 stations on the Pursat river, with 6 are still operational. The record for Bak Trakuon is apparently completed. At the rest stations, their records generally cover a few years either in the mid-nineties or as from the late nineties onward.

214. The discharge records as available cover 4 stations with a few complete years from the mid-nineties. Applying the existing rating curves with water level series available in the DHRW database (**Table v**), more extensive discharges database can be created with the same period as the available water levels. However, the data available for the study area are limited as there is no any gauge monitoring station at the water resources development places (Hydropower, irrigation diversion).

Table iv: Availability of daily water levels at stations within the Pursat river basin (Source: DWRW, Pursat PDOWRAM)

River catchmnet	River Name	HYMOS ID CODE	Station Name	Area at Gauging Station, km²	X_COORD	Y_COORD	TYPE of Station run by project /organisation	Status till 2011	Daily Data Availability																	
									1990						2000											
									4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	10	11
Pursat	Pursat	580104	Khum Veal	4,596	363700.7	1346389.3	DHRW	Non-Operational		120	+	306		+	+	+	+	+	+	+	+					
		580103	Bak Trakuon	4,245	364756.9	1365617.7	DHRW	Operational	255	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		580105	Lolok Sar		367847.3	1347660.8	DHRW	Operational	90	+	+	306				+	+	+	+	+	+	+	+	184		
		580106	Phum Kos		378380.2	1351302.1	DHRW	Non-Operational	90	+	+	306														
		580110	Kbal hong(up)		400493.0	1401662.8	DHRW	Operational		120	+	306				+	+	+	+	+	+	+	+	+	+	
		580120	Kbal hong(down)		394894.4	1396798.2	DHRW	Non-Operational		242				+	+	+	+	+	+	+						
	Stung Peam	580201	Peam	1,059	359610.0	1344257.8	DHRW	Operational								+	+	+	+	+	+	+	+	+	+	
	Stung Santre / Prey Khlong	580301	Prey Klong(down)	818	383622.0	1339545.0	DHRW	Operational	90	+	+	306				+	+	+	+	+	+	+	+	+	+	
		580302	Prey Klong(up)		307961.4	1383516.3	DHRW	Non-Operational	243	+	+	306				+										
	Stung Sanlong	580310	Sanlong(up)		371603.2	1410290.0	DHRW	Non-Operational		212	+	306														
		580320	Sanlong(down)		371852.5	1405434.4	DHRW	Non-Operational		212	+	306														
	Stung Svay At	580330	Svay At		371833.1	1401163.8	DHRW	Non-Operational	90	+	+	306														
	Stung Bromauy	580134	Veal Veng		293934.0	1359853.0	DHRW	Operational													364		146			

+ Data available
120 Number of gaps in a year

Table v: Availability of daily water discharges at stations within Pursat river basin (Source: DWRW)

No.	ID	Station Name	River sub-catchment	Computed daily timeseries		Rating Curve used
				Start Date	End Date	
1	580104	Khum Veal	Stung Pursat	01-Jan-99	31-Dec-06	New
2	580103	Bak Trakoun	Stung Pursat	01-Oct-94	31-Dec-11	New
3	580201	Peam	Stung Pursat (Peam)	01-Jan-01	31-Dec-10	New
4	580301	Prey Khlong	Stung Pursat (Santre)	01-Jan-01	31-Dec-10	New

4.2. Rating curve development

215. Stage-discharge rating curves (rating curves) were used to convert water level data (stage) recorded by the hydrometric monitoring stations into a discharge time-series or hydrograph. Rating curves were derived for the stations Stung Peam at Peam, Stung Santre at Prey Khlong, Stung Pursat at Bak Trakuon, and Stung Pursat at Kum Veal. All those four stations were considered without backwater effects and follow power function::

$$Q = b\,(H - H_0)^c$$

Where: ***Q*** is water discharge in m^3/s;

H is gauge height in meters;

b, ***c*** and H_0 are coefficients

216. It is important to note that the station Bak Trakuon was relocated to the Kravanh bridge about 2 km upstream of the old location since 2010; thus, two rating curves were developed at this station to compute discharges before and after 2010. The developed rating equations for all stations are shown in **Table vi**Table.

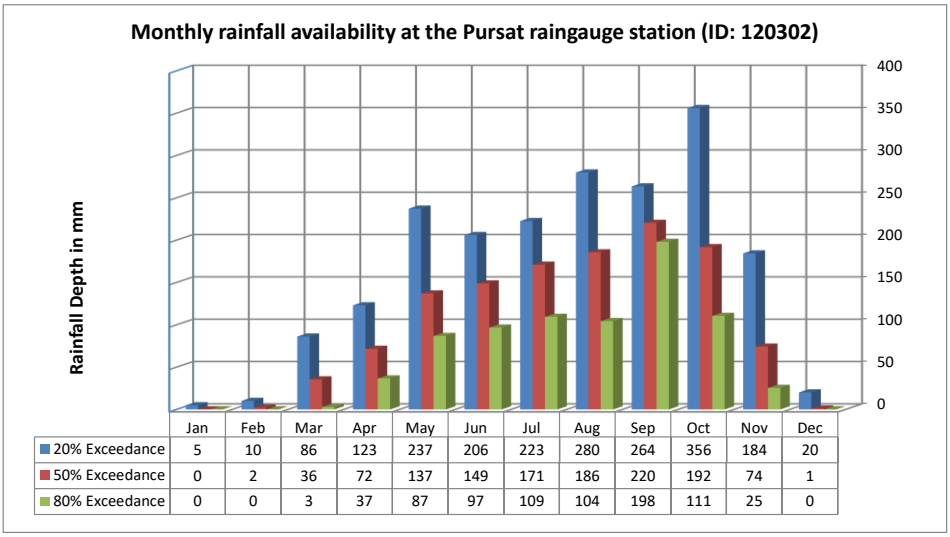
Table vi. Developed rating equations for four hydrometric stations in the Stung Pursat catchment.

Station Name	Station ID	Rating Equation	R^2	Number of points used
Peam	580201	$Q = -0.84 + 6.7952H + 2.713H^2$	0.9848	44 discharges measured between 1999- 2001
Prey Khlong	580301	$Q = 24.3175 \times (H-0.68)^{1.6134}$	0.9917	23 discharges measured in 1994 and 2001
Bak Trakuon	580103	Before 2010: $Q = 27.5335 \times (H-0.05)^{1.9304}$	0.9933	108 discharges measured in 1997 to 1999, 2001, 2005 to 2006, and 2010 to 2012
		After 2010: $Q = -6.62 + 20.3279\,H + 23.2066\,H^2$	0.9946	
Khum Veal	580104	$Q = -42.05 + 52.2099\,H - 8.2745\,H^2 + 2.0294\,H^3$	0.9977	36 discharges measured in 1998, 1999, and 2001

4.3. Representative rainfall station for the Pursat river catchment

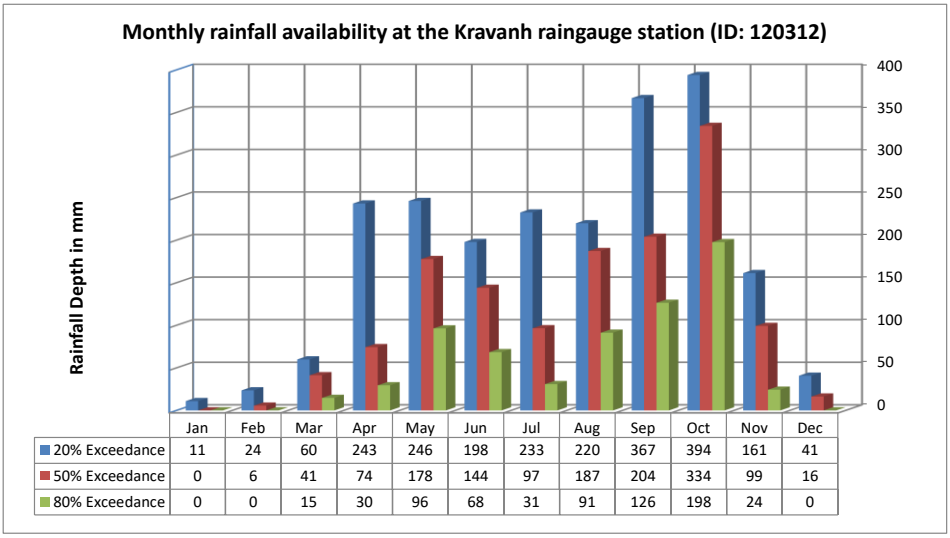
217. The rainfall station at Pursat (ID: 120302) was used as a representative station for the lower part of Stung Pursat catchment as its daily data records availability which is long enough for a period of 29 years (1981-2011). For the upper part of the catchment, the rainfall station at Kravanh (ID: 120312) was used as a representative station as its daily data records availability which is enough for a period of 17 years (1994-2010).

218. The monthly rainfall characteristics of the Pursat and Kravanh station were shown in **Figures ix** and **x**, respectively. The annual long term average is of 1390 mm for Pursat and 1500 mm for Kravanh, the annual variation at both stations ranges between 850 mm and 2100 mm. The month of October appears to be the wettest month.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20% Exceedance	5	10	86	123	237	206	223	280	264	356	184	20
50% Exceedance	0	2	36	72	137	149	171	186	220	192	74	1
80% Exceedance	0	0	3	37	87	97	109	104	198	111	25	0

Figure ix: Monthly rainfall distribution at the Pursat station from 1981 to 2011.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20% Exceedance	11	24	60	243	246	198	233	220	367	394	161	41
50% Exceedance	0	6	41	74	178	144	97	187	204	334	99	16
80% Exceedance	0	0	15	30	96	68	31	91	126	198	24	0

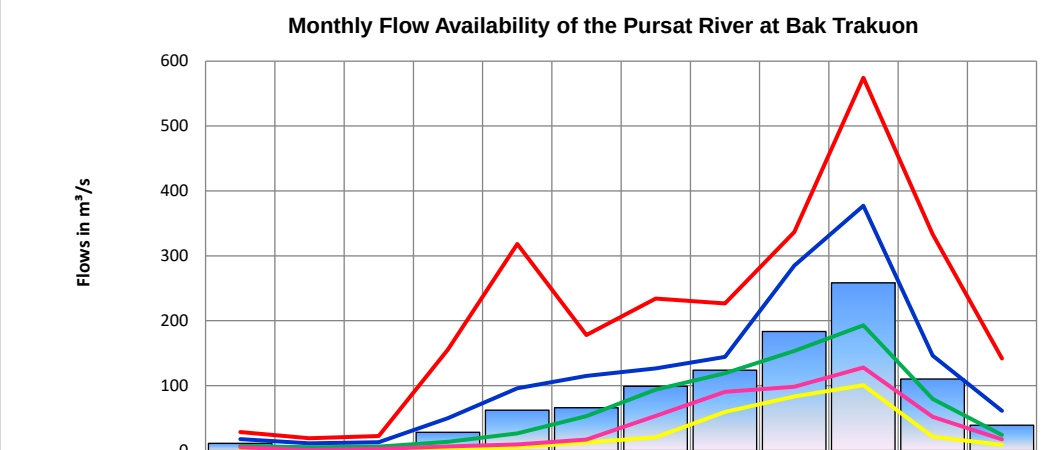
Figure x: Monthly rainfall distribution at the Kravanh station from 1994 to 2010.

4.4. Flow monitoring stations for the Stung Pursat river

219. There are mainly four water level and flow stations with reliably available data in the Stung Pursat river catchment: on the Stung Pursat river at Bak Trakuon and Khum Veal, on the Stung Peam at Peam and on the Stung Santre (Prey Khlong) at Prey Khlong.

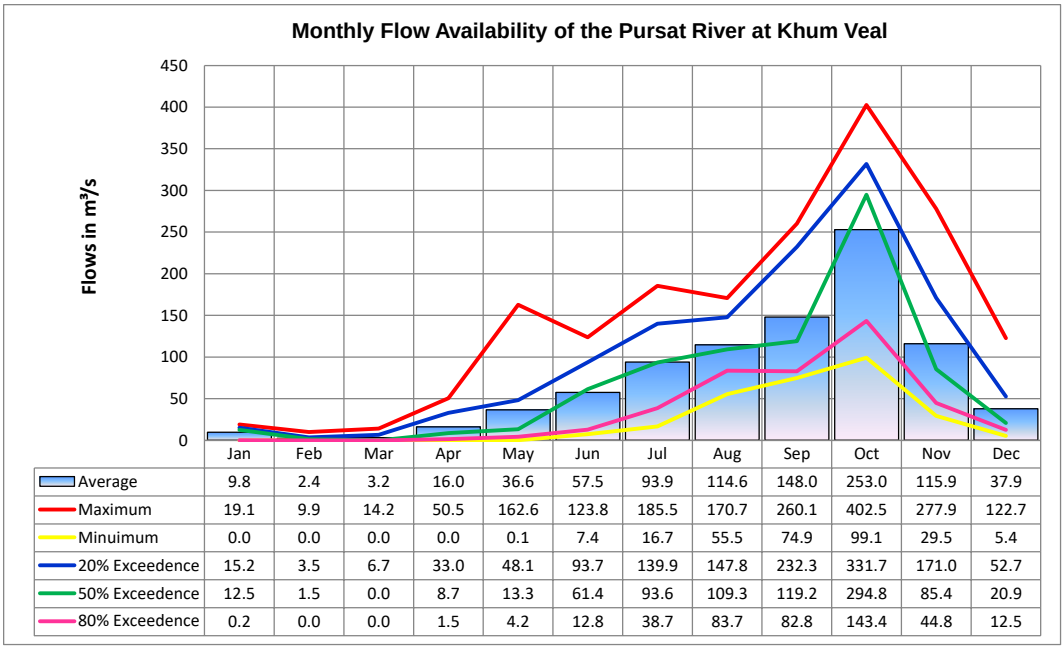
220. The flow station at Bak Trakuon (ID: 580103) is used to monitor the upper part of the Pursat river flow, while the station at Khum Veal (ID: 580104) monitors the flow in the lower part of Stung Pursat river. However, the latest station has been non-operational since 2007, but the data are reliable for further model calibration. The average monthly flows at Bak Trakuon and Khum Veal were summarized in **Figures xi** and **xii**, respectively.

221. It is obviously noted that the downstream flow at Khum Veal is less than the upstream flow at Bak Trakuon due to the fact that water is diverted from the Pursat river at Damnak Ampil weir via the main canal into the Dauntry catchment.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	11.1	6.3	7.8	28.2	62.2	66.1	99.1	123.8	183.5	258.3	110.1	39.1
Maximum	28.4	19.0	22.3	156.1	318.4	177.9	234.1	226.7	336.7	574.3	333.3	141.8
Minuimum	1.7	0.5	0.5	2.7	5.0	12.5	20.5	59.6	83.4	100.7	21.3	8.8
20% Exceedence	17.8	11.1	12.8	50.0	95.9	115.2	126.7	144.4	285.1	377.1	146.4	61.1
50% Exceedence	7.6	5.2	6.0	13.7	26.6	53.3	94.0	119.3	153.5	193.1	79.7	24.2
80% Exceedence	5.2	1.1	2.6	6.3	9.4	17.1	53.5	90.5	98.2	128.0	52.2	17.2

Figure xi: Monthly flow characteristics of the Stung Pursat river at Bak Trakuon (1995-2011)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	9.8	2.4	3.2	16.0	36.6	57.5	93.9	114.6	148.0	253.0	115.9	37.9
Maximum	19.1	9.9	14.2	50.5	162.6	123.8	185.5	170.7	260.1	402.5	277.9	122.7
Minuimum	0.0	0.0	0.0	0.0	0.1	7.4	16.7	55.5	74.9	99.1	29.5	5.4
20% Exceedence	15.2	3.5	6.7	33.0	48.1	93.7	139.9	147.8	232.3	331.7	171.0	52.7
50% Exceedence	12.5	1.5	0.0	8.7	13.3	61.4	93.6	109.3	119.2	294.8	85.4	20.9
80% Exceedence	0.2	0.0	0.0	1.5	4.2	12.8	38.7	83.7	82.8	143.4	44.8	12.5

Figure xii: Monthly flow characteristics of the Stung Pursat river at Khum Veal (1995-2006)

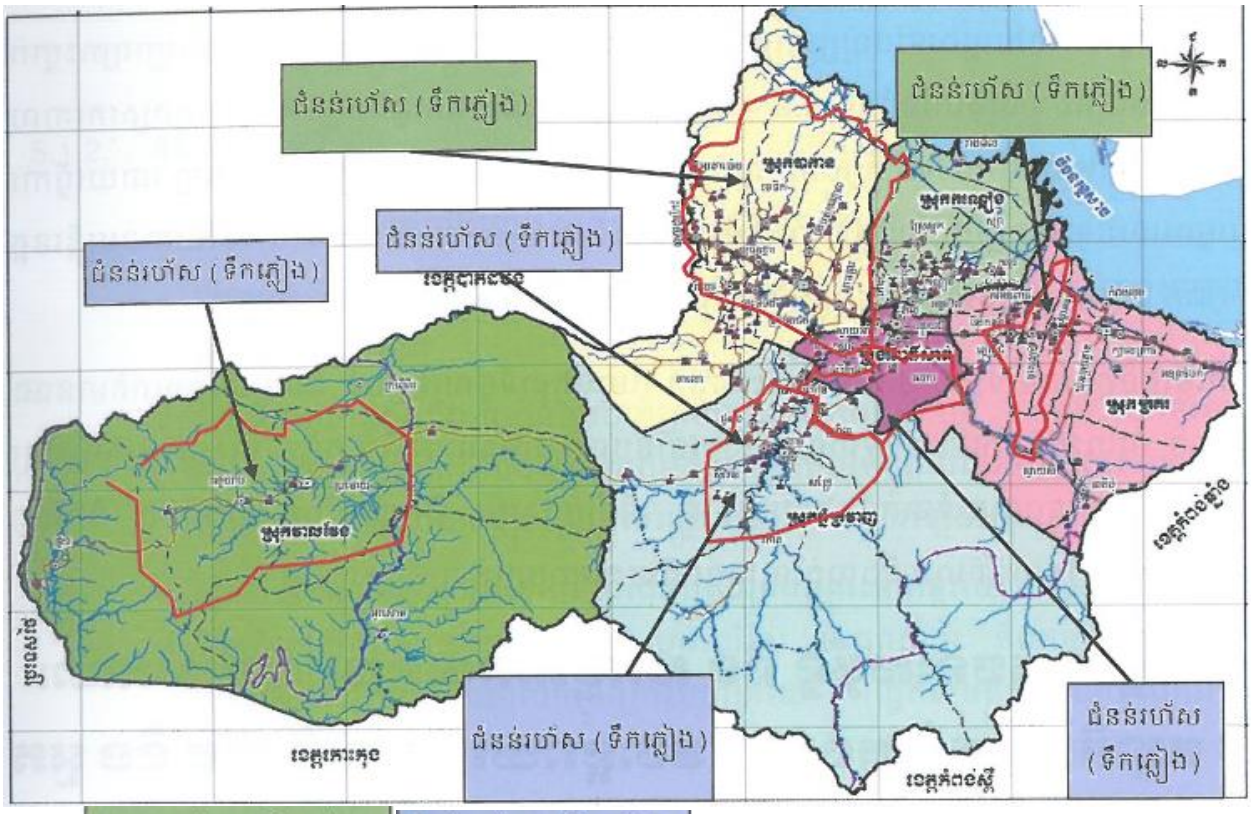
5. Floods and drought hazards

222. Presently the Stung Pursat faces series of water issues, such as:

- Water shortages in downstream parts of the catchment;
- Floods and drought in most part of the catchment;

223. Drought frequently and likely occurs most of the basin while flash flood occurs in both upstream and downstream parts (**Figure xiii**). The lowest parts of the basin especially in the Kandieng and Bakan districts are vulnerable to both flash flood and downstream sheet flood flow from the Tonle Sap Great Lake.

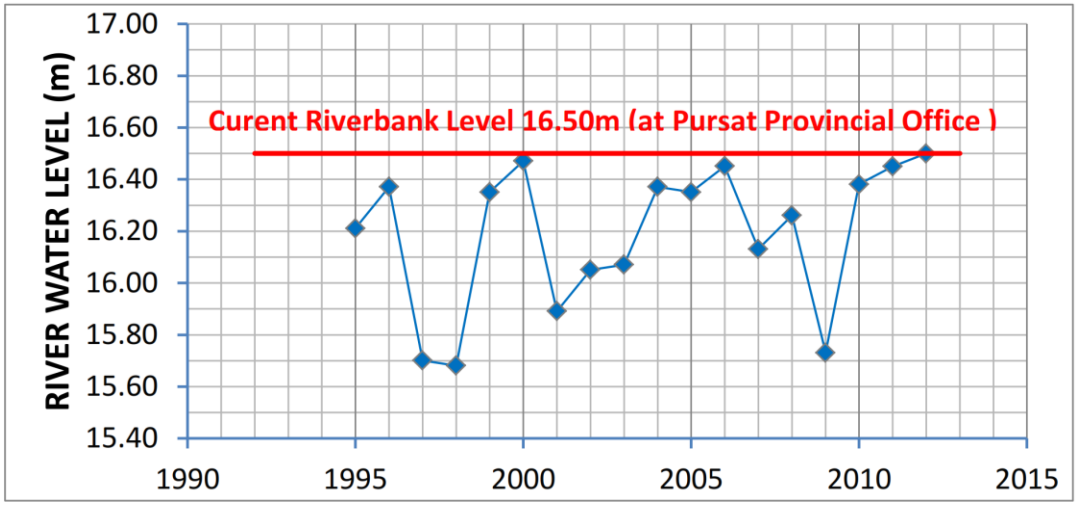
224. In 2013, flood and drought occurred and damaged most areas of all 6 districts Veal Veng, Kravanh, Krong Pursat (Sampov Meas), Krakor, Bakan and Kandieng.



Note: ជំនន់រហ័ស (ទឹកភ្លៀង) ជំនន់រហ័ស (ទឹកភ្លៀង) = Flash flooding

Figure xiii: Areas vulnerable to the flash flooding (Source: Pursat PCDM, 2014)

225. The major floods, which inundated the Pursat town, occurred in 2000, 2006, 2011 and 2012. **Figure xiv** shows the maximum flood hydrograph at Kbal Hong station, which is the focal station for flood monitoring for the Pursat town.



Source: TA7986-CAM Consultants

Figure xiv: Annual Flood Levels of the Pursat River in Pursat

6. References

1. CNMC, 2012. Profile of the Tonle Sap Sub-area (SA-9C), Basin Development Plan Program, Cambodia National Mekong Committee, Phnom Penh Cambodia.
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