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For sustainable development



Domestic and Industrial Water Use

Overall Progress Update



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DOMESTIC WATER USE

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Background

- In order to estimate total domestic water use (consumption) in the Lower Mekong Basin (LMB), the following information is necessary:
 - Population in the basin in 2007, 2020 and 2040; and
 - Water consumption in liters per capita per day (l/c/d) in 2007, 2020, and 2040.
- Once the estimates of population and water consumption per capita are obtained, estimates of annual total domestic water consumption can be computed.

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Population



According to the United Nations (2015), national populations in 2007 range between approximately 5.93 million in Lao PDR and 85.77 million in Viet Nam, and between 6.80 million and 93.4 million in 2015. These numbers imply a national annual population growth rate ranging between 0.299% in Thailand to 1.709% in Lao PDR. Cambodia also experienced a relatively high population growth rate between 2007 and 2015

Country	Population 2007	Population 2015	Implicit annual growth rate over the period (%)
Cambodia	13.73	15.58	1.59
Lao PDR	5.94	6.80	1.71
Thailand	66.35	67.96	0.30
Viet Nam	85.77	93.45	1.08

Source: UN, 2015

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Population

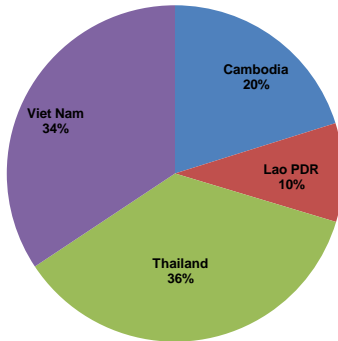


Country	Population	Country	Population 2007
Cambodia (2008)	12.88	Cambodia	12.68
Lao PDR (2011)	6.39	Lao PDR	5.97
Thailand (2010)	22.85	Thailand	22.65
Viet Nam (2012)	22.77	Viet Nam	21.58

Source: MRC, 2015 (Development Trends and Future Outlook)

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Distribution of LMB Population across Countries in 2007



In 2007, total population of the basin is estimated to have been approximately 62.9 million with approximately 36% of the LMB population located in Thailand and 34% in Viet Nam. Cambodia and Lao PDR accounted for 20% and 10% of the LMB population in 2007

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National Population Growth in 2020 & 2040



Country	Population 2020	Population 2040	Implicit annual growth rate over the period 2015-2020 (%)	Implicit annual growth rate over the period 2020-2040 (%)
LOW POPULATION GROWTH SCENARIO				
Cambodia	16.58	19.14	1.254	0.720
Lao PDR	7.32	8.66	1.480	0.845
Thailand	68.01	61.83	0.014	(0.475)
Viet Nam	97.18	102.27	0.787	0.256
MEDIUM POPULATION GROWTH SCENARIO				
Cambodia	16.81	20.94	1.533	1.105
Lao PDR	7.40	9.42	1.694	1.216
Thailand	68.58	66.19	0.182	(0.177)
Viet Nam	98.16	109.93	0.988	0.568
HIGH POPULATION GROWTH SCENARIO				
Cambodia	16.93	22.38	1.676	1.406
Lao PDR	7.48	10.19	1.906	1.53
Thailand	69.15	70.64	0.349	0.106
Viet Nam	99.13	70.64	1.188	(1.680)

Source: UN, 2015

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Assumed Annual Population Growth Rates in LMB



Country	Assumed annual growth rate over the period 2007-2015 (%)	Assumed annual growth rate over the period 2015-2020 (%)	Assumed annual growth rate over the period 2020-2040 (%)
LOW POPULATION GROWTH SCENARIO			
Cambodia	1.592	1.254	0.720
Lao PDR	1.709	1.480	0.845
Thailand	0.299	0.014	(0.475)
Viet Nam	1.077	0.787	0.256
MEDIUM POPULATION GROWTH SCENARIO			
Cambodia	1.592	1.533	1.105
Lao PDR	1.709	1.694	1.216
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Estimates of LMB Population by Country for Alternative Population Growth Scenarios



	2007	2015	2020	2040
LOW GROWTH				
Cambodia	12,675,337	14,382,652	15,890,786	16,829,705
Lao PDR	5,966,581	6,832,883	7,685,124	8,220,087
Thailand	22,645,424	23,193,454	23,220,187	22,352,000
Viet Nam	21,582,251	23,513,964	25,035,301	25,551,946
Total	62,869,594	67,922,954	71,831,399	72,953,738
MEDIUM GROWTH				
Cambodia	12,675,337	14,382,652	16,244,236	17,736,386
Lao PDR	5,966,581	6,832,883	7,797,549	8,572,909
Thailand	22,645,424	23,193,454	23,534,041	23,202,236
Viet Nam	21,582,251	23,513,964	25,438,303	26,617,023
Total	62,869,594	67,922,954	73,014,129	76,128,554
HIGH GROWTH				
Cambodia	12,675,337	14,382,652	16,427,562	18,368,243
Lao PDR	5,966,581	6,832,883	7,946,834	8,996,341
Thailand	22,645,424	23,193,454	23,849,470	24,052,829
Viet Nam	21,582,251	23,513,964	25,843,715	27,680,603

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Estimates of LMB Population by Country for Alternative Population Growth Scenarios



Country	Population Projection 2020	Population Projection 2040
Cambodia	15.54	19.03
Lao PDR	7.27	8.90
Thailand	21.79	19.16
Viet Nam	24.52	27.49
Total	69.12	74.58

Source: MRC, 2015

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Projections of Per Capita Domestic Water Consumption



- To offer projections of total domestic water consumption, it is necessary to account not only for projected increase in population, but also for projected increase in per capita water consumption.
- The increase is explained mostly by two factors:
 - per capita water consumption increases with access to urban water supply networks; and
 - per capita water consumption is expected to increase with income.

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Average GDP Growth Rates per Year: Actual and Estimates

	2001-2010	2011-2020	2021-2030	2031-2060
Cambodia	7.85	6.00	4.50	3.50
Lao PDR	6.47	6.00	4.50	3.00
Thailand	4.85	4.01	3.58	2.00
Viet Nam	7.41	4.86	3.74	3.00

Source: MRC, 2015

Assumptions about Average GDP Growth Rates per Year

	2007-2015	2015-2020	2020-2040
Cambodia	7.00	5.00	4.00
Lao PDR	6.00	5.00	3.75
Thailand	4.00	3.75	2.75
Viet Nam	6.00	4.00	3.30

Estimates of per Capita Water Consumption (l/c/d)

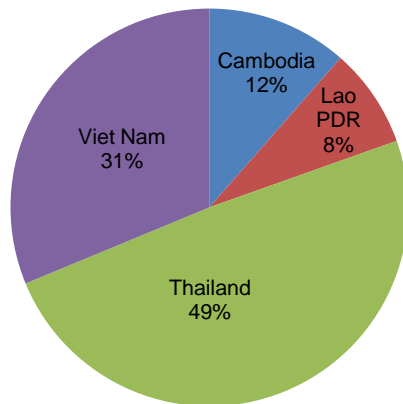
	2007	2020	2040
Cambodia	50	67	73
Lao PDR	75	97	107
Thailand	120	144	154
Viet Nam	80	102	110

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Estimated Total Domestic Water Consumption in the

	2007	2020	2040
Low Population Growth			
Cambodia	231,324,902	385,782,507	449,487,643
Lao PDR	163,335,167	273,347,792	319,749,139
Thailand	991,869,572	1,223,635,884	1,257,907,548
Viet Nam	630,201,731	927,602,687	1,024,377,735
Total	2,016,731,372	2,810,368,870	3,051,522,065
Medium Population Growth			
Cambodia	231,324,902	394,363,255	473,703,254
Lao PDR	163,335,167	277,346,564	333,473,391
Thailand	991,869,572	1,240,175,059	1,305,756,429
Viet Nam	630,201,731	942,534,623	1,067,076,695
Total	2,016,731,372	2,854,419,502	3,180,009,769
High Population Growth			
Cambodia	231,324,902	398,813,883	490,578,905
Lao PDR	163,335,167	282,656,399	349,944,253
Thailand	991,869,572	1,256,797,254	1,353,625,391
Viet Nam	630,201,731	957,555,846	1,109,715,607

Estimated Total Domestic Water Consumption in the LMB



Total domestic water consumption is estimated to have been approximately 2.016 billion m³ in 2007.

Approximately 49% of this water consumption took place in Thailand, 31% in Viet Nam, 12% in Cambodia, and 8% in Lao PDR


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INDUSTRIAL WATER USE


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Industrial Activities in Lao PDR (2014)



Name of Industrial Sector	Number of Enterprise		Number of Employees	
	Total	%	Total	%
Grain mill products	881	18.05	4,263	4.28
Furniture and fixtures (non-metal)	627	12.85	10,430	10.46
Soft drinks and carbonated waters industries	515	10.55	4,361	4.37
Non-metallic mineral products	348	7.13	4,184	4.20
Sawmills, planing and other wood mills	306	6.27	8,725	8.75
Structural clay products	294	6.02	3,024	3.03
Wearing apparel, except footwear	250	5.12	27,154	27.24
Wood and cork products	237	4.86	5,162	5.18
Dairy products	149	3.05	-	-
Food product	130	2.66	1,802	1.81
Slaughtering, preparing and preserving meat	130	2.66	-	-
Iron and steel basic industries	103	2.11	1,743	1.75
Tobacco manufactures	83	1.70	1,444	1.45
Spinning, weaving and finishing textiles	80	1.64	2,405	2.41
Bakery products	66	1.35	-	-
Basic industrial chemicals except fertilizers	63	1.29	1,630	1.64
Non-ferrous metal basic industries	60	1.23	1,512	1.52
Plastic products not elsewhere classified	53	1.09	1,546	1.55
Glass and glass products	52	1.07	-	-
Cement, lime and plaster	-	-	1,615	1.62
Motorcycles and bicycles	-	-	1,389	1.39
Radio, television and communication equipment	-	-	1,282	1.29
Malt liquors and malt	-	-	1,189	1.19
Footwear	-	-	1,153	1.16
Printing, publishing and allied industries	-	-	1,008	1.01
Others combined	454	9.30	12,665	12.70
Total	4,881	100.00	99,686	100.00

Geographical Distribution of Enterprises



Province	Number of Enterprise		Number of Employees	
	Total	%	Total	%
Vientiane Capital	1,601	32.80	52,673	52.84
Savannakhet	762	15.61	7,901	7.93
Borikhamxay	398	8.15	4,739	4.75
Champasack	335	6.86	2,694	2.70
Khammouane	269	5.51	7,460	7.48
Xayabury	221	4.53	3,993	4.01
Luangprabang	205	4.20	2,752	2.76
Saravane	194	3.97	2,258	2.27
Vientiane Province	178	3.65	4,027	4.04
Xiengkhouang	146	2.99	2,191	2.20
Houphan	107	2.19	2,155	2.16
Bokeo	106	2.17	1,600	1.61
Oudomxay	106	2.17	1,321	1.33
Sekong	85	1.74	1,414	1.42
Attapeu	75	1.54	1,636	1.64
Luang Namtha	50	1.02	653	0.66
Phongsaly	43	0.88	219	0.22
Total	4,881	100.00	99,686	100.00

Characterizing Industrial Water Use in the Lower Mekong Basin



1. Cambodia

- According to UNEP (2009), total water withdrawals are estimated to be 0.75 km³ per year, of which 94% is for agricultural purposes, approximately 4% for domestic purpose, and 2% for industrial purposes.
- In MRC (2002), total water withdrawals were estimated to be 0.50 km³ per year, of which 94% was for agricultural purposes, 5% for domestic purpose, and 1% for industrial use. While estimates of water withdrawals are relatively different, the percentage distribution of use across sectors is relatively consistent.

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Characterizing Industrial Water Use in the Lower Mekong Basin



1. Cambodia

- Our own estimate of domestic water consumption in Cambodia reaches approximately 277 million m³. If this volume of water were to represent approximately 4% of total water withdrawals, then total water withdrawal would amount to approximately 6.9 billion m³, and industrial water use would amount to approximately 69 million m³ in mid to late 2000.

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Characterizing Industrial Water Use in the Lower Mekong Basin



2. Lao PDR

- According to Water Environment Partnership Asia and World Bank, estimated industrial water usage is approximately equivalent or slightly higher in volume to domestic water usage.
- The industrial water consumption can be estimated to reach approximately 165 million m³ in 2007. Further assuming these proportions to remain approximately constant, then we would project industrial water usage to reach approximately 277 million m³ in 2020 and 335 million m³ in 2040 (based on medium population growth scenario).

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SAND MINING EXTRACTION

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Sand Mining Extraction



- The surveys conducted by WWF indicated that a total volume of 34.48 million cubic metres or 55.2 million tons of sediment were extracted from the Mekong main stem in Laos, Thailand, Cambodia, and Vietnam in 2011

Country	Extractions (m ³ /year)				
	Sand	Gravel	Pebbles/ Cobbles	Total	%
Cambodia	18,748,503	2,044,940	0	20,793,443	60
Lao	904,100	10,000	454,500	1,368,600	4
Thailand	3,677,200	857,740	0	4,534,940	13
Viet Nam	7,750,000	0	0	7,750,000	22

Volume of grain-size categories per country

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Consequences of Gravel Mining in the Mekong River



- The surveys conducted by WWF indicated that a total volume of 34.48 million cubic metres or 55.2 million tons of sediment were extracted from the Mekong main stem in Laos, Thailand, Cambodia, and Vietnam in 2011.
- Because sand and gravel extraction has to date not been considered in and of itself a cause of morphological change and environmental impacts in the Mekong River.
- In the absence of a systematic long profile of the Mekong River at low flow, it is not possible to document riverbed incision due to extraction.

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Consequences of Gravel Mining in the Mekong River



- Further incision, which may be expected giving on-going and planned extraction, may threaten infrastructure.
- In some places, concave banks are confronted with significant lateral erosion, for instance in Saman, downstream of Kratie. According to local residents, faster erosion, threatening villages on the levee, had been triggered by dredging and the village obtained a halt to extraction.

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Challenges



- The national consultants need additional time to collection all data and information regarding the domestic water use and industrial data

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The RTWG is requested to:



- Take note of the progress
- Approve data and analysis for the domestic water use in 2007, 2020, and 2040
- Provide feedback and guidance for the challenges regarding the data collection on industrial sector

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Thank You

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