



Mekong River Commission

Programme to Demonstrate the Multi-Functionality of Paddy Fields over the Mekong River Basin

Irrigation Water Use Assessment Annex

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Annex 1: Cropping Schedules

Cropping schedules have been based on the DSF study but including some adjustments. The main parameters are described below.

Schedule: The crop area is divided into 3 parts with a phased build up of cropping over three months.

Portion of the Area varies depending on the cropping schedule

Crop coefficients :based on DSF study. A weighted Kc factor is calculated based on the portion of the area and the Kc of each portion.

Infiltration factor is the portion of the area subject to infiltration-assumes that there would no need to compensate for infiltration losses during the harvest period.

Ponding factor is required for the period of land preparation only-data from the experimental farm sites shows that farmers generally do not increase the ponding depth over the period of the crop.

The actual crop area for evapotranspiration infiltration or ponding in each month is: the season rice crop area x appropriate factor.

Summary of the Cropping Schedules is given below. The regions refer to the DSF region categories.

Code	Description	Ponding Depth	Return Flow Factor
TW1	Thailand Wet Season region 1,2 and 4	0.2	0.3
TW2	Thailand Wet Season region 3 &7	0.2	0.3
TW3	Thailand Wet Season region 5 & 8	0.2	0.3
TD1	Thailand Dry Season region 1,2,5 and 8	0.2	0.2
TD2	Thailand Dry Season region 3	0.2	0.2
TD3	Thailand Dry season region4	0.2	0.2
TD4	Thailand Dry Season region7	0.2	0.2
LW1	Laos North and Central Wet Season	0.2	0.3
LD1	Laos all Dry Season	0.2	0.1
LW2	Laos South Wet Season	0.2	0.3
CW1	Cambodia Wet Season(early planted)	0.2	0.3
CW2	Cambodia Wet Season (late planted)-outside flood zone	0.2	0.3
CD1	Cambodia dry season (early planted)	0.0	0.3
CD2	Cambodia dry season	0.2	0.3
VW1	Wet season Vietnam Summer Autumn	0.2	0.0
VW2	Wet season Vietnam Autumn Winter	0.2	0.0
VD	Dry season Vietnam Winter -Spring	0.1	0.0
VW3	Wet season Vietnam (single rice crop)	0.1	0.0
VW4	Wet season crop in highland-as VW3 but different return flow and ponding depths	0.2	0.3
LV	Lao vegetable crop		0.1
TO	Thailand Other Non rice crops		0.2

Cropping Schedules_Thailand Wet Season

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TW1 Wet Season Thailand Region 1,2&4												
Crop schedule_1							P	C	C	C	H	
Crop schedule_2						P	C	C	C	H		
Crop schedule_3					P	C	C	C	H			
Portion of area-1							0.1	0.1	0.1	0.1	0.1	
Portion of area-2						0.8	0.8	0.8	0.8	0.8		
Portion of area-3					0.10	0.10	0.10	0.10	0.10			
Crop Area	0.0	0.0	0.0	0.0	0.1	0.9	1.0	1.0	1.0	0.9	0.1	0.0
Kc_1							0.45	0.93	1.16	1.26	0.94	
Kc_2						0.45	0.93	1.16	1.26	0.94		
Kc_3					0.45	0.93	1.16	1.26	0.94			
Weighted Kc_wet	0.00	0.00	0.00	0.00	0.45	0.50	0.91	1.15	1.22	0.98	0.94	0.00
Infiltration_factor	0	0	0	0	0	0.1	0.9	1	1	0.9	0.1	0
Ponding_factor	0	0	0	0	0	0.1	0.8	0.1	0	0	0	0
TW2 Wet Season Thailand Region 3&7												
Crop schedule_1								P	C	C	C	H
Crop schedule_2							P	C	C	C	H	
Crop schedule_3						P	C	C	C	H		
Proportion of area-1								0.3	0.3	0.3	0.3	0.3
Proportion of area-2							0.6	0.6	0.6	0.6	0.6	
Proportion of area-3						0.1	0.1	0.1	0.1	0.1	0.1	
Proportion Total	0.0	0.0	0.0	0.0	0.0	0.1	0.7	1.0	1.0	1.0	1.0	0.3
Kc_1								0.45	0.93	1.16	1.26	0.94
Kc_2							0.45	0.93	1.16	1.26	0.94	
Kc_3					0.45	0.93	1.16	1.26	0.94			
Weighted Kc_dry	0.00	0.00	0.00	0.00	0.00	0.45	0.52	0.81	1.10	1.20	0.94	0.94
Infiltration_factor	0	0	0	0	0	0.1	0.7	1	1	0.9	0.3	0
Ponding_factor	0	0	0	0	0	0.1	0.6	0.3	0	0	0	0
TW3 Wet Season Thailand Region 5&8												
Crop schedule_1							P	C	C	C	C	H
Crop schedule_2					P	C	C	C	C	H		
Crop schedule_3				P	C	C	C	C	H			
Proportion of area-1						0.2	0.2	0.2	0.2	0.2	0.2	
Proportion of area-2					0.7	0.7	0.7	0.7	0.7	0.7		
Proportion of area-3				0.1	0.1	0.1	0.1	0.1	0.1			
Crop Area	0.0	0.0	0.0	0.1	0.8	1.0	1.0	1.0	1.0	0.9	0.2	0.0
Kc_1						0.45	1.11	1.24	1.29	1.18	0.88	
Kc_2					0.45	1.11	1.24	1.29	1.18	0.88		
Kc_3				0.45	1.11	1.24	1.29	1.18	0.88			
Weighted Kc_wet	0.00	0.00	0.00	0.45	0.53	0.99	1.22	1.27	1.17	0.95	0.88	0.00
Infiltration_factor	0	0	0	0.1	0.8	1	1	1	0.9	0.2	0	0
Ponding_factor	0	0	0	0.1	0.7	0.2	0	0	0	0	0	0

Cropping Schedules_Thailand Dry Season

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TD1 Dry Season Thailand Region 1,2,5,8												
Crop schedule_1		C	C	C	H							P
Crop schedule_2		C	C	H							P	C
Crop schedule_3		C	H							P	C	C
Portion of area-2		0.7	0.7	0.7							0.7	0.7
Portion of area-3		0.10	0.10							0.10	0.1	0.10
Crop Area		0.8	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.8
Kc_1		1.20	1.29	1.23	0.97							0.50
Kc_2		1.29	1.23	0.97							0.50	1.20
Kc_3		1.23	0.97							0.50	1.20	1.29
Weighted Kc_wet		1.27	1.27	1.03	1.03	0.00	0.00	0.00	0.00	0.50	0.59	1.07
Infiltration_factor		1	0.9	0.2	0	0	0	0	0	0	0.1	0.8
Ponding_factor		0	0	0	0	0	0	0	0	0	0.1	0.7
TD2 Dry Season Thailand Region 3												
Crop schedule_1				C	C	C	C	H				
Crop schedule_2		P	C	C	C	C	H					
Crop schedule_3		C	C	C	C	H						P
Proportion of area-1			0.2	0.2	0.2	0.2	0.2	0.2				
Proportion of area-2		0.7	0.7	0.7	0.7	0.7	0.7					
Proportion of area-3		0.1	0.1	0.1	0.1	0.1						0.1
Proportion Total		0.8	1.0	1.0	1.0	1.0	0.9	0.2	0.0	0.0	0.0	0.1
Kc_1			0.5	0.50	0.93	1.16	1.26	0.94				
Kc_2		0.50	0.50	0.93	1.16	1.26	0.94					
Kc_3		0.50	0.93	1.16	1.26	0.94						0.50
Weighted Kc_dry		0.50	0.54	0.87	1.12	1.21	1.01	0.94	0.00	0.00	0.00	0.50
Infiltration_factor		0.8	0.8	1	1	0.9	0.2	0	0	0	0	0.1
Ponding_factor		0.7	0	0	0	0	0	0	0	0	0	0.1
TD3 Dry Season Thailand Region 4												
Crop schedule_1			P	C	C	H						
Crop schedule_2		P	C	C	H							
Crop schedule_3		C	C	H								P
Proportion of area-1			0.2	0.2	0.2	0.2						
Proportion of area-2		0.6	0.6	0.6	0.6							
Proportion of area-3		0.20	0.20	0.20								0.20
Crop Area		0.8	1.0	1.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.2
Kc_1			0.50	1.00	1.28	0.93						
Kc_2		0.50	1.00	1.28	0.93							
Kc_3		1.00	1.28	0.93								0.50
Weighted Kc_wet		0.63	0.96	1.15	1.02	0.93	0.00	0.00	0.00	0.00	0.00	0.50
Infiltration_factor		0.8	1	0.8	0.2	0	0	0	0	0	0	0.2
Ponding_factor		0.6	0.2	0	0	0	0	0	0	0	0	0.2
TD4 Dry Season Thailand Region 7												
Crop schedule_1			P	C	C	H						
Crop schedule_2		P	C	C	H							
Crop schedule_3		C	C	H								P
Proportion of area-1			0.2	0.2	0.2	0.2						
Proportion of area-2		0.6	0.6	0.6	0.6							
Proportion of area-3		0.20	0.20	0.20								0.20
Crop Area		0.8	1.0	1.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.2
Kc_1			0.50	1.00	1.28	0.93						
Kc_2		0.50	1.00	1.28	0.93							
Kc_3		1.00	1.28	0.93								0.50
Weighted Kc_wet		0.63	0.96	1.15	1.02	0.93	0.00	0.00	0.00	0.00	0.00	0.50
Infiltration_factor		0.8	1	0.8	0.2	0	0	0	0	0	0	0.2
Ponding_factor		0.6	0.2	0	0	0	0	0	0	0	0	0.2
Notes		P	Land Preparation & Ponding			C	Growing			H	Harvest	

Cropping Schedules_Laos

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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LW1 Wet Season(Laos North and Central)												
Crop schedule_1							P	C	C	C	C	H
Crop schedule_2							P	C	C	C	H	
Crop schedule_3					P	C	C	C	C	H		
LW1 Wet Season												
Portion of area-1							0.2	0.2	0.2	0.2	0.2	0.2
Portion of area-2						0.6	0.6	0.6	0.6	0.6	0.6	0.6
Portion of area-3					0.20	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Crop Area	0.0	0.0	0.0	0.0	0.2	0.8	1.0	1.0	1.0	1.0	0.8	0.2
Kc_1							1.18	1.02	1.03	1.05	1.00	0.84
Kc_2						1.18	1.02	1.03	1.05	1.00	0.84	
Kc_3					1.18	1.02	1.03	1.05	1.00	0.84		
Weighted Kc_wet	0.00	0.00	0.00	0.00	1.18	1.14	1.05	1.03	1.04	0.98	0.88	0.84
Infiltration_factor	0	0	0	0	0.2	0.2	1	1	1	0.8	0.2	0
Ponding_factor	0	0	0	0	0.2	0	0.8	0	0	0	0	0

LD Dry Season (all parts)												
Crop schedule_1		P	C	C	C	H						
Crop schedule_2		C	C	C	H							P
Crop schedule_3		C	C	H							P	C
LD Dry Season												
Proportion of area-1		0.2	0.2	0.2	0.2	0.2						
Proportion of area-2		0.6	0.6	0.6	0.6							0.6
Proportion of area-3		0.2	0.2	0.2							0.2	0.2
Proportion Total		1.0	1.0	1.0	0.8	0.2	0.0	0.0	0.0	0.0	0.2	0.8
Kc_1		1.2	1.07	1.01	1.05	0.88						
Kc_2		1.07	1.01	1.05	0.88							1.2
Kc_3		1.01	1.05	0.88							1.20	1.07
Weighted Kc_dry		1.08	1.03	1.01	0.92	0.88	0.00	0.00	0.00	0.00	1.20	1.17
Infiltration_factor		1	1	0.8	0.2	0	0	0	0	0	0.2	0.8
Ponding_factor		0.2	0	0	0	0	0	0	0	0	0.2	0.6

LW2 Wet Season(Laos South)												
Crop schedule_1							P	C	C	C	C	H
Crop schedule_2							P	C	C	C	H	
Crop schedule_3					P	C	C	C	C	H		
Wet Season												
Proportion of area-1							0.2	0.2	0.2	0.2	0.2	0.2
Proportion of area-2						0.2	0.2	0.2	0.2	0.2	0.2	0.2
Proportion of area-3					0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Crop Area	0.0	0.0	0.0	0.0	0.6	0.8	1.0	1.0	1.0	1.0	0.4	0.2
Kc_1							1.20	1.10	1.10	1.04	1.04	0.88
Kc_2						1.20	1.10	1.10	1.04	1.04	0.88	
Kc_3					1.20	1.10	1.10	1.04	1.04	0.88		
Weighted Kc_wet	0.00	0.00	0.00	0.00	1.20	1.13	1.12	1.06	1.05	0.94	0.96	0.88
Infiltration_factor	0	0	0	0	0.6	0.8	1	1	1	0.4	0.2	0
Ponding_factor	0	0	0	0	0.6	0.2	0.2	0	0	0	0	0

Notes	P	Land Preparation & Ponding	C	Growing	H	Harvest
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Cropping Schedules Cambodia

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
CW1 Wet Season Cambodia (early planted)													
Crop schedule_1					P	C	C	H					
Crop schedule_2				P	C	C	H						
Crop schedule_3			P	C	C	H							
Portion of area-1						0.2	0.2	0.2					
Portion of area-2				0.8	0.8	0.8	0.8						
Portion of area-3			0.20	0.20	0.20	0.20							
Crop Area	0.0	0.0	0.2	1.0	1.2	1.2	1.0	0.2	0.0	0.0	0.0	0.0	
Kc_1					1.10	1.10	1.14	1.18					
Kc_2				1.10	1.10	1.14	1.18						
Kc_3			1.10	1.10	1.14	1.14	1.18						
Weighted Kc_wet	0.00	0.00	1.10	1.10	1.11	1.14	1.17	1.18	0.00	0.00	0.00	0.00	
Infiltration_factor	0	0	0.2	1	1.2	1	0.2	0	0	0	0	0	
Ponding_factor	0	0	0.2	0.8	0.2	0	0	0	0	0	0	0	
CW2 Wet Season Cambodia (mid planted)													
Crop schedule_1	H						P	C	C	C	C	C	
Crop schedule_2							P	C	C	C	C	H	
Crop schedule_3						P	C	C	C	C	H		
Proportion of area-1	0.2						0.2	0.2	0.2	0.2	0.2	0.2	
Proportion of area-2						0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Proportion of area-3					0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Proportion Total	0.2	0.0	0.0	0.0	0.2	0.8	1.0	1.0	1.0	1.0	1.0	0.8	
Kc_1	0.40						0.40	1.14	1.18	1.16	0.95	0.95	
Kc_2						0.4	1.14	1.18	1.16	0.95	0.95	0.40	
Kc_3					0.4	1.14	1.18	1.16	0.95	0.95	0.40		
Weighted Kc_dry	0.40	0.00	0.00	0.00	0.40	0.59	1.00	1.17	1.12	0.99	0.84	0.54	
Infiltration_factor	0	0	0	0	0.2	0.8	1	1	1	1	0.8	0.2	
Ponding_factor	0	0	0	0	0.2	0.6	0.2	0	0	0	0	0	
CD1 Dry Season Cambodia													
Crop schedule_1	P	C	C	C	H								
Crop schedule_2	C	C	C	H								P	
Crop schedule_3	C	C	H								P	C	
Proportion of area-1	0.2	0.2	0.2	0.2	0.2								
Proportion of area-2	0.6	0.6	0.6	0.6								0.6	
Proportion of area-3	0.2	0.2	0.2								0.2	0.2	
Crop Area	1.0	1.0	1.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.8	
Kc_1	0.40	0.97	1.22	1.15	0.75								
Kc_2	0.97	1.22	1.15	0.75								0.40	
Kc_3	1.22	1.15	0.75								0.40	0.97	
Weighted Kc_wet	0.91	1.16	1.08	0.85	0.75	0.00	0.00	0.00	0.00	0.00	0.40	0.54	
Infiltration_factor	0.4	0.4	0.2	0.8	0	0	0	0	0	0	0.2	0.8	
Ponding_factor	0.2	0	0	0	0	0	0	0	0	0	0.2	0.6	
CD2 Dry Season Cambodia													
Crop schedule_1		P	C	C	C	H							
Crop schedule_2	P	C	C	C	H								
Crop schedule_3	C	C	C	H								P	
Proportion of area-1		0.2	0.2	0.2	0.2	0.2							
Proportion of area-2	0.6	0.6	0.6	0.6	0.6								
Proportion of area-3	0.2	0.2	0.2	0.2								0.2	
Crop Area	0.8	1.0	1.0	1.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.2	
Kc_1		0.40	0.97	1.22	1.15	0.75							
Kc_2		0.4	0.97	1.22	1.15	0.75							
Kc_3		0.97	1.22	1.15	0.75							0.40	
Weighted Kc_wet	0.54	0.91	1.16	1.08	0.85	0.75	0.00	0.00	0.00	0.00	0.00	0.40	
Infiltration_factor	0.8	1	1	0.8	0.2	0	0	0	0	0	0	0.2	
Ponding_factor	0.6	0.2	0	0	0	0	0	0	0	0	0	0.2	
Notes	P	Land Preparation & Ponding				C	Growing			H	Harvest		

Cropping Schedules Vietnam

VW1 Wet Season Vietnam Summer Autumn													
Crop schedule_1									P	C	C	C	H
Crop schedule_2						P	C	C	C			H	
Crop schedule_3						P	C	H					
Portion of area-1								0.2	0.2	0.2	0.2	0.2	
Portion of area-2							0.6	0.6	0.6	0.6	0.6		
Portion of area-3						0.20	0.20	0.20					
Crop Area		0.0	0.0	0.2	0.8	1.0	0.8	0.8	0.8	0.8	0.2	0.0	0.0
Kc_1								0.70	1.05	1.20	1.15	0.80	
Kc_2							0.70	1.05	1.20	1.15	0.80		
Kc_3						1.05	1.20	1.00					
Weighted Kc_wet		0.00	0.00	1.05	0.83	0.97	1.16	1.16	0.89	0.80	0.00	0.00	0.00
Infiltration_factor		0	0	0.2	0.8	0.8	0.8	0.8	0.2	0	0	0	0
Ponding_factor		0	0	0.2	0.6	0.2	0	0	0	0	0	0	0

VW2 Wet Season Vietnam Autumn Winter													
Crop schedule_1										P	C	C	H
Crop schedule_2									P	C	C	H	
Crop schedule_3								P	C	C	H		
Proportion of area-1										0.1	0.1	0.1	0.1
Proportion of area-2									0.7	0.7	0.7	0.7	
Proportion of area-3								0.2	0.2	0.2	0.2		
Proportion Total		0.0	0.0	0.0	0.0	0.0	0.2	0.9	1.0	1.0	0.8	0.1	0.0
Kc_1										0.83	1.2	1.15	0.7
Kc_2									0.83	1.2	1.15	0.7	
Kc_3							0.83	1.2	1.15	0.7			
Weighted Kc_dry		0.00	0.00	0.00	0.00	0.00	0.83	0.91	1.15	1.07	0.76	0.70	0.00
Infiltration_factor		0	0	0	0	0	0.2	0.9	1	0.8	0.1	0	0
Ponding_factor		0	0	0	0	0	0.2	0.7	0.1	0	0	0	0

VD Dry Season Vietnam Winter-Spring													
Crop schedule_1			P	C	C	H							
Crop schedule_2			C	C	H								P
Crop schedule_3			C	H									P
Proportion of area-1			0.2	0.2	0.2	0.2							
Proportion of area-2			0.6	0.6	0.6								0.6
Proportion of area-3			0.2	0.2								0.2	0.2
Crop Area			1.0	1.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.8
Kc_1			0.70	1.05	1.20	0.70							
Kc_2			1.05	1.20	0.70								0.70
Kc_3			1.20	0.70								0.70	1.05
Weighted Kc_wet			1.01	1.07	0.83	0.70	0.00	0.00	0.00	0.00	0.00	0.70	0.79
Infiltration_factor			1	0.8	0.2	0	0	0	0	0	0	0	0.2
Ponding_factor			0.2	0	0	0	0	0	0	0	0	0	0.2

VW3 Wet Season Vietnam Single Rice													
Crop schedule_1										P	C	C	C
Crop schedule_2									P	C	C	C	C
Crop schedule_3									P	C	C	C	H
Proportion of area-1			0.2						0.2	0.2	0.2	0.2	0.2
Proportion of area-2								0.6	0.6	0.6	0.6	0.6	0.6
Proportion of area-3							0.2	0.2	0.2	0.2	0.2	0.2	0.2
Crop Area			0.2	0.0	0.0	0.0	0.2	0.8	1.0	1.0	1.0	1.0	0.8
Kc_1			0.70						0.60	0.93	1.15	1.20	1.20
Kc_2								0.60	0.93	1.15	1.20	1.20	1.00
Kc_3							0.60	0.93	1.15	1.20	1.20	1.00	0.70
Weighted Kc_wet			0.70	0.00	0.00	0.00	0.60	0.68	0.91	1.12	1.19	1.16	0.98
Infiltration_factor			0	0	0	0	0.2	0.8	1	1	1	1	0.8
Ponding_factor			0	0	0	0	0.2	0.6	0.2	0	0	0	0

Notes	P	Land Preparation & Ponding	C	Growing	H	Harvest
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Cropping Schedules -Other crops

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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LV LAO VEGETABLES													
Crop schedule_1										C	C	C	
Crop schedule_2		C	C	C	C								
Portion of area-1		0.5	0.5	0.5	0.5								
Portion of area-2									0.5	0.5	0.5		
Crop Area Factor		0.0	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.5	0.0
Kc_1										0.81	1.08	1.06	
Kc_2			0.75	0.90	1.10	1.04							
Weighted Kc_wet		0.00	0.75	0.90	1.10	1.04	0.00	0.00	0.00	0.81	1.08	1.06	0.00

TO Thailand Other Crops(kc based on Maize)												
Crop schedule_1		C	C	C	C							
Crop schedule_2		C	C	C								C
Crop schedule_3		C	C								C	C
Proportion of area-1		0.3	0.3	0.3	0.3							
Proportion of area-2		0.4	0.4	0.4								0.4
Proportion of area-3		0.3	0.3								0.3	0.3
Crop Area		1.0	1.0	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.7
Kc_1		0.54	0.99	1.33	0.89							
Kc_2		0.99	1.33	0.89								0.54
Kc_3		1.33	0.89								0.54	0.99
Weighted Kc_wet		0.96	1.10	1.08	0.89	0.00	0.00	0.00	0.00	0.00	0.54	0.73

Annex 2: Water Use Analysis of On Farm Experiments and Other Monitoring Information

Introduction

Under the DMPF programme the riparian countries were assigned to carry out monitoring of water use and other parameters at on farm experiment sites. They also collected and compiled information on a wider aspects of rice production including land use, some water use information, cropping information. This analysis has focused on the water use data and wherever possible the findings have been incorporated into the water use analysis.

The findings of the on farm experiments were discussed at the recent DMPF workshop in Hanoi and it is clear that some difficulties were experienced at most of the sites. This has resulted in some restrictions in abstracting useful results..

Thailand

On Farm Experiments

Two farm monitoring assessments were carried out. It was difficult to derive good information on water use due to the monitoring starting six weeks late. There was no climate or rainfall data collected and although these are dry months confirmation of the amount of rainfall is important. To obtain indicative values effective rainfall and Eto from the database have been imported. The data is shown in the Table A3-1 but it is considered that no meaningful conclusions can be made from the analysis.

Discharge Monitoring Data

As part of the information from Thailand flow measurement data was provided from nine locations. There was however no crop information for any sites. This data was reviewed and the information for three sites where releases for irrigation were defined it was possible to carry out an analysis comparing the actual irrigation releases from the monitoring data with the estimated water use from the water use analysis. The three sites are Lam Pao Irrigation Project, Nam Oon and Lum Phra Phleong. The comparison is shown in Table A3-2. The table shows quite large variations between the calculated and actual water use. It is difficult to draw definitive conclusions without actual crop data. It is considered that the estimated areas of the various irrigated crops are the main source of variation.

If some measured data on crop areas had been available it would have been possible to adjust the other factors to get a closer correlation between actual and calculated values. The analysis shows the importance of obtaining good quality spatial cropping information.

Vietnam

On Farm Experiments

The two sites in Vietnam have reasonable monitoring of the irrigation water use for the Winter Spring crops. The actual water use has been compared with the estimated requirements using the approach used in the water use analysis. The results of the analysis are shown in Table A3-3

For site 1 the actual water applied is 3949m³/ha compared with 6900m³/ha as calculated as the water requirement-this indicates a water use factor of about 0.57.

For site 2 the actual water applied is 4337 m³/ha compared with 5389m³/ha as calculated as the water requirement-this indicates a water use factor of about 0.8. At both sites there appeared to be water ponded in the field prior to the start of the flow monitoring-whether this

is from rainfall flood or irrigation is not clear-if irrigation water has been applied then this would effectively have added to the crop water use. It is interesting to note that site 2 is classed as a rainfed irrigation system and yet the water use factor was higher than site 1 which is classed as a irrigated rice eco system. At both sites water is pumped and as is normal for pump schemes due to financial restrictions often the water applied is less than the calculated requirement.

Laos

Two farm experiments have been carried out in Laos. Site 1: 1.3 ha site at Phong Vanh in Luangprabang and Site 2: is at the National Agricultural Research Centre at Naphok. The data has been analysed to compare the actual and calculated water requirements. There were some difficulties in assessing the actual water applied as there are many data gaps in the tables. Two seasons were monitored at the two sites however actual water applied could only be estimated for the dry season crops. For site 1 dry season at total of 4700m³/ha was supplied to the site and the calculated requirement was 7754m³/ha indicating a water use factor of 0.61. At the site 2 a total of 3854m³/ha was supplied and the calculated water requirement was 4596m³/ha. This gives a water use factor of 0.84. It is considered that at both sites there is some underestimation of the actual water supplied and consequently the water use factors are considered too low. The analysis is summarised in Table A3-5.

Cambodia

The two sites in Cambodia provided some information on water use it was however difficult to extract the information. At the first site Kampong Puoy it was not possible to measure the water use. At the second site a reported figure 3264m³/ha was applied although it is not clear how this was derived –the calculated application requirement was 5294m³/ha giving a water use factor of 0.61. The water use analysis for Cambodia is shown in Table A3-6.

Conclusions

The monitoring conditions for the on farm sites were not perfect and some caution must be used in drawing conclusions from the results. It is however apparent that at all the sites where some data could be extracted that farmers were using fairly significant levels of water below the calculated estimates of the requirement. The range of values appeared to be in the range of 0.6-0.8. The values from the experimental sites have been used to help develop the water use factors which are a core part of the analysis.

Table A3-1 Summary of DMPF On Farm Experiment, Thailand
Site 1 Huay Luang

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total for crop
Cropping site 1	Crop												
ET0mm/d(from Database)	4.17	4.07	4.63	4.37	3.60	2.87	2.91	3.05	3.38	4.11	3.92	3.76	
Kc crop 1	0.50	1.00	1.28	0.93									
number of days	10	28	31	30	10								
Calculated evapotranspiration using crop factors(mm/month)	21		184	122	0	0	0	0	0	0	0	0	327
Evapotranspiration lysometermm/month	ND	ND	282	390	327								
Infiltration average mm/d	3.6	3.6	3.6	3.6	3.6								
Infiltration average mm/month	36	101	112	108	36						6	90	
Calculated Crop Water Requirement(mm)													
Evapotranspiration (mm)	21	0	184	122	0	0	0	0	0	0	0	0	327
Ponding	100												100
Infiltration (mm)	36	101	112	108	36								392
Effective rainfall (mm) (from database)	-3	-15	-35	-69	-135								-257
Total calculated irrigation requirement(mm)	154	86	260	161	-99	0	0	0	0	0	0	0	562
Irrigation inflow m3 total (based on 2.0ha plot)	ND	9360	5120										0
Irrigation outflow m3													
Rainfall (m3) from database	60	300	700	1380	2700								
Total applied (m3)	ND	9660	5820										ND
Irrigation applied mm	ND	468	256	0	0	0	0	0	0	0	0	0	ND
Rainfall mm	3	15	35										58
Total applied (mm)	ND	483	291	0	0	0	0	0	0	0	0	0	0
Total calculated irrigation water requirement (m3/ha)		1716	5209										
Actual irrigation applied (m3/ha)		4680	2560										
Water Use Factor (ratio of actual applied/requirement)		2.7273	0.4915					(average=	1.0455)				

Summary of Thailand DMP Experimental Site (plot 2)
Sico Yai

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total for crop
Cropping schedule	Crop												
ET0mm/d	4.0	4.0	4.5	4.4	3.9	3.1	3.1	3.2	3.5	4.2	4.0	3.9	
Kc crop 1			0.5	0.5	1	1.28	0.93	0.93			0.70	1.05	
number of days			20	30	31	30	30	15					
Calculated evapotranspiration using crop factors(mm/month)	0	0	45	66	121	119	86	45	0	0	0	0	482
Evapotranspiration by lysometermm/month		ND	303	270	315								
Infiltration average mm/d	4	4	4	4	4	4	4	4	4	4	4	4	
Infiltration average mm/month	0	0	80	120	124	120	120	60	0	0	0	0	0
Calculated Crop Water Requirement(mm)													
Evapotranspiration (mm)	0	0	45	66	121	119	86	45	0	0	0	0	482
Ponding			200										200
Infiltration (mm)	0	0	80	120	124	120	120	60	0	0	0	0	624
Effective rainfall contribution (mm)			-21	-31	-32	-31	-31	-16					-161
Total calculated irrigation requirement(mm)	0	0	304	155	213	208	175	89	0	0	0	0	1145
Irrigation inflow m3 total (based 1.0 ha plot)				2910	2450	2800							
Irrigation outflow m3													
Rainfall (m3)				310	320.33	310							
Total Applied			ND	3220	2770.3	3110	ND	ND					
Irrigation applied mm				291	245	280	ND	ND					
Rainfall mm													
Total applied (mm)													
Total calculated irrigation water requirement (m3/ha)			3043.3	1550	2128.7	2080.4	1754.9	891.4					11449
Actual irrigation applied (m3/ha)			ND	3220	2770.3	3110	ND	ND					ND
Water Use Factor (ratio of actual applied/requirement)				2.0774	1.3014	1.4949	average=	1.5802					

Table A3-2 Evaluation of Water Use Estimates for Three Thailand Schemes

	Lam Pao Irrigation (ref35787)		Nam Oon (re 32421)		Lum Phra Phloeng (ref 35934)	
	Water Use Calculated from Water Use Analysis	Water use actual recorded in 2004	Water Use Calculated from Water Use Analysis	Water use actual recorded in 2004	Water Use Calculated from Water Use Analysis	Water use actual recorded in 2004
Monthly volume (000m3/month)						
JAN	33,297	108,647	5,725	23,526	16,659	3,428
FEB	37,291	112,654	6,202	15,058	15,054	13,429
MAR	31,114	111,648	4,678	19,876	9,632	14,047
APR	12,632	73,855	1,276	650	2,559	17,885
MAY	-	1,781	1,762	-	19,674	12,626
JUN	-	33,552	-	-	21,996	10,454
JUL	74,406	111,831	10,305	10,356	18,258	23,077
AUG	75,519	70,026	2,329	26,862	15,444	19,064
SEP	70,247	104,233	21,920	15,353	6,214	25,747
OCT	154,676	119,901	20,216	64,720	3,383	23,537
NOV	118,336	24,391	3,774	7,910	16,504	10,800
DEC	35,417	39,101	2,900	24,494	16,539	67
Total wet season	493,184	430,381	58,544	125,202	84,968	114,505
Total dry season	149,751	445,904	20,781	83,605	76,947	59,657
Difference (%)						
Wet season	14.59%		-53.24%		-25.80%	
Dry Season	-66.42%		-75.14%		28.98%	
Cropping schedule	TW2/TD4		TW2/TD3		TW3/TD1	
Crop Information from the Irrigation Database						
Area-wet(ha)	50,400				10,096	10,096
Area-dry(ha)	40,640				6,400	6,400
Area-3rd(ha)					-	-
area_irr	50,400		29,728		1,096	1,096
Actual crop areas (ha)used in the analysis						
Rice						
Area wet(ha)	28,224		8,910		9,086	
Area dry(ha)	3,528				3,300	
Area-3rd (ha)	-					
Non rice crops	2541		1553		355	
Fish	0		0		329	

Table A3-3 Summary of Vietnam DMPF
1/ Plot 1 Cay Lay Tien Giang

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total for crop
Cropping site 1		Crop 1										Crop 1	
ET0mm/d(fromCai Lay Tieng Gang)	4.30	4.96	5.56	5.55	4.87	4.39	4.63	4.64	4.44	4.27	4.36	4.04	
Kc crop 1	1.20	0.70									0.70	1.05	
number of days	31	28									12	31	
Calculated evapotranspiration using crop factors(mm/month)	160	97	0	0	0	0	0	0	0	0	37	131	425
Evapotranspiration lysometermm/month	75	39									12	88	214
Infiltration average mm/d	2.5	0.9									0.5	2.9	
Calculated Crop Water Requirement(mm)													
Evapotranspiration (mm)	160	97	0	0	0	0	0	0	0	0	37	131	425
Ponding													0
Infiltration (mm)	78	25									6	90	199
Effective rainfall contribution (mm)												-48	-48
Total calculated irrigation requirement(mm)	237	122	0	0	0	0	0	0	0	0	43	173	576
Irrigation inflow m3 total (based on 0.7ha plot)	1041	232									248	835	2356
Irrigation outflow m3													0
Rainfall (m3)												408	408
Total applied (m3)	1041	232									248	1243	2764
Irrigation applied mm	149	33	0	0	0	0	0	0	0	0	35	119	337
Rainfall mm												58	58
Total applied (mm)	149	33	0	0	0	0	0	0	0	0	35	178	395
Total calculated irrigation water requirement (m3/ha)													5758
Actual irrigation applied													3366
Water Use Factor (ratio of actual applied/requirement)													0.58

Summary of Vietnam DMP Output (plot 2)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total for crop
Cropping site 1		Crop 1			Crop 2							Crop 1	
ET0mm/d	4.5	5.3	5.9	6.0	4.5	4.0	4.0	3.9	3.7	3.6	3.8	4.0	
Kc crop 1	1.20	0.70									0.70	1.05	
number of days	31	15									5	31	
Calculated evapotranspiration using crop factors(mm/month)	169	56	0	0	0	0	0	0	0	0	13	130	369
Evapotranspiration by lysometermm/month	91	0									14	102	207
Infiltration average mm/d	2.3	0									1.4	2.7	
Calculated Crop Water Requirement(mm)													
Evapotranspiration (mm)	169	56	0	0	0	0	0	0	0	0	13	130	369
Ponding													0
Infiltration (mm)	71	0	0	0	0	0	0	0	0	0	7	84	162
Effective rainfall contribution (mm)												-42	-42
Total calculated irrigation requirement(mm)	240	56	0	0	0	0	0	0	0	0	20	172	489
Irrigation inflow m3 total (based on 1.5 ha plot)	1958										200	3725	5883
Irrigation outflow m3													0
Rainfall (m3)												623	623
Total Applied	1958										200	4348	6506
Irrigation applied mm	131	0									13	248	392
Rainfall mm												42	42
Total applied (mm)	131	0									13	290	434
Total calculated irrigation water requirement (m3/ha)													4889
Actual irrigation applied (m3/ha)													3922
Water Use Factor (ratio of actual applied/requirement)													0.80

Site 1 1.3 ha site at Phong Vanh in Luangprabang

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total for crop
Cropping site 1			Crop 1										
								Crop 2					
ET0mm/d(from Data Base)	3.40	3.63	4.13	3.90	3.50	2.60	2.47	2.87	3.60	3.90	3.50	3.10	
Kc crop 1 number of days	1.20	1.07	1.01	1.05	0.88		1.18	1.02	1.03	0.84			
		28	31	30	28		19	31	30	28			

Calculated evapotranspiration using crop factors(mm/month)		0	109	129	123	86	0	55	91	111	92	0	0	796
Evapotranspiration lysometermm/month		ND		98	348	425.6		171	375	8.983	176.4			
Infiltration average mm/d		5	5	5	5	5		5	5	5	5	5	5	

Calculated Crop Water Requirement(mm)-dry season crop

Evapotranspiration (mm)		0	109	129	123	86	0					0	0	447
Ponding														0
Infiltration (mm)		0	140	155	150	140	0							585
Effective rainfall contribution (mm)					-130	-127								-257
Total calculated irrigation requirement(mm)		0	249	284	143	99	0	0	0	0	0	0	0	775
Actual Field Results (based on 1.2ha plot)														
Net Irrigation appliedm3			1557	2408	1586	109								5660
Rainfall (m3)					1560	1524								3084
Total applied (m3)			1557	2408	3146	1633	0	0	0	0	0	0	0	8744
Irrigation applied mm		0	130	201	132	9	0	0	0	0	0	0	0	472
Effective Rainfall mm					130	127								257
Total applied (mm)		0	130	201	262	136	0	0	0	0	0	0	0	729
Total calculated irrigation water requirement (m3/ha)														7753.593
Actual irrigation applied														4717
Water Use Factor (ratio of actual applied/requirement)														0.61

Calculated Crop Water Requirement(mm)-wet season crop

Evapotranspiration (mm)								55	91	111	92	0	0	349
Ponding								50						50
Infiltration (mm)								95	155	150	140	0	0	540
Effective rainfall contribution (mm)								-111	-206	-107	-52			-476
Total calculated irrigation requirement(mm)								89	40	154	180	0	0	463
Actual Field Results (based on 1.3ha plot)														
Net Irrigation appliedm3								No valid data						
Rainfall (m3)														
Total applied (m3)														
Irrigation applied mm		0												
Effective Rainfall mm														
Total applied (mm)		0												
Total calculated irrigation water requirement (m3/ha)														4629.147
Actual irrigation applied														0
Water Use Factor (ratio of actual applied/requirement)														0.00

Site 2 at the National Agricultural Research Centre at Naphok.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total for crop
Cropping site 2			Crop 1										
								Crop 2					
ET0mm/d(from Data Base)	4.17	4.07	4.63	4.39	3.61	2.86	2.91	3.06	3.39	4.11	3.92	3.77	
Kc crop 1 number of days	1.20	1.07	1.01	1.05	0.88		1.18	1.02	1.03	0.84			
		27	31	15			25	31	30	21			

Calculated evapotranspiration using crop factors(mm/month)		0	117	145	69	0	0	86	97	105	73	0	0	691
Infiltration average mm/d		4	4	4	4	4	4	4	4	4	4	4	4	

Calculated Crop Water Requirement(mm)-dry season crop

Evapotranspiration (mm)		0	117	145	69	0	0					0	0	332
Ponding (ponding outside monitoring period)														0
Infiltration (mm)		0	108	124	60	0	0							292
Effective rainfall contribution (mm)			-66	-2	-96									-164

Table A3-5 Summary of Cambodia DMPF Experimental Farm Site

1. Kampong Puoy Battambang (1ha)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total for crop	
Cropping site 1				Crop Period										
ET0mm/d	4.80	4.60	5.27	4.63	4.03	3.43	3.40	3.60	3.56	4.10	4.10	4.30		
Rainfall			10	47	82	243								
Kc crop 1			0.68	1.09	1.15	0.75								
number of days			25	30	31	23								
Calculated evapotranspiration using crop factors(mm/month)	0	0	90	151	144	59	0	0	0	0	0	0	444	
Evapotranspiration lysometermm/month			162	201	213	144							214	
Infiltration average mm/d			2.8	2.8	2.8	2.8								
Infiltration average mm/month														
Calculated Crop Water Requirement(mm)														
Evapotranspiration (mm)	0	0	90	151	144	59	0	0	0	0	0	0	444	
Ponding			50										50	
Infiltration (mm)			70	84	87	64							305	
Effective rainfall contribution (mm)			-8	-47	-85	149							-48	
Total calculated irrigation requirement(mm)	0	0	201	188	146	273	0	0	0	0	0	-48	760	
Irrigation inflow m3														
Irrigation outflow m3														
Rainfall (m3)			No measurement of flow was possible											
Total applied (m3)														
Irrigation applied mm														
Rainfall mm														
Total applied (mm)														
Total calculated irrigation water requirement (m3/ha)													7600	
Actual irrigation applied				No data										
Water Use Factor (ratio of actual applied/requirement)														

2. Thnot Tey Takeo Province

1.6 ha

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total for crop
Cropping site 1		Crop 1										Crop 1	
ET0mm/d	4.5	5.3	5.9	6.0	4.5	4.0	4.0	3.9	3.7	3.6	3.8	4.0	
Rainfall											95		
Kc crop 1	1.22	0.75									0.40	0.97	
number of days	31	9									22	31	
Calculated evapotranspiration using crop factors(mm/month)	172	36	0	0	0	0	0	0	0	0	34	120	362
Evapotranspiration by lysometermm/month													0
Infiltration average mm/d	2.82	2.82									2.82	2.82	
Infiltration average mm/month													
Calculated Crop Water Requirement(mm)													
Evapotranspiration (mm)	172	36	0	0	0	0	0	0	0	0	34	120	362
Ponding													0
Infiltration (mm)	87	25	0	0	0	0	0	0	0	0	62	87	262
Effective rainfall contribution (mm)											-95		-95
Total calculated irrigation requirement(mm)	259	61	0	0	0	0	0	0	0	0	1	208	529
Irrigation inflow m3 total (based on 1.5 ha plot)													
Irrigation outflow m3													
Rainfall (m3)													
Total Applied					total estimated volume applied								5228
Irrigation applied mm	131	0									13	248	392
Rainfall mm												42	42
Total applied (mm)	131	0									13	290	434
Total calculated irrigation water requirement (m3/ha)													5294
Actual irrigation applied (m3/ha)													3268
Water Use Factor (ratio of actual applied/requirement)													0.62

Annex 3: Irrigation Scheme Database and Metadata

Irrigation scheme data are one of the main outputs. The MRC prepared the irrigation scheme database as of 2001 which was the main output of Land Resources Inventory for Agricultural Development (LRIAD) Project that was finished in 2002. Through the Multi-Functionality of the Paddy Fields (DMPF) Project, the latest irrigation scheme datasets were updated from the same counterpart agencies in the riparian states.

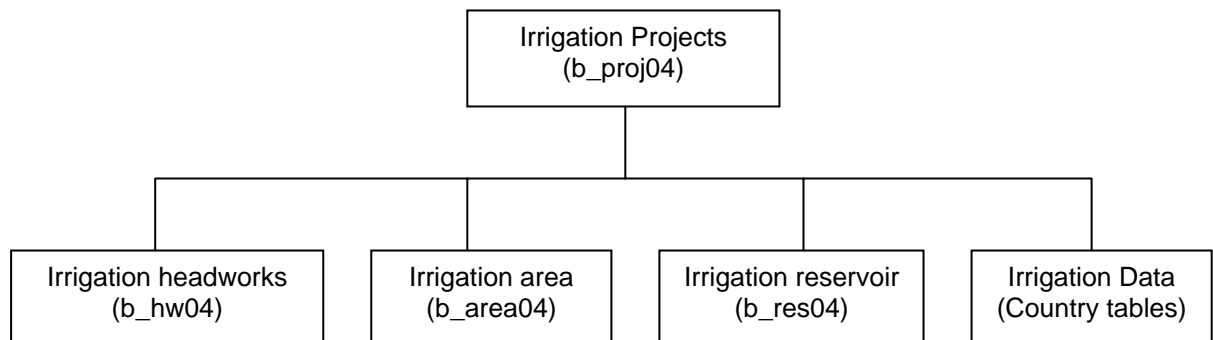
Irrigation datasets obtained from counterpart agencies of the 4 countries have been combined into a basin-wide layer. They are structured and formatted in accordance with the MRC standard in order to ensure their compatibility with the MRC database structure. The final datasets to be handed over to TSD will be stored in "Personal Geodatabase" which can later be uploaded into the MRC Geodatabase. Data dictionary and metadata of each dataset will also be included.

Attribute table structure of irrigation datasets will follow the standard structure developed and agreed by the counterpart agencies of the 4 riparian states during the operation of Land Resources Inventory for Agriculture Development (LRIAD) Project. This standard structure had also been applied to all irrigation datasets of 2001.

Review of irrigation scheme database

The latest irrigation datasets received in 2004 from the counterpart agencies contained a mixture of old and some new data. The new information was updated into the 2001 datasets.

Referenced IDs were added to each irrigation datasets as keys to link with other irrigation datasets and additional tables. Therefore, each dataset can be linked to another by this key ID as shown in the following diagram.



It should be noted that irrigation data are not complete which each dataset contains empty fields or records, the solution is to eliminate the empty fields while empty records are still kept for future update.

Irrigation data quality assurance

To assure the quality of irrigation datasets, the MRC-IS Data Quality Assurance Procedures were applied to this section as a QA checking guideline. The QA results of each irrigation dataset are provided in tables below.

a. Irrigation project

	Theme	Check	Comments
1	Metadata	1.1 Properly documented data	<i>Short description of dataset was provided as part of the project interim report (May 2005). Metadata was provided in the final reports on data collection prepared by the countries.</i>
2	Feature definitions	2.1 MRC accepted terminology	<i>Standard structure which was agreed upon by the riparian state agencies during the LIRIAD Project was applied to the datasets; at the same time MRC format and design were applied to the development of irrigation DB 2004.</i>
		2.2 MRC accepted classification systems	<i>Classification system is accepted by the counterpart agencies and therefore, accepted by the MRC since there is no standard classification exists in the MRC.</i>
		2.3 Classification completeness	<i>Classifications are not quite complete.</i>
3	Geodetic datum and map projection	3.1 Consistency with existing spatial data presentations	<i>UTM Zone 48, Indian Datum 1960, Everest Spheroid was applied to irrigation project dataset for all 4 countries datasets.</i>
4	Topology	4.1 Consistency with existing spatial data presentations	<i>Consistence.</i>
		4.2 Closed polygons	<i>Data is point location</i>
		4.3 Unbroken networks	<i>No network data.</i>
		4.4 Completeness of data records	<i>There are numbers of empty records and fields which should be filled in the future.</i>
5	Positional accuracy	5.1 Identification of gross geo-referencing and/or coding errors	<i>No positional accuracy applied. Existing data (2001) was used for Thai part while the rest was replaced by the updated ones.</i>
		5.2 Consistency with existing spatial data presentations	<i>Total Number of irrigation project in 2004 is more than in 2001. All countries, except Thailand, have increased the number of irrigation projects.</i>
6	Attribute data	6.1 Accepted spelling	<i>Attribute names are accepted as long as descriptions are available</i>

Theme	Check	Comments
	6.2 Accepted referencing and/or coding	<i>Common codes, e.g. country codes are using MRC coding system, while irrigation codes are used as what agreed among the counterparts.</i>
	6.3 Consistency with official records	<i>Data was checked to ensure that no schemes fall out of their own country and codes were entered correctly.</i>
	6.4 Completeness	<i>There are a number of fields and records with blank cells. This matter should be noted by all users when using this dataset. The MRC should somehow consider filling the data gap by obtained updates from the countries regularly.</i>
	6.5 Accepted structure	<i>Structure has been modified a bit to fit with the agreed standard format.</i>
b. Irrigation headwork		
Theme	Check	Comments
1 Metadata	1.1 Properly documented data	<i>Short description of dataset was provided as part of the project interim report (May 2005). Metadata was provided in the final reports on data collection prepared by the countries</i>
2 Feature definitions	2.1 MRC accepted terminology	<i>Standard structure which was agreed upon by the riparian state agencies during the LIRIAD Project was applied to the datasets; at the same time MRC format and design were applied to the development of irrigation DB 2004.</i>
	2.2 MRC accepted classification systems	<i>Classification system is accepted by the counterpart agencies and therefore, accepted by the MRC since there is no standard classification exists in the MRC.</i>
	2.3 Classification completeness	<i>Classifications are not complete due to unavailable information.</i>
3 Geodetic datum and map projection	3.1 Consistency with existing spatial data presentations	<i>UTM Zone 48, Indian Datum 1960, Everest Spheroid was applied to irrigation project dataset for all 4 countries datasets.</i>
4 Topology	4.1 Consistency with existing spatial data presentations	<i>Consistence. Viet Nam and Laos parts were updated with the new data</i>
	4.2 Closed polygons	<i>Data is point location</i>

Theme	Check	Comments
	4.3 Unbroken networks	<i>No network data.</i>
	4.4 Completeness of data records	<i>There are numbers of empty records and fields which should be filled in the future.</i>
5 Positional accuracy	5.1 Identification of gross geo-referencing and/or coding errors	<i>No spatial accuracy checking applied. Existing data (2001) were used for Cambodia and Thai parts while the rest was updated by the derived update ones.</i>
	5.2 Consistency with existing spatial data presentations	<i>Consistence.</i>
6 Attribute data	6.1 Accepted spelling	<i>Attribute names are accepted as long as descriptions are available</i>
	6.2 Accepted referencing and/or coding	<i>Common codes, e.g. country codes are using MRC coding system, while irrigation codes are used as what agreed among the counterparts.</i>
	6.3 Consistency with official records	<i>Data was checked to ensure that no schemes fall of their own country and codes were entered correctly.</i>
	6.4 Completeness	<i>There are a number of fields and records with blank cells. This matter should be noted by all users when using this dataset. The MRC should somehow consider filling the data gaps by obtaining regular updates from the countries..</i>
	6.5 Accepted structure	<i>The original attribute structure pretty much followed the agreed standard.</i>

c. Irrigation area

Theme	Check	Comments
1 Metadata	1.1 Properly documented data	<i>Short description of dataset was provided as part of the project interim report (May 2005). Metadata was provided in the final reports on data collection prepared by the countries</i>
2 Feature definitions	2.1 MRC accepted terminology	<i>Standard structure which was agreed upon by the riparian state agencies during the LIRIAD Project was applied to the datasets; at the same time MRC format and design were applied to the development of irrigation DB 2004.</i>

Theme	Check	Comments
	2.2 MRC accepted classification systems	<i>Classification system is accepted by the counterpart agencies and therefore, accepted by the MRC since there is no standard classification exists in the MRC.</i>
	2.3 Classification completeness	<i>Classifications are not quite complete.</i>
3 Geodetic datum and map projection	3.1 Consistency with existing spatial data presentations	<i>UTM Zone 48, Indian Datum 1960, Everest Spheroid was applied to irrigation project dataset for all 4 countries datasets.</i>
4 Topology	4.1 Consistency with existing spatial data presentations	<i>Consistence. The updates have more polygons, shape of area has somewhat changed, as well as codes (southern part)</i>
	4.2 Closed polygons	<i>All polygons are closed.</i>
	4.3 Unbroken networks	<i>No network data.</i>
	4.4 Completeness of data records	<i>There are numbers of empty records and fields which should be filled in the future.</i>
5 Positional accuracy	5.1 Identification of gross geo-referencing and/or coding errors	<i>No positional accuracy applied. Existing 2001 dataset was used for Cambodia, Thai and Delta parts. Laos and Central Highland parts were completely updated with the derived updates.</i>
	5.2 Consistency with existing spatial data presentations	<i>Pretty much consistence with existing spatial data.</i>
6 Attribute data	6.1 Accepted spelling	<i>Attribute names are accepted as long as descriptions are available</i>
	6.2 Accepted referencing and/or coding	<i>Common codes, e.g. country codes are using MRC coding system, while irrigation codes are used as what agreed among the counterparts.</i>
	6.3 Consistency with official records	<i>Data was checked to ensure that no schemes fall out of their own country and codes were entered correctly.</i>
	6.4 Completeness	<i>There are a number of fields and records with blank cells. This matter should be noted by all users when using this dataset. The MRC should somewhat consider filling the data gap by obtained updates from the countries regularly.</i>
	6.5 Accepted structure	<i>The original structure was pretty much followed an agreed format.</i>

d. Irrigation reservoir

	Theme	Check	Comments
1	Metadata	1.1 Properly documented data	<i>Short description of dataset was provided as part of the project interim report (May 2005). Metadata was provided in the final reports on data collection prepared by the countries</i>
2	Feature definitions	2.1 MRC accepted terminology	<i>Standard structure which was agreed upon by the riparian state agencies during the LIRIAD Project was applied to the datasets; at the same time MRC format and design were applied to the development of irrigation DB 2004.</i>
		2.2 MRC accepted classification systems	<i>Classification system is accepted by the counterpart agencies and therefore, accepted by the MRC since there is no standard classification exists in the MRC.</i>
		2.3 Classification completeness	<i>Classifications are not complete. Viet Nam data has no attribute information.</i>
3	Geodetic datum and map projection	3.1 Consistency with existing spatial data presentations	<i>UTM Zone 48, Indian Datum 1960, Everest Spheroid was applied to irrigation project dataset for all 4 countries datasets.</i>
4	Topology	4.1 Consistency with existing spatial data presentations	<i>There is no reservoir data for Cambodia. The update from Laos has less number of features than the existing version. There is no change in Thailand dataset. New reservoir features in Central Highland of Viet Nam was received but no update for the Delta.</i>
		4.2 Closed polygons	<i>Polygons are closed.</i>
		4.3 Unbroken networks	<i>No network data.</i>
		4.4 Completeness of data records	<i>There are numbers of empty records and fields which should be filled in the future.</i>
5	Positional accuracy	5.1 Identification of gross geo-referencing and/or coding errors	<i>Update from Laos is a bit different from the existing one. Shape of some polygons has been changed.</i>
		5.2 Consistency with existing spatial data presentations	<i>Consistency with an existing data.</i>
6	Attribute data	6.1 Accepted spelling	<i>Attribute names are accepted as long as descriptions are available</i>

Theme	Check	Comments
	6.2 Accepted referencing and/or coding	<i>Common codes, e.g. country codes, are using MRC coding system, while irrigation codes are used as what agreed among the counterparts.</i>
	6.3 Consistency with official records	<i>Data was checked to ensure that no schemes fall out of their own country and codes were entered correctly.</i>
	6.4 Completeness	<i>There are a number of fields and records with blank cells. This matter should be noted by all users when using this dataset. The MRC should somewhat consider filling the data gap by obtained updates from the countries regularly.</i>
	6.5 Accepted structure	<i>The attribute structure was followed an agreed structure.</i>

e. Irrigation data

It was decided not to combine the additional data into one basin-table since there are too many uncommon fields in each country data. Tables were then cleaned and left as country data table with referenced ID (REF) to link to irrigation datasets. QA procedure was not applied to this data table since they are new tables created during this exercise to store the additional irrigation data that were not included in the irrigation scheme layers. Each table will also contain key fields that can be linked to the irrigation scheme layers. Attribute structure detail and metadata are provided in the section "[Data Dictionary and Metadata: Irrigation data](#)".

Basin-wide irrigation scheme database

The irrigation scheme datasets derived from this project include:

- Irrigation project - point locations and key data for all irrigation schemes
- Irrigation headwork – point locations and key data for all irrigation headwork
- Irrigation reservoir – area showing irrigation and other reservoir areas
- Irrigation area – area showing irrigation command areas
- Irrigation data – data on irrigation schemes (country-wide) can be linked to the irrigation projects by unique codes.

Data dictionary and metadata of above mentioned irrigation scheme datasets are described following.

Data dictionary & Metadata

This section contains data dictionary and metadata for basin-wide irrigation scheme datasets. Format for both data dictionary and metadata is based on MRC standard format as described in "the Data Dictionary of the MRC Geospatial Database and the MRC-IS Metadata Standard" (copy can be obtained from MRC/Technical Support Division (TSD). This section should eventually be added into the "Data Dictionary of the MRC Geospatial Database" document.

For metadata of country-wide datasets, please refer to the *final reports on Data Collection in Cambodia, Lao PDR, Thailand, and Viet Nam for the Programme to Demonstrate Multi-functionality of Paddy Fields over the Mekong River Basin (DMPF)*.

a. Irrigation Project

1. Data dictionary

Dataset name: SDE.IRRG_b_proj04

Type: Feature class

Geometry type: Point

Description: Point locations and key information for all irrigation schemes

Coordinate system: UTM zone 48, Indian 1960

Sources: Cambodia: - 1:50,000 scale topographic maps, UTM Zone 48, US series L7016 (1960s/70s), Updated GPS points collected by Provincial Department of Water Resource and Meteorology for 2 provinces: Kampong Speu and Kandal, last update in May 2004

Lao PDR: - 1:100,000 Topomaps and Spot image of 2000 (10 m. resolution), last update of data in June 2003.

Thailand: Various including project maps at various scales

Viet Nam: - 1:100,000 scale maps with supplementary information from Sub Institute of Water Resource Planning (SIWRP)

Point attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Numeric reference number
MRC_ID	Text, 50	MRC code
Proj_Name	Text, 50	Project name
PROJ_ID	Text, 50	Unique project ID codes as used by each riparian country
POINT_LOC	Text, 50	This defines what point represents. Three options are available. If the location is uncertain "L" should be used. H : Headwork location (preferred option if data available) C : Centre of irrigation area L : Approximate scheme location
AGENCY	Text, 50	Agency name
CCODE	Short integer	Country code
SCHEME_ID	Text, 50	ID of irrigation scheme, used by the countries

2. Metadata

General information

Title: Irrigation project location, 2004

Creation date: 18 October 2005

Language use: English

Abstract of data: Irrigation project location and its related information as of 2004
Metadata author: Penroong Bamrungrach
Point of contact:

Individual's name: Mr. Ulf Hedlund
Organization name: Mekong River Commission Secretariat (MRCS)
Contact's position: DB/GIS Team Leader
Contact's role: Publisher
Contact information:
Address: P.O. Box 6101
City: Vientiane, 01000
E-mail address: Hedlund@mrcmekong.org
Country: Lao PDR
Delivery point: MRCS
Phone: +856-21-263263
Fax: +856-21-263264

History

Coverage area: Lower Mekong Basin
Generation: Laos dataset was re-projected from UTM Zone 48n, WGS 1984 to UTM Zone 48n, IND 1960. Four original dataset from the countries were combined (UNION).

Data source: Cambodia: - 1:50,000 scale topographic maps, UTM Zone 48, US series
L7016 (1960s/70s), Updated GPS points collected by Provincial Department of Water Resource and Meteorology for 2 provinces: Kampong Speu and Kandal, last update in May 2004

Lao PDR: 1:100,000 topomaps and Spot image, 2000 (15 m. resolution), last update in June 2003

Thailand: Various including project maps at various scales

Viet Nam: - 1:100,000 scale maps with supplementary information from Sub Institute of Water Resource Planning (SIWRP)

Source agency: Cambodia: Department of Meteorology, Ministry of Water Resources and Meteorology (MOWRAM), Phnom Penh

Lao PDR: Technical Division, Department of Irrigation, Ministry of Agriculture and Forestry (MFA)

Thailand: Data was based on information received from Royal Irrigation Department (RID), Department of Energy and Development Promotion (DEDP) and Ministry of Interior (MOI). Data was prepared by Project Planning Division Section1, Royal Irrigation Department (RID), Bangkok (Contact: Mr. Chatchat Boonlue and Mr. Pipat Ruangngam)

Viet Nam: Data was received from Sub Institute of Water Resource Planning (SIWRP), Ho Chi Minh

Status of data: Although some information is not available but the dataset is complete as far as data was available from the counterpart agencies. However, MRC should try to obtain the updates from counterpart agencies regularly.

Spatial representation:
Vector: Point feature
Raster: n/a

Dataset identification

Theme or category of dataset: Water resources

Additional characteristic: n/a

Restrictions: Limitations of use – the Mekong River Commission make no warranties about this data and disclaim all responsibility and liability

for all expenses, losses, damages and costs which may be incurred as a result of the data being inaccurate or incomplete in any opinion whatsoever on the part of the Mekong River Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delineation of its frontiers or boundaries

Legal restrictions: Copyright, Data use license
 Use restrictions: Copyright, Data are not for commercial use.

Spatial information

Coordinate system: UTM
 Zone: 48
 Horizontal datum: Indian 1960
 Spheroid: Everest
 Unit: Meter
 Vertical datum: n/a

Date and version of data

Last update: 18 October 2005
 Version of data: n/a

Format

Personal Geodatabase, ArcGIS 9.0

Spatial attribute description

Ref Reference ID which is a key to link to other irrigation dataset and additional table
 MRC_ID Project ID developed by the MRC
 Proj_Name Name of each scheme
 Proj_ID ID code used by each country
 Point_Loc This defines what point represents. Three options are available. If the location is uncertain "L" should be used.
 H : Headwork location (preferred option if data available)
 C : Centre of irrigation area
 L : Approximate scheme location, (locations from WUP report)
 Agency Agency name who provided the data
 Ccode Country code where:
 1 – Cambodia
 2 – Lao PDR
 3 – Thailand
 4 – Viet Nam
 Scheme_ID ID of irrigation scheme used by the country

Quality information

Attribute table contains number of empty records. Location of Laos point data had deviated slightly compared to the 2001 version. However, it has been confirmed from the responsible agency that the 2004 version is more accurate and it should be replace the old one.

Comments

n/a

Distribution information

Distributor: Mekong River Commission Secretariat (MRCS)
 Transfer options:
 Online source: file - \\...
 Online location (URL): MRC/FTP site
 Connection protocol: Local area network
 Function performed: Information
 Description: Downloadable data
 Medium/mean of distribution: CD-ROM, file transfer via e-mail or FTP site
 Available format:

Format name: SDE feature class, Shapefile, ArcInfo coverage
 Format version: ArcGIS 9.x
 Contact information:
 Individual's name: Ulf Hedlund
 Organization's name: Mekong River Commission Secretariat
 Contact's role: distributor
 Contact's information:
 Address: P.O. Box 6101
 Delivery points: No. 184, Unit 18, Fa Ngoum Rd, Ban Sithane Neua
 City: Sikhotlaboung District, Vientiane
 E-mail address: mrc@mrcmekong.org
 Country: Lao PDR
 Phone: +856-21-263263
 Fax: +856-21-263264
 Contact position: Custodian
 Ordering process: Visit <http://www.mrcmekong.org>
 Instruction: Visit <http://www.mrcmekong.org>
 Terms and fees: In accordance with the MRC Pricing Policy

b. Irrigation headwork

1. Data dictionary

Dataset name: SDE.IRRG_b_hw04
Type: Feature class
Geometry type: Point
Description: Point locations and key information for all irrigation schemes
Coordinate system: UTM zone 48, Indian 1960
Sources: Cambodia: - 1:50,000 scale topographic maps, UTM Zone 48, US series L7016 (1960s/70s). There was no update for Cambodia; therefore, it was taken from existing irrigation headworks.
Lao PDF: - 1:100,000 topomaps and Spot image, 2000 (15m. resolution), last update in June 2003
Thailand: Various including project maps at various scales
Viet Nam: - 1:100,000 scale maps with supplementary information from Sub Institute of Water Resource Planning (SIWRP)

Point attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Reference ID
MRC_ID	Text, 50	ID used by the MRC
PROJ_NAME	Text, 50	Project name
PROJ_ID	Text, 50	Project ID
HW_ID	Text, 50	Headwork ID
HW_TYPE	Text, 50	Headwork type

HW_TYPE1	Text, 50	Headwork type, additional information
HW_SPEC	Text, 50	Headwork specification
AGENCY	Text, 50	Agency name
CCODE	Short integer	Country code

2. Metadata

General information

Title: Irrigation headwork, 2004
 Creation date: 18 October 2005
 Language use: English
 Abstract of data: Irrigation headwork and its related information as of 2004
 Metadata author: Penroong Bamrungrach
 Point of contact:
 Individual's name: Mr. Ulf Hedlund
 Organization name: Mekong River Commission Secretariat (MRCS)
 Contact's position: DB/GIS Team Leader
 Contact's role: Publisher
 Contact information:
 Address: P.O. Box 6101
 City: Vientiane, 01000
 E-mail address: Hedlund@mrcmekong.org
 Country: Lao PDR
 Delivery point: MRCS
 Phone: +856-21-263263
 Fax: +856-21-263264

History

Coverage area: Lower Mekong Basin
 Generation: Four datasets from riparian countries were combined (UNION).
 Data source: Cambodia: - 1:50,000 scale topographic maps, UTM Zone 48, US series L7016 (1960s/70s). There was no update for Cambodia; therefore, it was taken from existing irrigation headworks.
Lao PDR: - 1:100,000 topomaps and Spot images, 2000 (15m resolution), last update in June 2003
Thailand: Various including project maps at various scales
Viet Nam: - 1:100,000 scale maps with supplementary information from Sub Institute of Water Resource Planning (SIWRP)
 Source agency: Cambodia: Department of Meteorology, Ministry of Water Resources and Meteorology (MOWRAM), Phnom Penh
Lao PDR: Technical Division, Department of Irrigation, Ministry of Agriculture and Forestry, Vientiane (Contact: Oulaphone Ongkeo)
Thailand: Data was based on information received from Royal Irrigation Department (RID), Department of Energy and Development Promotion (DEDP) and Ministry of Interior (MOI). Data was prepared by Project Planning Division Section1, Royal Irrigation Department (RID), Bangkok (Contact: Mr. Chatchat Boonlue and Mr. Pipat Ruangngam)
Viet Nam: Data was received from Sub Institute of Water Resource Planning (SIWRP), Ho Chi Minh

Status of data: Although some information is not available but the dataset is complete as far as data was available from the counterpart agencies. However, MRC should try to obtain the updates from counterpart agencies regularly.

Spatial representation:
Vector:: Point feature
Raster: n/a

Dataset identification

Theme or category of dataset: Water resources
Additional characteristic: n/a
Restrictions: Limitations of use – the Mekong River Commission make no warranties about this data and disclaim all responsibility and liability for all expenses, losses, damages and costs which may be incurred as a result of the data being inaccurate or incomplete in any opinion whatsoever on the part of the Mekong River Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delineation of its frontiers or boundaries
Legal restrictions: Copyright, Data use license
Use restrictions: Copyright, Data are not for commercial use.

Spatial information

Coordinate system: UTM
Zone: 48
Horizontal datum: Indian 1960
Spheroid: Everest
Unit: Meter
Vertical datum: n/a

Date and version of data

Last update: 18 October 2004
Version of data: n/a

Format

Personal Geodatabase, ArcGIS 9.0

Spatial attribute description

Ref	Reference ID which is a key to link to other irrigation dataset and additional table
MRC_ID	Project ID developed by the MRC
Proj_Name	Name of each scheme
Proj_ID	ID code used by each country
Hw_ID	Headwork ID
Hw_Type	Headwork type
Hw_Type1	Headwork type (additional information if available)
Hw_Spec	Headwork specification
Agency	Agency name who provided the data
Ccode	Country code where: 1 – Cambodia 2 – Lao PDR 3 – Thailand 4 – Viet Nam

Quality information

Attribute table contains number of empty records. Location of Laos point data deviated slightly compared to the 2001 version. However, it has been confirmed from the responsible agency that the 2004 version is more accurate and it should be replace the old one.

Comments

n/a

Distribution information

Distributor: Mekong River Commission Secretariat (MRCS)

Transfer options:

Online source: file - \\...
Online location (URL): MRC/FTP site
Connection protocol: Local area network
Function performed: Information
Description: Downloadable data
Medium/mean of distribution: CD-ROM, file transfer via e-mail or FTP site

Available format:

Format name: SDE feature class, Shapefile, ArcInfo coverage
Format version: ArcGIS 9.x

Contact information:

Individual's name: Ulf Hedlund
Organization's name: Mekong River Commission Secretariat
Contact's role: distributor
Contact's information:
Address: P.O. Box 6101
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City: Sikhotlaboung District, Vientiane
E-mail address: mrc@mrcmekong.org
Country: Lao PDR
Phone: +856-21-263263
Fax: +856-21-263264
Contact position: Custodian
Ordering process: Visit <http://www.mrcmekong.org>
Instruction: Visit <http://www.mrcmekong.org>
Terms and fees: In accordance with the MRC Pricing Policy

c. Irrigation reservoir

1. Data dictionary

Dataset name: SDE.IRRG_b_resv04
Type: Feature class
Geometry type: Polygon
Description: Area and key information for reservoirs
Coordinate system: UTM zone 48, Indian 1960
Sources:
Cambodia: - 1:50,000 scale topographic maps, UTM Zone 48, US series L7016 (1960s/70s). There was no update for Cambodia; therefore, it was taken from existing irrigation reservoirs (2001).
Lao PDR: - Spot image, 2000 (15m resolution), last update in June 2003
Thailand: Various including project maps at various scales
Viet Nam: - 1:100,000 scale maps with supplementary information from Sub Institute of Water Resource Planning (SIWRP)

Polygon attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Reference ID as key to link to other irrigation scheme dataset

PROJ_ID	Text, 50	Project ID used by the country
PROJ_NAME	Text, 50	Project name
RES_SPEC	Text, 50	Description specification of reservoir, e.g. natural lake, reservoir, or swamp
AGENCY	Text, 50	Agency who provided the data
CCODE	Short integer	Country code where 1 – Cambodia 2 – Lao PDR 3 – Thailand 4 – Viet Nam

2. Metadata

General information

Title: Irrigation reservoir, 2004
Creation date: 18 October 2005
Language use: English
Abstract of data: Irrigation reservoir and its related information as of 2004
Metadata author: Penroong Bamrungrach
Point of contact:

Individual's name: Mr. Ulf Hedlund
Organization name: Mekong River Commission Secretariat (MRCS)
Contact's position: DB/GIS Team Leader
Contact's role: Publisher
Contact information:
Address: P.O. Box 6101
City: Vientiane, 01000
E-mail address: Hedlund@mrcmekong.org
Country: Lao PDR
Delivery point: MRCS
Phone: +856-21-263263
Fax: +856-21-263264

History

Coverage area: Lower Mekong Basin
Generation: Union country datasets into basin-wide dataset
Data source: Cambodia: - 1:50,000 scale topographic maps, UTM Zone 48, US series L7016 (1960s/70s). There was no update for Cambodia; therefore, it was taken from existing irrigation headworks.
Lao PDR: - Spot images, 2000 (15m resolution), last update in June 2003
Thailand: Various including project maps at various scales
Viet Nam: - 1:100,000 scale maps with supplementary information from Sub Institute of Water Resource Planning (SIWRP)
Source agency: Cambodia: Department of Meteorology, Ministry of Water Resources and Meteorology (MOWRAM), Phnom Penh
Lao PDR: Technical Division Department of Irrigation, Ministry of Agriculture and Forestry, Vientiane (Contact: Oulaphone Ongkeo)
Thailand: Data was based on information received from Royal Irrigation Department (RID), Department of Energy and Development

Promotion (DEDP) and Ministry of Interior (MOI). Data was prepared by Project Planning Division Section1, Royal Irrigation Department (RID), Bangkok (Contact: Mr. Chatchat Boonlue and Mr. Pipat Ruangngam)

Viet Nam: Data was received from Sub Institute of Water Resource Planning (SIWRP), Ho Chi Minh

Status of data: Although some information is not available but the dataset is complete as far as data was available from the counterpart agencies. However, MRC should try to obtain the updates from counterpart agencies regularly.

Spatial representation:
Vector:: Polygon feature
Raster: n/a

Dataset identification

Theme or category of dataset: Water resources

Additional characteristic: n/a

Restrictions: Limitations of use – the Mekong River Commission make no warranties about this data and disclaim all responsibility and liability for all expenses, losses, damages and costs which may be incurred as a result of the data being inaccurate or incomplete in any opinion whatsoever on the part of the Mekong River Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delineation of its frontiers or boundaries

Legal restrictions: Copyright, Data use license

Use restrictions: Copyright, Data are not for commercial use.

Spatial information

Coordinate system: UTM

Zone: 48

Horizontal datum: Indian 1960

Spheroid: Everest

Unit: Meter

Vertical datum: n/a

Date and version of data

Last update: 18 October 2005

Version of data: n/a

Format

Personal Geodatabase, ArcGIS 9.0

Spatial attribute description

REF Referenced ID used as key to link to other irrigation datasets.

PROJ_ID Project ID used by each country

PROJ_NAME Name of irrigation project

RES_SPEC Description of reservoir

AGENCY Agency who provided the data

CCODE Country code where

1 – Cambodia

2 – Lao PDR

3 – Thailand

4 – Viet Nam

Quality information

Attribute table contains a number of empty records.

Comments

n/a

Distribution information

Distributor: Mekong River Commission Secretariat (MRCS)

Transfer options:

- Online source: file - \\...
- Online location (URL): MRC/FTP site
- Connection protocol: Local area network
- Function performed: Information
- Description: Downloadable data
- Medium/mean of distribution: CD-ROM, file transfer via e-mail or FTP site

Available format:

- Format name: MS Excel, MS Access
- Format version: Window XP

Contact information:

- Individual's name: Ulf Hedlund
- Organization's name: Mekong River Commission Secretariat
- Contact's role: distributor
- Contact's information:
 - Address: P.O. Box 6101
 - Delivery points: No. 184, Unit 18, Fa Ngoum Rd, Ban Sithane Neua
 - City: Sikhotlaboung District, Vientiane
 - E-mail address: mrc@mrcmekong.org
 - Country: Lao PDR
 - Phone: +856-21-263263
 - Fax: +856-21-263264
- Contact position: Custodian
- Ordering process: Visit <http://www.mrcmekong.org>
- Instruction: Visit <http://www.mrcmekong.org>
- Terms and fees: In accordance with the MRC Pricing Policy

d. Irrigation area

1. Data dictionary

Dataset name: SDE.IRRG_b_area04

Type: Feature class

Geometry type: Polygon

Description: Area and key information for irrigated area

Coordinate system: UTM zone 48, Indian 1960

Sources:

- Cambodia: - 1:50,000 scale topographic maps, UTM Zone 48, US series L7016 (1960s/70s). There was no update for Cambodia; therefore, it was taken from existing irrigation headworks.
- Lao PDR: - 1:100,000 topomap and Spot image, 2000 (15m resolution), last update in June 2003
- Thailand: Various including project maps at various scales
- Viet Nam: - 1:100,000 scale maps with supplementary information from Sub Institute of Water Resource Planning (SIWRP)

Point attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Referenced ID used as key to link to other irrigation scheme datasets

MRC_ID	Text, 50	ID used by MRC
PROJ_NAME	Text, 50	Project name
PROJ_ID	Text, 50	Project ID used by the country
SHA_AREA	Double	Project area
AGENCY	Text, 50	Agency who provided the data
SOUR_TH_P	Text, 50	Code identify pumped irrigation area from different agencies RP – Pumped irrigation area from RID MP – Pumped irrigation area from MOI DP – Pumped irrigation area from DEDP
SOUR_TH_G	Text, 50	Code identify pumped irrigation area from different agencies RG – Gravity irrigation area from RID MG – Gravity irrigation area from MOI DG – Gravity irrigation area from DEDP
SHA_AREA_TH_G	Double	Gross area of polygon in hectares of gravity irrigation area of Thai part
AGENCY_TH_G	Text, 50	Agency who provided the gravity irrigation area data of Thai part
PROJ_ID_TH_G	Text, 50	Project ID codes of gravity irrigation area of Thai part as used by Thai agencies
CCODE	Short integer	Country code where: 1 – Cambodia 2 – Lao PDR 3 – Thailand 4 – Viet Nam

2. Metadata

General information

Title: Irrigation area, 2004
Creation date: 18 October 2005
Language use: English
Abstract of data: Irrigated area and related information as of 2004
Metadata author: Penroong Bamrungrach
Point of contact:

Individual's name: Mr. Ulf Hedlund
Organization name: Mekong River Commission Secretariat (MRCS)
Contact's position: DB/GIS Team Leader
Contact's role: Publisher
Contact information:
Address: P.O. Box 6101
City: Vientiane, 01000
E-mail address: Hedlund@mrcmekong.org
Country: Lao PDR
Delivery point: MRCS
Phone: +856-21-263263
Fax: +856-21-263264

History

Coverage area:	Lower Mekong Basin
Generation:	Data on Cambodia and Thailand were taken from the existing 2001 while Laos and Viet Nam data were replaced by the updates received from the counterpart agencies. All four-country datasets were combined/union to the basin-wide layer.
Data source:	<p><u>Cambodia</u>: - 1:50,000 scale topographic maps, UTM Zone 48, US series L7016 (1960s/70s). There was no update for Cambodia; therefore, it was taken from existing irrigation headworks.</p> <p><u>Lao PDR</u>: - 1:100,000 topomap and Spot image 2000 (15m resolution)</p> <p><u>Thailand</u>: Various including project maps at various scales</p> <p><u>Viet Nam</u>: - 1:100,000 scale maps with supplementary information from Sub Institute of Water Resource Planning (SIWRP)</p>
Source agency:	<p><u>Cambodia</u>: Department of Meteorology, Ministry of Water Resources and Meteorology (MOWRAM), Phnom Penh</p> <p><u>Lao PDR</u>: Technical Division, Department of Irrigation, Ministry of Agriculture and Forestry, Vientiane (Contact: Oulaphone Ongkeo)</p> <p><u>Thailand</u>: Data was based on information received from Royal Irrigation Department (RID), Department of Energy and Development Promotion (DEDP) and Ministry of Interior (MOI). Data was prepared by Project Planning Division Section 1, Royal Irrigation Department (RID), Bangkok (Contact: Mr. Chatchat Boonlue and Mr. Pipat Ruangngam)</p> <p><u>Viet Nam</u>: Data was received from Sub Institute of Water Resource Planning (SIWRP), Ho Chi Minh</p>
Status of data:	Although some information is not available but the dataset is complete as far as data was available from the counterpart agencies. However, MRC should try to obtain the updates from counterpart agencies regularly.
Spatial representation:	
Vector::	Polygon feature
Raster:	n/a

Dataset identification

Theme or category of dataset:	Water resources
Additional characteristic:	n/a
Restrictions:	Limitations of use – the Mekong River Commission make no warranties about this data and disclaim all responsibility and liability for all expenses, losses, damages and costs which may be incurred as a result of the data being inaccurate or incomplete in any opinion whatsoever on the part of the Mekong River Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delineation of its frontiers or boundaries
Legal restrictions:	Copyright, Data use license
Use restrictions:	Copyright, Data are not for commercial use.

Spatial information

Coordinate system:	UTM
Zone:	48
Horizontal datum:	Indian 1960
Spheroid:	Everest
Unit:	Meter
Vertical datum:	n/a

Date and version of data

Last update: 18 October 2005
Version of data: n/a

Format

Personal Geodatabase, ArcGIS 9.0

Spatial attribute description

REF	Referenced ID used as key to link to other irrigation schemes
MRC_ID	ID used by the MRC
PROJ_NAME	Project name
PROJ_ID	ID used by the country
SHA_AREA	Irrigated area (ha)
AGENCY	Agency who provided the data
SOUR_TH_P	Code identify pumped irrigation area from different agencies RP – Pumped irrigation area from RID MP – Pumped irrigation area from MOI DP – Pumped irrigation area from DEDP
SOUR_TH_G	Code identify pumped irrigation area from different agencies RG – Gravity irrigation area from RID MG – Gravity irrigation area from MOI DG – Gravity irrigation area from DEDP
SHA_AREA_TH_G part	Gross area of polygon in hectares of gravity irrigation area of Thai part
AGENCY_TH_G	Agency who provided the gravity irrigation area data of Thai part
PROJ_ID_TH_G	Project ID codes of gravity irrigation area of Thai part as used by Thai agencies
CCODE	Country code where: 1 – Cambodia 2 – Lao PDR 3 – Thailand 4 – Viet Nam

Quality information

Dataset covers Lao PDR, Thailand and Central Highland of Viet Nam. Comparing to 2001 dataset, there was no update on Thai part while there was no data exist on Viet Nam part in 2001 dataset. For Laos part, it was told by the counterpart agency that this update version should completely replace the existing one.

Comments

n/a

Distribution information

Distributor: Mekong River Commission Secretariat (MRCS)

Transfer options:

Online source: file - \\...
Online location (URL): MRC/FTP site
Connection protocol: Local area network
Function performed: Information
Description: Downloadable data
Medium/mean of distribution: CD-ROM, file transfer via e-mail or FTP site

Available format:

Format name: SDE feature class, Shapefile, ArcInfo coverage
Format version: ArcGIS 9.x

Contact information:

Individual's name: Ulf Hedlund
Organization's name: Mekong River Commission Secretariat
Contact's role: distributor
Contact's information:
Address: P.O. Box 6101
Delivery points: No. 184, Unit 18, Fa Ngoum Rd, Ban Sithane Neua
City: Sikhotlaboung District, Vientiane
E-mail address: mrc@mrcmekong.org

Country: Lao PDR
 Phone: +856-21-263263
 Fax: +856-21-263264
 Contact position: Custodian
 Ordering process: Visit <http://www.mrcmekong.org>
 Instruction: Visit <http://www.mrcmekong.org>
 Terms and fees: In accordance with the MRC Pricing Policy

e. Irrigation data (supporting data)

Cambodia

1. Data dictionary

Dataset name: SDE.IRRG_c_irr_data04
Type: SDE Table
Geometry type: n/a
Description: key information for Cambodia irrigation schemes
Coordinate system: n/a
Sources: additional data provided by the country, as well as part of information took out from irrigation layers.

Table attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Referenced ID used as key to link to other irrigation scheme datasets
MRC_ID	Text, 50	ID used by the MRC
PROJ_ID	Text, 50	Project ID used by the country
PROJ_NAME	Text, 50	Project name
X	Double	X coordinate (UTM)
Y	Double	Y coordinate (UTM)
TYPE	Text, 50	Irrigation type G – Gravity P – Fixed pump (power source not specified) E – Fixed pump electric D – Fixed pump diesel M – Mobile/portable pump T – Traditional lift R – Recession irrigation L – Tidal irrigation
AREA_PLW	Double	Planned or potential wet season area (ha)
AREA_PLD	Double	Planned or potential dry season area (ha)
AREA_IRR	Double	Actual irrigable area

AREA_WET	Double	Actual irrigable wet season area
AREA_3 RD	Double	Actual irrigable 3 rd season area
CROP_CODE	Text, 50	Crop code information as supplied from riparian countries where: 1 – one rice crop per year 2 – two rice crop per year 3 – three rice crop per year M – mixed cropping, mixture of rice and other crops S – shrimp crop
RICE_INT	Double	Annual intensity of rice equivalent to the total area of rice harvested divided by the irrigation area (Rice_int = area_wet + area_dry + area_3 rd)/ area_ir
AREA_DRY	Double	Actual irrigable dry area season
AGENCY	Text, 50	Agency who provided the data
WATER_USE	Text, 16	Daily record of water use
ASSOCIATIO	Text, 20	Association involved in an irrigation system
CHARGE_SYS	Text, 20	Method of payment

2. Metadata

General information

Title: Irrigation scheme data
Creation date: 18 October 2005
Language use: English
Abstract of data: Additional information of irrigation schemes in the LMB as of 2004
Metadata author: Penroong Bamrungrach
Point of contact:

Individual's name: Mr. Ulf Hedlund
Organization name: Mekong River Commission Secretariat (MRCS)
Contact's position: DB/GIS Team Leader
Contact's role: Publisher
Contact information:
Address: P.O. Box 6101
City: Vientiane, 01000
E-mail address: Hedlund@mrcmekong.org
Country: Lao PDR
Delivery point: MRCS
Phone: +856-21-263263
Fax: +856-21-263264

History

Coverage area: Lower Mekong Basin
Generation: Data was compiled and merged into the basin table. Key fields were created to link with irrigation scheme layer when needed.
Data source: Additional data provided by the countries, as well as items took out from the country layers.

Source agency: Cambodia: Department of Meteorology, Ministry of Water Resources and Meteorology (MOWRAM), Phnom Penh

Status of data: Although some information is not available but the table is complete as far as data was available from the counterpart agencies. However, MRC should try to obtain the updates from counterpart agencies regularly.

Spatial representation:

Vector:: n/a

Raster: n/a

Dataset identification

Theme or category of dataset: Water resources

Additional characteristic: n/a

Restrictions: Limitations of use – the Mekong River Commission make no warranties about this data and disclaim all responsibility and liability for all expenses, losses, damages and costs which may be incurred as a result of the data being inaccurate or incomplete in any opinion whatsoever on the part of the Mekong River Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delineation of its frontiers or boundaries

Legal restrictions: Copyright, Data use license

Use restrictions: Copyright, Data are not for commercial use.

Spatial information

n/a

Date and version of data

Last update: 18 October 2005

Version of data: n/a

Format

Personal Geodatabase Table

Spatial attribute description

REF	Referenced ID as key to link to other irrigation datasets and tables
MRC_ID	MRC code
PROJ_ID	Project ID used by the countries
PROJ_NAME	Project name
CCODE	Country code
X	X coordinate (UTM)
Y	Y coordinate (UTM)
CROP_CODE	Crop code applied by the country
AREA_WET	Actual irrigable in wet season
AREA_DRY	Actual irrigable in dry season
AREA_IRR	Actual irrigable area
RICE_INT	Annual intensity of rice equivalent to the total area of rice harvested divided by the irrigation area
AREA_3 RD	Actual irrigable 3 rd season area
AREA_PLW	Planned or potential wet season area (ha)
AREA_PLD	Planned or potential dry season area (ha)
AGENCY	Agency who provided the data
TYPE	Irrigation type

WATER_USE Daily record of water use
ASSOCIATIO Association involved in an irrigation system
CHARGE_SYS Method of payment

Quality information

Attribute completeness: There are gaps in the data, empty fields and records, due to unavailable information within the counterpart agencies of the riparian states.

Comments

Because of there are a number of missing information in fields and records; therefore, users should consider using this data with care.

Distribution information

Distributor: Mekong River Commission Secretariat (MRCS)

Transfer options:

Online source: file - \\...
Online location (URL): MRC/FTP site
Connection protocol: Local area network
Function performed: Information
Description: Downloadable data
Medium/mean of distribution: CD-ROM, file transfer via e-mail or FTP site

Available format:

Format name: MS Access, dBaseIV, SDE Table (geodatabase)
Format version: Window XP

Contact information:

Individual's name: Ulf Hedlund
Organization's name: Mekong River Commission Secretariat
Contact's role: distributor
Contact's information:
Address: P.O. Box 6101
Delivery points: No. 184, Unit 18, Fa Ngoum Rd, Ban Sithane Neua
City: Sikhotlaboung District, Vientiane
E-mail address: mrc@mrcmekong.org
Country: Lao PDR
Phone: +856-21-263263
Fax: +856-21-263264
Contact position: Custodian
Ordering process: Visit <http://www.mrcmekong.org>
Instruction: Visit <http://www.mrcmekong.org>
Terms and fees: In accordance with the MRC Pricing Policy

Laos

1. Data dictionary

Dataset name: SDE.IRRG_I_area_dat04
Type: SDE Table
Geometry type: n/a
Description: key information for Cambodia irrigation schemes
Coordinate system: n/a
Sources: additional data provided by the country, as well as part of information took out from irrigation layers.

Table attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Referenced ID used as key to link to other irrigation scheme datasets
MRC_ID	Text, 50	ID used by the MRC
PROJ_ID	Text, 50	Project ID used by the country
PROJ_NAME	Text, 50	Project name
SCHEME_ID	Text, 9	ID for group of projects falling into one large scheme
CL_1	Text, 5	Local project code 1 – province
CL_2	Text, 5	Local project code 2 - district
STATUS	Text, 50	Irrigation project status F – Existing fully operational P – Existing partially operational N – Existing non operational U – status (including data) uncertain
AREA_CPW	Double	Actual irrigable wet season area
AREA_CPD	Double	Actual irrigable dry season area
AREA_3 RD	Double	Actual irrigable 3 rd season area
CROP_CODE	Text, 50	Crop code information as supplied from riparian countries where: 1 – one rice crop per year 2 – two rice crop per year 3 – three rice crop per year M – mixed cropping, mixture of rice and other crops S – shrimp crop
AGENCY	Text, 50	Agency who provided the data
WATER_USE	Text, 12	Daily record of water use
ASSOCIATIO	Short integer	Number of association involved in the irrigation system
UPD_DATE	Text, 8	Last update

Dataset name: SDE.IRRG_I_hw_dat04

Type: SDE Table

Geometry type: n/a

Description: key information for Laos irrigation headworks

Coordinate system: n/a

Sources: additional data provided by the country, as well as part of information took out from irrigation layers.

Table attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Referenced ID used as key to link to other irrigation scheme datasets
MRC_ID	Text, 50	ID used by the MRC
PROJ_ID	Text, 50	Project ID used by the country
PROJ_NAME	Text, 50	Project name
SCHEME_ID	Text, 9	ID for group of projects falling into one large scheme
CL_1	Text, 5	Local project code 1 – province
CL_2	Text, 5	Local project code 2 - district
VILLAGE	Text, 17	Village name
RIVER_NAME	Text, 14	River name
HDW_TYPE	Text, 11	Headwork type
STATUS	Text, 50	Irrigation project status F – Existing fully operational P – Existing partially operational N – Existing non operational U – status (including data) uncertain
AGENCY	Text, 50	Agency who provided the data
WATER_USE	Text, 12	Water use
ASSOCIATIO	Short integer	Number of association involved in the irrigation system
CHARGE_SYS	Short integer	Method of payment
UPD_DATE	Text, 8	Last update

Dataset name: SDE.IRRG_I_proj_dat04

Type: SDE Table

Geometry type: n/a

Description: key information for Laos irrigation schemes

Coordinate system: n/a

Sources: additional data provided by the country, as well as part of information took out from irrigation layers.

Table attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Referenced ID used as key to link to other irrigation scheme datasets
MRC_ID	Text, 50	ID used by the MRC
PROJ_ID	Text, 50	Project ID used by the country
PROJ_NAME	Text, 50	Project name
SCHEME_ID	Text, 9	ID for group of projects falling into one large scheme
CL_1	Text, 5	Local project code 1 – province
CL_2	Text, 5	Local project code 2 - district
PROJ_COST	Text, 15	Cost of construction
CROP_CODE	Text, 12	Crop code information as supplied from riparian countries where: 1 – one rice crop per year 2 – two rice crop per year 3 – three rice crop per year M – mixed cropping, mixture of rice and other crops S – shrimp crop
STATUS	Text, 50	Irrigation project status F – Existing fully operational P – Existing partially operational N – Existing non operational U – status (including data) uncertain
AREA_PLW	Double	Planned and potential wet season area (ha)
AREA_PLD	Double	Planned and potential dry season area (ha)
AREA_WET	Double	Actual irrigable wet season area
AREA_DRY	Double	Actual irrigable dry season area
AREA_3 RD	Double	Actual irrigable 3 rd season area
RICE_INT	Float	Annual intensity of rice equivalent to the total of area of rice harvested divided by the irrigation
YR_CONS	Double	Year of construction
VILLAGE	Text, 17	Village name

RIVER_NAME	Text, 14	River name
HDW_TYPE	Text, 11	Headwork type
AGENCY	Text, 50	Agency who provided the data
WATER_USE	Text, 12	Daily record of water use
ASSOCIATIO	Short integer	Number of association involved in the irrigation system
UPD_DATE	Text, 8	Last update

Dataset name: SDE.IRRG_I_res_dat04

Type: SDE Table

Geometry type: n/a

Description: key information for Cambodia irrigation reservoir

Coordinate system: n/a

Sources: additional data provided by the country, as well as part of information took out from irrigation layers.

Table attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Referenced ID used as key to link to other irrigation scheme datasets
MRC_ID	Text, 50	ID used by the MRC
PROJ_ID	Text, 50	Project ID used by the country
PROJ_NAME	Text, 50	Project name
HDW_TYPE	Text, 10	Headwork type
LC_1	Text, 5	Local project code 1 – province
LC_2	Text, 5	Local project code 2 - district
AGENCY	Text, 50	Agency who provided the data
WATER_USE	Text, 12	Daily record of water use
ASSOCIATIO	Short integer	Number of association involved in the irrigation system
CHARGE_SYS	Short integer	Method of payment
AREA	Double	Area of reservoir calculated by Arcview
PERIMETER	Double	Perimeter calculated by arcview

UPDATE_DAT	Text, 8	Last update
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2. Metadata

General information

Title: Irrigation areas, headworks, schemes, and reservoir data
Creation date: 18 October 2005
Language use: English
Abstract of data: Additional information of irrigation schemes in the LMB as of 2004
Metadata author: Penroong Bamrungrach
Point of contact:
Individual's name: Mr. Ulf Hedlund
Organization name: Mekong River Commission Secretariat (MRCS)
Contact's position: DB/GIS Team Leader
Contact's role: Publisher
Contact information:
Address: P.O. Box 6101
City: Vientiane, 01000
E-mail address: Hedlund@mrcmekong.org
Country: Lao PDR
Delivery point: MRCS
Phone: +856-21-263263
Fax: +856-21-263264

History

Coverage area: Lower Mekong Basin
Generation: Data was compiled and merged into the basin table. Key fields were created to link with irrigation scheme layer when needed.
Data source: Additional data provided by the countries, as well as items took out from the country layers.
Source agency: Lao PDR: Technical Division, Department of Irrigation, Ministry of Agriculture and Forestry, Vientiane
Status of data: Although some information is not available but the table is complete as far as data was available from the counterpart agencies. However, MRC should try to obtain the updates from counterpart agencies regularly.
Spatial representation:
Vector:: n/a
Raster: n/a

Dataset identification

Theme or category of dataset: Water resources
Additional characteristic: n/a
Restrictions: Limitations of use – the Mekong River Commission make no warranties about this data and disclaim all responsibility and liability for all expenses, losses, damages and costs which may be incurred as a result of the data being inaccurate or incomplete in any opinion whatsoever on the part of the Mekong River Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delineation of its frontiers or boundaries
Legal restrictions: Copyright, Data use license
Use restrictions: Copyright, Data are not for commercial use.

Spatial information

n/a

Date and version of data

Last update: 18 October 2005
Version of data: n/a

Format

Personal Geodatabase Table

Spatial attribute description

Irrigation area:

REF	Referenced ID as key to link to other irrigation datasets and tables
MRC_ID	MRC code
PROJ_ID	Project ID used by the countries
PROJ_NAME	Project name
CCODE	Country code
SCHEME_ID	ID for a group of projects falling under one large scheme
CL_1	Local project code 1 - province
CL_2	Local project code 2 - district
CROP_CODE	Crop code supplied by the countries
AREA_CPW	Cropping area in wet season
AREA_CPD	Cropping area in dry season
AGENCY	Agency name
WATER_USE	Daily record of water use
ASSOCIATIO	Number of association involved in the irrigation system
CHARGE_SYS	Method of payment
STATUS	Status of irrigation
UPD_DATE	Update date

Irrigation headworks

REF	Referenced ID as key to link to other irrigation datasets and tables
MRC_ID	MRC code
PROJ_ID	Project ID used by the countries
PROJ_NAME	Project name
CCODE	Country code
SCHEME_ID	ID for group of projects falling under one large scheme
CL_1	Local project code 1 - province
CL_2	Local project code 2 - district
VILLAGE	Village name
RIVER_NAME	River name
HDW_TYPE	Headwork types (combination of main headwork type and detail)
AGENCY	Agency name
WATER_USE	Daily record of water use
ASSOCIATIO	Number of association involved in the irrigation system
CHARGE_SYS	Method of payment
STATUS	Status of irrigation
UPDATE_DAT	Last update

Irrigation project:

REF	Referenced ID as key to link to other irrigation datasets and tables
MRC_ID	MRC code
PROJ_ID	Project ID used by the countries
PROJ_NAME	Project name
SCHEME_ID	ID of group of project falling under one large scheme
CL_1	Local project code 1 - province
CL_2	Local project code 2 - district
PROJ_COST	Cost of project construction
CROP_CODE	Crop codes
AREA_PLW	Planned or potential wet season area (ha)
AREA_PLD	Planned or potential dry season area (ha)
RICE_INT	Annual intensity of rice equivalent to the total area of rice harvested divided by the irrigation area
AREA_3RD	Actual irrigable 3rd season area
YR_CONS	Year of construction
Village	Village name
RIVER_NAME	River name
HDW_TYPE	Headworks type
AGENCY	Agency who provided the data
WATER_USE	Daily record of water use
ASSOCIATIO	Number of association involved in the irrigation system
CHARGE_SYS	Method of payment
STATUS	Status of irrigation
UPDATE_DAT	last update

Irrigation reservoir:

REF	Referenced ID as key to link to other irrigation datasets and tables
MRC_ID	MRC code
PROJ_ID	Project ID used by the countries
PROJ_NAME	Project name
SCHEME_ID	ID of group of project falling under one large scheme
CL_1	Local project code 1 - province
CL_2	Local project code 2 - district
AGENCY	Agency who provided the data
WATER_USE	Daily record of water use
ASSOCIATIO	Number of association involved in the irrigation system
CHARGE_SYS	Method of payment

STATUS	Status of irrigation
AREA	Area of polygon calculated by AV
Perimeter	perimeter calculated by AV
UPDATE_DAT	last update

Quality information

Attribute completeness: There are gaps in the data, empty fields and records, due to unavailable information within the counterpart agencies of the riparian states.

Comments

Because of there are a number of missing information in fields and records; therefore, users should consider using this data with care.

Distribution information

Distributor: Mekong River Commission Secretariat (MRCS)

Transfer options:

Online source: file - \\...
 Online location (URL): MRC/FTP site
 Connection protocol: Local area network
 Function performed: Information
 Description: Downloadable data
 Medium/mean of distribution: CD-ROM, file transfer via e-mail or FTP site

Available format:

Format name: MS Access, dBaseIV, SDE Table (geodatabase)
 Format version: Window XP

Contact information:

Individual's name: Ulf Hedlund
 Organization's name: Mekong River Commission Secretariat
 Contact's role: distributor
 Contact's information:
 Address: P.O. Box 6101
 Delivery points: No. 184, Unit 18, Fa Ngoum Rd, Ban Sithane Neua
 City: Sikhotlaboung District, Vientiane
 E-mail address: mrc@mrcmekong.org
 Country: Lao PDR
 Phone: +856-21-263263
 Fax: +856-21-263264
 Contact position: Custodian
 Ordering process: Visit <http://www.mrcmekong.org>
 Instruction: Visit <http://www.mrcmekong.org>
 Terms and fees: In accordance with the MRC Pricing Policy

Thailand

Thai data were collected by three different agencies which sometimes create some overlaps on data collection. Merging data into one table could possibly create risk on miss-linking to the right irrigation scheme. Therefore, it was decided to keep the data from different agencies separately.

1. Data dictionary

Dataset name: SDE.IRRG_t_irr_d_dat04
Type: SDE Table
Geometry type: n/a
Description: key information for Thai irrigation schemes, prepared by DEDP
Coordinate system: n/a

Sources: additional data provided by the country, as well as part of information took out from irrigation layers, as of 2001.

Table attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Referenced ID used as key to link to other irrigation scheme datasets
MRC_ID	Text, 255	ID used by the MRC
PROJ_ID	Text, 255	Project ID used by the country
PROJ_NAME	Text, 255	Project name
IRR_TYPE	Text, 255	Irrigation type G – Gravity P – Fixed pump (power source not specified) E – Fixed pump electric D – Fixed pump diesel M – Mobile/portable pump T – Traditional lift R – Recession irrigation L – Tidal irrigation
IRR_STATUS	Text, 255	Irrigation project status F – Existing fully operational P – Existing partially operational N – Existing non operational U – status (including data) uncertain
AREA_PW	Double	Planned or potential wet season area (ha)
AREA_PD	Double	Planned or potential dry season area (ha)
AREA_IRR	Double	Actual irrigable area
AREA_WET	Double	Actual irrigable wet season area
AREA_3 RD	Double	Actual irrigable 3 rd season area
YR_CONS1	Double	Start year of construction
YR_CONS2	Double	Finish year of construction
PROJ_CLASS	Text, 255	Project class
CROP_CODE	Text, 255	Crop code information as supplied from riparian countries where: 1 – one rice crop per year 2 – two rice crop per year 3 – three rice crop per year M – mixed cropping, mixture of rice and other crops S – shrimp crop
RIVER_NAME	Text, 255	Local name of the river

SOURCE_TYP	Text, 255	Type of water source (hydrology) R – reservoir L – large river M – medium river S – small river K – natural lake
PROJ_FUNC	Text, 255	Function of project including combinations S – water storage I – irrigation D – drainage R – soil reclamation acid Sulphate control C – water conservation / colmatage F – flood control H – hydropower W – Water supply A – Aquaculture (freshwater) B – Aquaculture (brackish water) L – salinity control
RICE_INT	Double	Annual intensity of rice equivalent to the total area of rice harvested divided by the irrigation area (Rice_int = area_wet + area_dry + area_3 rd)/ area_ir
AREA_DRY	Double	Actual irrigable dry area season
DIS_ID	Double	District ID
PROV_ID	Double	Province ID
PROVINCE	Text, 255	Province name
SCODE	Double	Sub-catchment code used by MRC
SNAME	Text, 255	Name of sub-catchments (MRC names)
PROJ_ID1	Double	Project ID
HW_ID	Text, 255	Headwork ID
PROJECT_ID	Text, 255	Project ID
AGENCY	Text, 255	Agency who provided the data
CCODE	Short integer	Country code where: 1 – Cambodia 2 – Lao PDR 3 – Thailand 4 – Viet Nam

Dataset name: SDE.IRRG_t_irr_m_dat04

Type: SDE Table

Geometry type: n/a

Description: key information for Thai irrigation schemes, prepared by MOI

Coordinate system: n/a

Sources: additional data provided by the country, as well as part of information took out from irrigation layers, as of 2001.

Table attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Referenced ID used as key to link to other irrigation scheme datasets
MRC_ID	Text, 255	ID used by the MRC
PROJ_ID	Text, 255	Project ID used by the country
PROJ_NAME	Text, 255	Project name
IRR_TYPE	Text, 255	Irrigation type G – Gravity P – Fixed pump (power source not specified) E – Fixed pump electric D – Fixed pump diesel M – Mobile/portable pump T – Traditional lift R – Recession irrigation L – Tidal irrigation
IRR_STATUS	Text, 255	Irrigation project status F – Existing fully operational P – Existing partially operational N – Existing non operational U – status (including data) uncertain
AREA_PW	Double	Planned or potential wet season area (ha)
AREA_PD	Double	Planned or potential dry season area (ha)
AREA_IRR	Double	Actual irrigable area
AREA_WET	Double	Actual irrigable wet season area
AREA_3 RD	Double	Actual irrigable 3 rd season area
YR_CONS1	Double	Start year of construction
YR_CONS2	Double	Finish year of construction
PROJ_CLASS	Text, 255	Project class
CROP_CODE	Text, 255	Crop code information as supplied from riparian countries where: 1 – one rice crop per year 2 – two rice crop per year 3 – three rice crop per year M – mixed cropping, mixture of rice and other crops

		S – shrimp crop
RIVER_NAME	Text, 255	Local name of the river
SOURCE_TYP	Text, 255	Type of water source (hydrology) R – reservoir L – large river M – medium river S – small river K – natural lake
PROJ_FUNC	Text, 255	Function of project including combinations S – water storage I – irrigation D – drainage R – soil reclamation acid Sulphate control C – water conservation / colmatage F – flood control H – hydropower W – Water supply A – Aquaculture (freshwater) B – Aquaculture (brackish water) L – salinity control
RICE_INT	Double	Annual intensity of rice equivalent to the total area of rice harvested divided by the irrigation area (Rice_int = area_wet + area_dry + area_3 rd)/ area_ir
AREA_DRY	Double	Actual irrigable dry area season
DIS_ID	Double	District ID
PROV_ID	Double	Province ID
PROVINCE	Text, 255	Province name
SCODE	Double	Sub-catchment code used by MRC
SNAME	Text, 255	Name of sub-catchments (MRC names)
PROJ_ID1	Double	Project ID
HW_ID	Text, 255	Headwork ID
PROJECT_ID	Text, 255	Project ID
AGENCY	Text, 255	Agency who provided the data
CCODE	Short integer	Country code where: 1 – Cambodia 2 – Lao PDR 3 – Thailand 4 – Viet Nam

Dataset name: SDE.IRRG_t_irr_r_dat04
Type: SDE Table
Geometry type: n/a
Description: key information for Thai irrigation schemes, prepared by RID
Coordinate system: n/a
Sources: additional data provided by the country, as well as part of information took out from irrigation layers, as of 2001.

Table attributes:

Attribute/Field	Field Definition	Description
REF	Long integer	Referenced ID used as key to link to other irrigation scheme datasets
MRC_ID	Text, 255	ID used by the MRC
PROJ_ID	Text, 255	Project ID used by the country
PROJ_NAME	Text, 255	Project name
IRR_TYPE	Text, 255	Irrigation type G – Gravity P – Fixed pump (power source not specified) E – Fixed pump electric D – Fixed pump diesel M – Mobile/portable pump T – Traditional lift R – Recession irrigation L – Tidal irrigation
IRR_STATUS	Text, 255	Irrigation project status F – Existing fully operational P – Existing partially operational N – Existing non operational U – status (including data) uncertain
AREA_PW	Double	Planned or potential wet season area (ha)
AREA_PD	Double	Planned or potential dry season area (ha)
AREA_IRR	Double	Actual irrigable area
AREA_WET	Double	Actual irrigable wet season area
AREA_3 RD	Double	Actual irrigable 3 rd season area
YR_CONS1	Double	Start year of construction
YR_CONS2	Double	Finish year of construction
PROJ_CLASS	Text, 255	Project class
CROP_CODE	Text, 255	Crop code information as supplied from riparian countries where:

		1 – one rice crop per year 2 – two rice crop per year 3 – three rice crop per year M – mixed cropping, mixture of rice and other crops S – shrimp crop
RIVER_NAME	Text, 255	Local name of the river
SOURCE_TYP	Text, 255	Type of water source (hydrology) R – reservoir L – large river M – medium river S – small river K – natural lake
PROJ_FUNC	Text, 255	Function of project including combinations S – water storage I – irrigation D – drainage R – soil reclamation acid Sulphate control C – water conservation / colmatage F – flood control H – hydropower W – Water supply A – Aquaculture (freshwater) B – Aquaculture (brackish water) L – salinity control
RICE_INT	Double	Annual intensity of rice equivalent to the total area of rice harvested divided by the irrigation area $(\text{Rice_int} = \text{area_wet} + \text{area_dry} + \text{area_3}^{\text{rd}}) / \text{area_ir}$
AREA_DRY	Double	Actual irrigable dry area season
DIS_ID	Double	District ID
PROV_ID	Double	Province ID
PROVINCE	Text, 255	Province name
SCODE	Double	Sub-catchment code used by MRC
SNAME	Text, 255	Name of sub-catchments (MRC names)
PROJ_ID1	Double	Project ID
HW_ID	Text, 255	Headwork ID
PROJECT_ID	Text, 255	Project ID
AGENCY	Text, 255	Agency who provided the data
CCODE	Short integer	Country code where: 1 – Cambodia 2 – Lao PDR 3 – Thailand

2. Metadata

General information

Title: Irrigation schemes data
 Creation date: 18 October 2005
 Language use: English
 Abstract of data: Additional information of irrigation schemes in the Thai part as of 2001
 Metadata author: Penroong Bamrungrach
 Point of contact:
 Individual's name: Mr. Ulf Hedlund
 Organization name: Mekong River Commission Secretariat (MRCS)
 Contact's position: DB/GIS Team Leader
 Contact's role: Publisher
 Contact information:
 Address: P.O. Box 6101
 City: Vientiane, 01000
 E-mail address: Hedlund@mrcmekong.org
 Country: Lao PDR
 Delivery point: MRCS
 Phone: +856-21-263263
 Fax: +856-21-263264

History

Coverage area: Lower Mekong Basin
 Generation: Data was compiled and merged into the basin table. Key fields were created to link with irrigation scheme layer when needed.
 Data source: Additional data provided by the countries, as well as items took out from the country layers.
 Source agency: Thailand: Data was based on information received from Royal Irrigation Department (RID), Department of Energy and Development Promotion (DEDP) and Ministry of Interior (MOI). Data was prepared by Project Planning Division Section1, Royal Irrigation Department (RID), Bangkok (Contact: Mr. Chatchat Boonlue and Mr. Pipat Ruangngam)
 Status of data: Although some information is not available but the table is complete as far as data was available from the counterpart agencies. However, MRC should try to obtain the updates from counterpart agencies regularly.
 Spatial representation:
 Vector:: n/a
 Raster: n/a

Dataset identification

Theme or category of dataset: Water resources
 Additional characteristic: n/a
 Restrictions: Limitations of use – the Mekong River Commission make no warranties about this data and disclaim all responsibility and liability for all expenses, losses, damages and costs which may be incurred as a result of the data being inaccurate or incomplete in any opinion whatsoever on the part of the Mekong River Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delineation of its frontiers or boundaries
 Legal restrictions: Copyright, Data use license
 Use restrictions: Copyright, Data are not for commercial use.

Spatial information

n/a

Date and version of data

Last update: 18 October 2005

Version of data: n/a

Format

Personal Geodatabase Table

Spatial attribute description

Department of Energy and Development Promotion (DEDP)

REF	Referenced ID
MRC_ID	MRC ID
IRR_TYPE	Irrigation type or method of irrigation including combination: <ul style="list-style-type: none">- G = Gravity- P = Fixed pump (power source not specified)- E = Fixed pump electric- D = Fixed pump diesel- M = mobile/portable pumps- T = Traditional lift- R = Recession irrigation- L = Tidal irrigation
PROJ_FUNC	Function of project including combinations <ul style="list-style-type: none">- S = water storage- I = irrigation- D = drainage- R = soil reclamation acid sulphate control- C = Water conservation/ colmatage- F = flood control- H = hydropower- W = water supply- A = Aquaculture (freshwater)- B = Aquaculture (brackishwater)- L = Salinity control
AREA_PW	planned or potential wet season area (ha)
AREA_PD	planned or potential dry season area (ha)
AREA_WET	Actual irrigable wet season area (ha)
AREA_DRY	Actual irrigable dry season area (ha)
YR_CONS1	start year of construction
YR_CONS2	finish year of construction
PROJ_CLASS	Project class
IRR_STATUS	Project status <ul style="list-style-type: none">- F = existing, fully operational

	- P = existing, partially operational
	- N = existing, non operational
	- U = status (including data) uncertain
SOURCE_TYP	type of water source (hydrology)
	- R = reservoir
	- L = large river
	- M = medium river
	- S = small river
	- K = natural lake
RIVER_NAME	River name
CROP_CODE	crop code provided by countries
AGENCY	agency who provided the data
DIS_ID	district ID
PROV_ID	province ID
PROVINCE	province name
SCODE	subcatchment code (MRC)
SNAME	subcatchment name (MRC)
PROJ_NAME	project name
PROJ_ID	project ID used by country
PROJ_ID1	Another project ID
HW_ID	Headwork ID
PROJECT_ID	Another project ID
AREA_3RD	actual irrigable 3rd season area (ha)
AREA_IRR	Actual irrigable area
CCODE	Country code

Ministry of Interior (MOI)

REF	Referenced ID
MRC_ID	MRC ID
IRR_TYPE	Irrigation type or method of irrigation including combination:
	- G = Gravity
	- P = Fixed pump (power source not specified)
	- E = Fixed pump electric
	- D = Fixed pump diesel
	- M = mobile/portable pumps
	- T = Traditional lift
	- R = Recession irrigation
	- L = Tidal irrigation
PROJ_FUNC	Function of project including combinations
	- S = water storage

	- I = irrigation
	- D = drainage
	- R = soil reclamation acid sulphate control
	- C = Water conservation/ colmatage
	- F = flood control
	- H = hydropower
	- W = water supply
	- A = Aquaculture (freshwater)
	- B = Aquaculture (brackishwater)
	- L = Salinity control
AREA_PW	planned or potential wet season area (ha)
AREA_PD	planned or potential dry season area (ha)
AREA_WET	Actual irrigable wet season area (ha)
AREA_DRY	Actual irrigable dry season area (ha)
YR_CONS1	start year of construction
YR_CONS2	finish year of construction
PROJ_CLASS	Project class
IRR_STATUS	Project status
	- F = existing, fully operational
	- P = existing, partially operational
	- N = existing, non operational
	- U = status (including data) uncertain
SOURCE_TYP	type of water source (hydrology)
	- R = reservoir
	- L = large river
	- M = medium river
	- S = small river
	- K = natural lake
RIVER_SOUR	River source
RIVER_NAME	River name
CROP_CODE	crop code provided by countries
AGENCY	agency who provided the data
DIS_ID	district ID
PROV_ID	province ID
PROVINCE	province name
SCODE	subcatchment code (MRC)
SNAME	subcatchment name (MRC)
PROJ_NAME	project name
PROJ_ID	project ID used by country
PROJ_ID1	Another project ID

HW_ID	Headwork ID
PROJECT_ID	Another project ID
AREA_3RD	actual irrigable 3rd season area (ha)
AREA_IRR	Actual irrigable area
CCODE	Country code

Royal Irrigation Department (RID)

REF	Referenced ID
MRC_ID	MRC ID
IRR_TYPE	Irrigation type or method of irrigation including combination: <ul style="list-style-type: none"> - G = Gravity - P = Fixed pump (power source not specified) - E = Fixed pump electric - D = Fixed pump diesel - M = mobile/portable pumps - T = Traditional lift - R = Recession irrigation - L = Tidal irrigation
PROJ_FUNC	Function of project including combinations <ul style="list-style-type: none"> - S = water storage - I = irrigation - D = drainage - R = soil reclamation acid sulphate control - C = Water conservation/ colmatage - F = flood control - H = hydropower - W = water supply - A = Aquaculture (freshwater) - B = Aquaculture (brackishwater) - L = Salinity control
AREA_PW	planned or potential wet season area (ha)
AREA_PD	planned or potential dry season area (ha)
AREA_WET	Actual irrigable wet season area (ha)
AREA_DRY	Actual irrigable dry season area (ha)
YR_CONS1	start year of construction
YR_CONS2	finish year of construction
PROJ_CLASS	Project class
IRR_STATUS	Project status <ul style="list-style-type: none"> - F = existing, fully operational - P = existing, partially operational

	- N = existing, non operational
	- U = status (including data) uncertain
SOURCE_TYP	type of water source (hydrology)
	- R = reservoir
	- L = large river
	- M = medium river
	- S = small river
	- K = natural lake
RIVER_SOUR	River source
RIVER_NAME	River name
CROP_CODE	crop code provided by countries
AGENCY	agency who provided the data
DIS_ID	district ID
PROV_ID	province ID
PROVINCE	province name
RBASIN_ID	Basin code used by owner
SCODE	subcatchment code (MRC)
SNAME	subcatchment name (MRC)
PROJ_NAME	project name
PROJ_ID	project ID used by country
PROJ_ID1	Another project ID
COUNTRY	Country name
FND_CONS	Source of construction funds
YR_REHAB1	start year of rehabilitation
YR_REHAB2	finish year of rehabilitation
FND_REHAB	source of rehabilitation funds
PROJECT_ID	Another project ID
AREA_3RD	actual irrigable 3rd season area (ha)
AREA_IRR	Actual irrigable area
CCODE	Country code

Quality information

Attribute completeness: There are gaps in the data, empty fields and records, due to unavailable information within the counterpart agencies of the riparian states.

Comments

Because of there are a number of missing information in fields and records; therefore, users should consider using this data with care.

Distribution information

Distributor: Mekong River Commission Secretariat (MRCS)

Transfer options:

Online source: file - \\...
 Online location (URL): MRC/FTP site
 Connection protocol: Local area network
 Function performed: Information

Description: Downloadable data
Medium/mean of distribution: CD-ROM, file transfer via e-mail or FTP site
Available format:
Format name: MS Access, dBaseIV, SDE Table (geodatabase)
Format version: Window XP
Contact information:
Individual's name: Ulf Hedlund
Organization's name: Mekong River Commission Secretariat
Contact's role: distributor
Contact's information:
Address: P.O. Box 6101
Delivery points: No. 184, Unit 18, Fa Ngoum Rd, Ban Sithane Neua
City: Sikhotlaboung District, Vientiane
E-mail address: mrc@mrcmekong.org
Country: Lao PDR
Phone: +856-21-263263
Fax: +856-21-263264
Contact position: Custodian
Ordering process: Visit <http://www.mrcmekong.org>
Instruction: Visit <http://www.mrcmekong.org>
Terms and fees: In accordance with the MRC Pricing Policy

Viet Nam

Note: Additional data provided by Viet Nam counterpart has no relationship to the irrigation schemes. Scheme names do not match with any existing schemes.

1. Data dictionary

Dataset name: SDE.IRRG_v_hl_dat04
Type: SDE Table
Geometry type: n/a
Description: key information for Central Highland, Viet Nam irrigation schemes
Coordinate system: n/a
Sources: additional data provided by the country, as well as part of information took out from irrigation layers, as of 2004.

Table attributes:

Attribute/Field	Field Definition	Description
ID	Double	Auto-run ID
SCHEME	Text, 255	Scheme name
RIVER	Text, 255	River name
LOC_HW	Text, 255	Location of headworks
CATCH_A	Double	Catchment area
COOR_UTM	Double	Coordinates (UTM)
TYP_WITHD	Text, 255	Type of withdrawal

TOTA_CAP	Double	Total capacity (106m3)
ACTIVE_CA	Double	Active capacity (106m3)
DESIGN_A	Double	Designed irrigation area
IRR_AREA	Double	Existing irrigation area (ha)
RICE_ARE	Double	Rice area (ha)
IND_AREA	Double	Industrial tree area (ha)
MAIN_C	Text, 255	Type of withdrawal
OTHERC_A	Double	Coffee or other crop area (ha)
STRUC_W	Double	Structure of withdrawal

2. Metadata

General information

Title: Irrigation scheme data
Creation date: 18 October 2005
Language use: English
Abstract of data: Additional information of irrigation schemes in the Viet Nam (Central Highland) as of 2004
Metadata author: Penroong Bamrungrach
Point of contact:
Individual's name: Mr. Ulf Hedlund
Organization name: Mekong River Commission Secretariat (MRCS)
Contact's position: DB/GIS Team Leader
Contact's role: Publisher
Contact information:
Address: P.O. Box 6101
City: Vientiane, 01000
E-mail address: Hedlund@mrcmekong.org
Country: Lao PDR
Delivery point: MRCS
Phone: +856-21-263263
Fax: +856-21-263264

History

Coverage area: Lower Mekong Basin
Generation: Data was compiled and merged into the basin table. Key fields were created to link with irrigation scheme layer when needed.
Data source: Additional data provided by the countries, as well as items took out from the country layers.
Source agency: Viet Nam: Data was received from Sub Institute of Water Resource Planning (SIWRP), Ho Chi Minh
Status of data: Although some information is not available but the table is complete as far as data was available from the counterpart agencies. However, MRC should try to obtain the updates from counterpart agencies regularly.
Spatial representation:
Vector:: n/a
Raster: n/a

Dataset identification

Theme or category of dataset: Water resources
 Additional characteristic: n/a
 Restrictions: Limitations of use – the Mekong River Commission make no warranties about this data and disclaim all responsibility and liability for all expenses, losses, damages and costs which may be incurred as a result of the data being inaccurate or incomplete in any opinion whatsoever on the part of the Mekong River Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delineation of its frontiers or boundaries
 Legal restrictions: Copyright, Data use license
 Use restrictions: Copyright, Data are not for commercial use.

Spatial information

n/a

Date and version of data

Last update: 18 October 2005
 Version of data: n/a

Format

Personal Geodatabase Table

Spatial attribute description

ID	ID
SCHEME	Scheme name
RIVER	river name
LOC_HW	Location of headwork
CATCH_A	Catchment area
COOR_UTM	Coordinates (UTM)
TYP_WITHD	Type of withdrawal
TOTA_CAP	Total capacity (106m3)
ACTIVE_CA	Active capacity (106m3)
DESIGN_A	Designed irrigation area (ha)
IRR_REA	Existing irrigation area (ha)
RICE_ARE	Rice area (ha)
IND_AREA	Industrial tree area (ha)
MAIN_C	Type of withdrawal
OTHERC_A	Coffee or other crop area (ha)
STRUC_W	Sturcture of widthdrawal

Quality information

Attribute completeness: There are gaps in the data, empty fields and records, due to unavailable information within the counterpart agencies of the riparian states.

Comments

Because of there are a number of missing information in fields and records; therefore, users should consider using this data with care.

Distribution information

Distributor: Mekong River Commission Secretariat (MRCS)
 Transfer options:
 Online source: file - \\...
 Online location (URL): MRC/FTP site
 Connection protocol: Local area network
 Function performed: Information

Description: Downloadable data
Medium/mean of distribution: CD-ROM, file transfer via e-mail or FTP site
Available format:
Format name: MS Access, dBaseIV, SDE Table (geodatabase)
Format version: Window XP
Contact information:
Individual's name: Ulf Hedlund
Organization's name: Mekong River Commission Secretariat
Contact's role: distributor
Contact's information:
Address: P.O. Box 6101
Delivery points: No. 184, Unit 18, Fa Ngoum Rd, Ban Sithane Neua
City: Sikhotlaboung District, Vientiane
E-mail address: mrc@mrcmekong.org
Country: Lao PDR
Phone: +856-21-263263
Fax: +856-21-263264
Contact position: Custodian
Ordering process: Visit <http://www.mrcmekong.org>
Instruction: Visit <http://www.mrcmekong.org>
Terms and fees: In accordance with the MRC Pricing Policy

Annex 4: Irrigation Water Use Database and Metadata

Input data and description

The following table lists the dataset and table which were used in the diversion water use analysis.

Table A5 – 1: List of datasets and tables used in the analysis

Table Name	Type	Contents
Irr04	Primary input dataset	Key information relating to each scheme
fschw	Primary input table	Wet season crop factors from irrigation schedules per scheme
fschd	Primary input table	Dry season crop factors from irrigation schedules per scheme
fsch3	Primary input table	3 rd season crop factors from irrigation schedules per scheme
et_ef	Primary input dataset	Evapotranspiration and effective rainfall for each scheme
b_soil_hp	Primary input dataset	Hydrologic soil groups
rice_evap	Calculated table	Calculated monthly evapotranspiration crop water requirements(m3/month) for each scheme
rice_pond	Calculated table	Calculated monthly requirements for land preparation and ponding (m3/month) for each scheme
rice_inf	Calculated table	Calculated monthly infiltration (m3/month) for each scheme
rice_ef	Calculated table	Monthly contribution to each scheme from effective rainfall (m3/month)
rice_field	Calculated table	Monthly field water requirements for each scheme(m3/month)
rice_dreq	Calculated table	Monthly diversion water requirements (m3/month) for each scheme.
rice_dreq_ret	Calculated table	Monthly estimated water used by each scheme(m3 month) based on water requirement multiplied by the water use factor.
fish_factors	Calculated table	Calculated factors for each scheme (m3/month) as input for water diversion requirement for fish pond
fish_fdreq	Calculated table	Calculated water diversion requirement for fish pond for each scheme
fish_dreq_ret	Calculated table	Calculated net water diversion requirement for fish pond for each scheme
nrice_fdreq	Calculated table	Calculated field water requirement (m3/month) for each scheme for non-rice crops
nrice_dreq	Calculated table	Calculated water diversion requirement (m3/month) for each scheme for non-rice crops
nrice_dreq_ret	Calculated table	Calculated net water diversion requirement (m3/month) for each scheme for non-rice crops

Final output is a table contains data of total diversion water use and net diversion water use (Div_WU_all).

Factors and definitions

The definitions are shown below. These either refer to the seasons as xxx (wet, dry or 3rd season) or for the months xx (where 01 = January, 02 = February etc).

Table A5 – 2: List of factors and definitions used in the analysis

Code	Units	Definition	Source of Data
ac_XXX	ha	Estimated maximum area of rice crop in xxx season (ha)	GIS rice area as described in 3.2 of the main report.
af_xx	-	Cropping factor to determine the area of rice in each month. Crop area in month xx =ac_XXX*af_XXX	Crop factors are shown in the cropping schedules
kc_xx	factor	Crop coefficients in month xx	From cropping schedules
inf	mm/ month	Scheme infiltration rate based on the hydrologic soil group-same value irrespective of the month.	Soil data
if_xx	-	Infiltration factor in month xx. There are only infiltration losses during land preparation and crop, there is no infiltration loss during the harvest period. Infiltration factor is the portion of the crop area subject to infiltration	Cropping schedules
pf_xx	-	Ponding factor in month xx. Ponding is only required during land preparation. The ponding factor is the portion of the crop area requiring water for ponding.	Cropping schedules
ef_XX..	mm/month	Effective rainfall in month xx	Effective rainfall data
et_XX	mm/month	Potential evapotranspiration in month xx	Evapotranspiration data
pd	m	Water application for land preparation and the initial ponding-one. Same value irrespective of the month.	From cropping schedules
c_eff	-	Conveyance efficiency	
ret	-	Water use return factors	
wuf		Water use factors for each scheme which relate actual water use to water requirement.	
Wuf_fp	-	Water use factor for each scheme which relates actual water use to water requirement (applied only to fish pond).	

Water use analysis and methodology

The diversion water use analysis was divided into 2 types based on crop type: (1) rice and (2) other crops, including fish ponds.

a. Rice

In order to calculate water use for rice cropping, there are certain input parameters needed, including:

1. Monthly Rice Area per scheme

$$[ac_wet*af_xx + ac_dry*af_xx + ac_3^{rd}*af_xx]$$

2. Evapotranspiration requirement ('000 m³/month) can be calculated by:

$$[crop\ area\ (ha) * evapotranspiration\ (mm/month) * crop\ factor * 10000 * 0.001/1000]$$

Or

$$[ac_xxx * af_xx * et_xx * Kc_xx * 10,000 * 0.001/1000]$$

3. Infiltration requirement ('000 m³/month) can be calculated by:

$$[crop\ area(ha) * portion\ of\ crop\ area\ subject\ to\ infiltration * infiltration\ rate(mm/month) * 10000 * 0.001/1000]$$

Or

$$[ac_xxx * af_xx * if_xx * inf * 10,000 * 0.001/1000]$$

4. Ponding Water Requirement ('000 m³/month) can be calculated by:

$$[crop\ area(ha) * portion\ of\ crop\ area\ requiring\ ponding * ponding\ depth(m)]$$

Or

$$[ac_xxx * af_xx * pf_xx * pd * 10,000/1000]$$

5. Effective Rainfall Contribution ('000 m³/month) can be calculated by:

$$[crop\ area(ha) * effective\ rainfall\ (mm/month) * 10000 * 0.001/1000]$$

Or

$$[ac_xxx * af_xx * ef_xx * 10,000 * 0.001/1000]$$

6. Field Water requirement ('000 m³/month) can be calculate by:

$$[evapotranspiration\ ('000\ m^3/month) + infiltration\ requirement\ ('000\ m^3/month) + ponding\ requirement\ ('000\ m^3/month) - Effective\ rainfall\ contribution\ ('000\ m^3/month)]$$

7. Diversion requirement ('000 m³/month) can be calculated by:

$$[field\ water\ requirement\ ('000\ m^3/month),\ derived\ from\ (6) / conveyance\ efficiency\ (c_eff)]$$

8. Net diversion requirement ('000 m³/month) can be calculated by:

$$[diversion\ requirement\ ('000m^3/month) * (1 - return\ factor)]$$

Or

$$[rice_dreq * (1 - Ret)]$$

Note conversion factors = 10000 to convert ha to m², 001 to convert mm to metres and 1/1000 to convert m³ to '000m³)

b. Other Irrigation Water Use

The data on irrigation water outside rice use is limited and only indicative estimates can be prepared. There are two main classes-1/ fish ponds and 2/non ponded irrigated crops such as maize, soyabeans etc.

1. Fish ponds

For Thailand and Laos where there is no spatial data on the fish ponds it has been assumed that all fish ponds would be located on class D and C soil groups. Fish pond areas for each of the irrigation schemes have been based on a estimated percentage of fish ponds.

The fish pond percentage = area of fish ponds/ total irrigation area in class C & D soils.

The area of fish ponds (Area_{fp}) in each scheme (class C&D soils only) = (irrigation area) x (the estimated fish pond percentage).

Water requirement for fish ponds ('000m³/month) can be calculated using the following parameters:

1. Water exchange can be calculated by:

[1% of pond volume per day]

Or

*[0.01 * 7000 m³ * 30/1000 * area pond (ha)]*

Or

*[2.1 * area pond (ha)]*

Assumes pond depth = 0.7m. In the brackish water area exchange of 1% fresh water would be supplemented by a portion of salt water depending on the salinity.

2. Evaporation ('000 m³/month) can be calculated by:

*[1.05 * evapotranspiration (mm/month) * 10000 * 0.001 / 1000 * area of fishing pond (ha)]*

Or

*[1.05 * et_{xx} (mm/month) * 10000 * 0.001 / 1000 * area pond (ha)]*

Kc open water =1.05

3. Infiltration requirement ('000 m³/month) can be calculated by:

*[scheme infiltration rate based on hydrologic soil group (mm/month) * area pond (ha) * 10000 * 0.001 / 1000]*

Or

*[inf * Area_{fp} * 10000 * 0.001 / 1000]*

4. Effective rainfall contribution ('000 m³/month) can be calculated by:

*[effective rainfall (mm/month) * 0.001 * 10000 / area of fishing pond (ha)]*

Or

$$[ef_{xx} * 0.001 * 10000 / 1000 * \text{area pond (ha)}]$$

5. The total requirement for fish ponds at the diversion structure can be calculated by:

$$[(\text{Water exchange} + \text{Evaporation ('000 m}^3\text{/month)} + \text{Infiltration requirement ('000 m}^3\text{/month)} - \text{Effective rainfall contribution ('000 m}^3\text{/month)}) / \text{conveyance efficiency}]$$

Return flows from fish ponds will vary depending on the zone-in the vietnam delta return factors of 0.1 have been estimated. Inland ponds the return factor has been estimated as 0.7.

2. Other Non Rice Crops

The main irrigation water use if for non ponded crops such as vegetables, groundnuts, Mungbean, Maize and Soya and fish ponds. The following approach has been used for the analysis:

1. The areas of non rice crops (except Kenef) have been taken from the WUP tables for the year 2000¹ [A_Nrice]
2. For Thailand the area of all the crops have been combined as a total non rice area (TNR). As there are not major differences in the crop coefficients between the different crops it has been assumed that Maize represents quite reasonably the water requirements for the different crops.
3. For Laos it is assumed that 50%of the vegetables are early vegetables and 50% are late vegetables.
4. The data of the area of 'non rice crops' is based on the province has been allocated to each scheme in proportion to the 'dry season available area'.

$$[\text{Dry season Available Area (Area}_{AV}) = \text{Scheme Area (Area}_{irr}) - \text{'Area of dry season rice in each scheme}']$$

5. Field application efficiencies (FAF) of 50% have been assumed.
6. The diversion requirement for non rice crops ('000m³/month) is calculated by:

$$[\text{Diversion Requirement (Dreq) ('000 m}^3\text{/month)} = (\text{field water use}) - (\text{contribution from effective rainfall}) / \text{conveyance efficiency}]$$

Or

$$[AC_{xx} * Af_{xx} * 10000 * 0.001 / 1000 * (et_{xx} * kc_{xx} / (0.5 - ef_{xx})) / c_{eff}]$$

Once all necessary parameters are ready, the total diversion water use and net diversion water use can be calculated. They are:

1. Total Diversion Water Use (D_TWU) is calculated by:

$$[\text{Total Diversion requirement (without irrigation return flow)} * \text{water use factors}]$$

¹ Water Utilisation Project Component A: Final Report, Vol. 11 – Technical Reference Report, DSF 620 SWAT and IQQM Models, March 2004, p.B.1-13, 17, 19, 20, and 21.

$[(\text{Rice_dreq} + \text{Nrice_dreq}) * \text{WUF} + \text{Fish_fdreq} * \text{WUF_FP (factor for fish pond)}]$

2. Net Diversion Water Use(D_NWU) is calculated by:

$[\text{Total Diversion Water Use minus the portion of water returned to the river (water return factors)}]$

$[(\text{Rice_dreq_ret} + \text{Nrice_dreq_ret}) * \text{WUF} + \text{Fish_dreq_ret} * \text{WUF_FP (factor for fish pond)}]$

Methodology

Data analysis was mostly done in MS Access since it seems to be easier for people who are non-gis user to understand how the calculation works while gis user can also access the tables stored in MS Access directly using ArcGIS.

Equations were run using Update Query function. All queries were saved, so that the calculation can be run again as required.

The following demonstrates the process of analysis in detail:

1. Before any calculation could be performed, the primary input data (see Table A5 – 1) need to be prepared.
 - a. Basin-wide irrigation scheme (IRR04) – country datasets of irrigation scheme were combined into basin layer using UNION function in ArcMap². This basin-wide layer contains around 12,700 irrigation schemes with basic attributes (Referenced ID (REF), MRC ID (MRC_ID), Project ID (PROJ_ID), Project Name (PROJ_NAME), Country Code (CCODE), AC_XXX, etc.). Referenced IDs are primary keys which link to all other factor tables.
 - b. SPATIALJOIN function in Arcview was used to join other factors, e.g. hydrologic soil groups (HYDGRP), infiltration rate (INF), conveyance efficiency (C_EFF), water use factors (WUF), etc, to the irrigation attribute table (see Figure A5-1).

² ArcMap is a GIS software developed by ESRI.

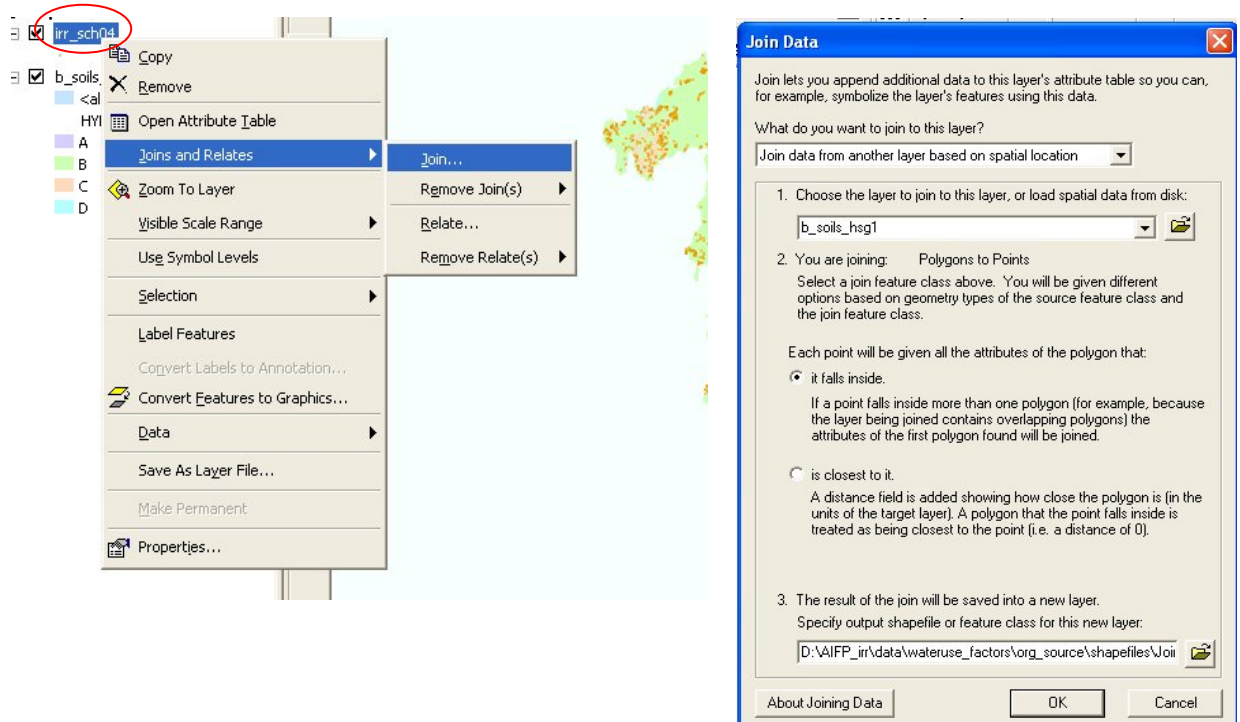


Figure A5-1: SPATIALJOIN in ArcMap

- c. Tables contained monthly crop factor information for all 3 seasons: wet (FSCHW), dry (FSCHD), and 3rd (FSCH3), were prepared based on information from crop statistics by district and cropping schedule provided by WUP-A. These tables contains monthly cropping factors by scheme (AF_XX), crop coefficients (KC_XX), ponding (PF_XX), infiltration factors (IF_XX), irrigation return factors (RET) and water application for land preparation (PD).
 - d. Also using SPATIALJOIN, Evapotranspiration (ETXX) and effective rainfall (EFG) for each scheme were taken from monthly evapotraspiration and effective rainfall polygons (converted from GRID format) which were interpolated from point data in GIS format.
2. After all primary data had been prepared, they will then imported into MS Access (WU_rice.mdx) as tables (see Figure A5-2).

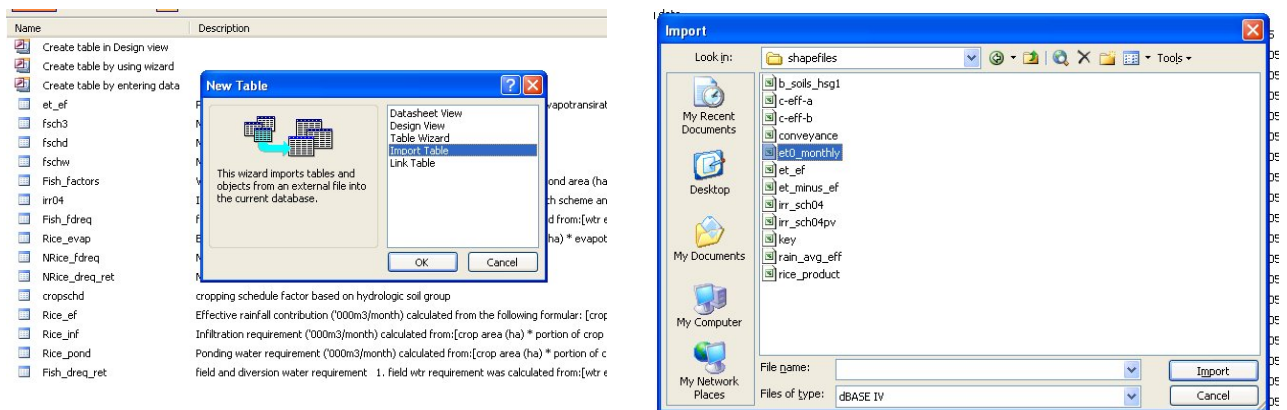
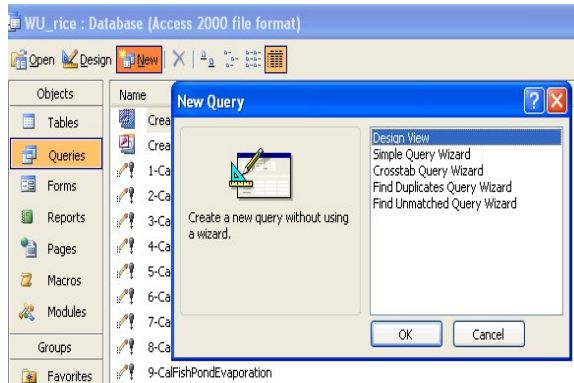
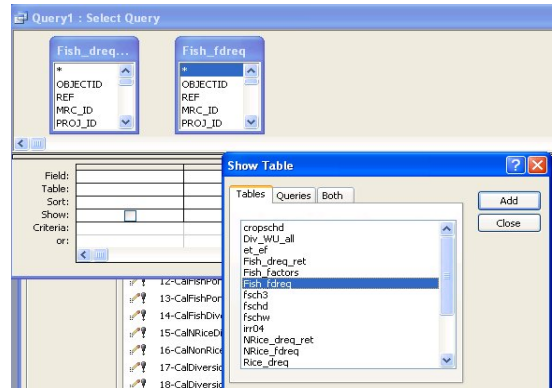


Figure –A5-2: Import table into MS Access

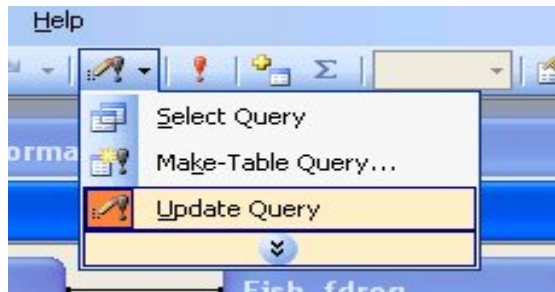
3. In MS Access, calculations were done using Query Update function. Figure A5-3 shows how to build the Update Query in MS Access.



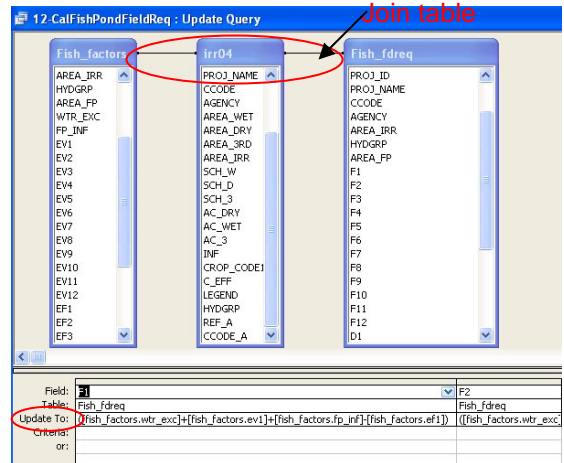
(1) create new query



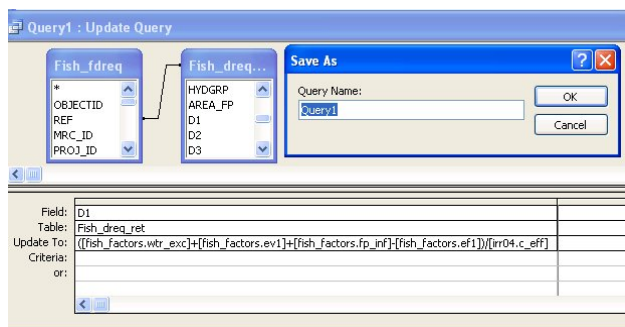
(2) add table to query



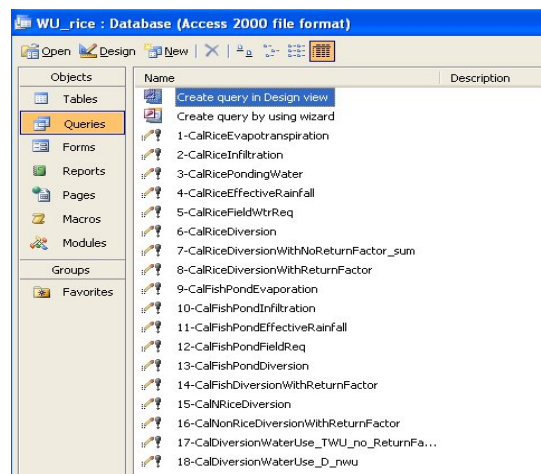
(3) select type of query (Update Query)



(4) link tables (using REF) and add equation in the query (Update To:)



(5) save query



(6) list of Update Queries

Figure A5-3: Query Building in Ms Access

However, please note that all queries in the query tab were numbered. Those number (1, 2, 318) indicate the order of calculation starting from the least number (1).

All equations used in this analysis were based on the above given formulas. The following figure shows an example of putting equation into Update Query.

Field: (field name/item name that calculated value will be stored), e.g ev1_wet (=evapotranspiration in January of the wet season)
Table: (name of table where 'Field' is created).
Update to: (equation for calculation, e.g. evapotranspiration requirement for rice cropping) – e.g.
 $[irr04.ac_wet] * [fschw.af_01] * [et_ef.et_jan] * [fschw.kc_01] * 10000 * 0.001 / 1000$
*[where: irr04.ac_wet = cropping area in wet season,
 fschw.af_01 = cropping factor in Jan of wet cropping season
 fschw.kc_01 = crop coefficients in Jan of wet cropping season]*
Criteria: (put some limitation or criteria for calculation, e.g. irrigation area in dry season (AC_DRY) < 700 ha)

Figure A5-4: sample of equation in query update

MS Access can update values of more than one whole field/item at a time. Therefore, in order to do more than one field at a time, user needs to identify field names and put equation/formula or value wished to update in the "Update To:" for all columns as show in 'orange box' in Figure A5-4.

- Once all queries were built, user can now run those queries in sequence. Please be noted that, after running Query-5 and 12, negative value may occur. This negative value means no requirement/under requirement and the user must recalculate the negative numbers to zero (0).



To do this, create new Update Query for the table that contains negative numbers.

In "Update To:", type zero (0).

Add criteria as for update any value that is less than zero (0), see Figure A5-5.

Figure A5-5: Update negative value to Zero (0)

- The last two queries (17 & 18) will calculate the total diversion water use and net diversion water use which are the end result of the analysis (see Figure A5-6).

Total diversion water use				Net diversion water use			
Div_WU_all : Table							
D_TWU9	D_TWU10	D_TWU11	D_TWU12	D_NWU1	D_NWU2	D_NWU3	D_NWU4
1.77106285714	1.71216	3.57545142857	2.29972114286	0.264	0	0	0
3.50744485714	3.36717042857	7.27287614286	5.88189921429	1.85671612143	1.54102807143	1.5603223	0.8211799
2.73299892857	2.92791207143	6.01726957143	3.85899621429	0.44770417143	0.00564441429	0.00588175714	0.00503980714
5.58332964286	5.7299835	12.2623071429	16.5316545	10.1516628214	10.6776831643	10.8739036	5.6970529
2.83501614286	2.92791207143	6.01726957143	3.85405007143	0.44674012143	0.00564846429	0.00588310714	0.00504250714
11.1410502857	11.459967	24.0574052857	15.3886577143	1.77668294286	0.01129692857	0.01176621429	0.0100647
34.7237382857	34.3119882857	72.7367498571	63.8238291429	23.8311767286	21.5160483286	21.7975178	11.4352232
119.437526887	113.294300943	238.766034906	390.397131509	267.614394906	289.892531038	294.864572972	155.540954123
142.640435660	128.787954906	274.239106698	176.133126226	20.3088706698	0.12723393396	0.13183403774	0.11308143396
3.87570021429	4.09447207143	8.418001	5.39510592857	0.62402282143	0.00564711429	0.00588310714	0.00504385714
53.7149021429	57.2765607143	118.695376429	167.774711429	103.986468214	109.491836143	112.218100071	58.8420403714
2.73940342857	2.92791207143	6.01726957143	3.86146928571	0.44770417143	0.00564576429	0.00588175714	0.00504115714
2.86108892857	2.807879	6.09367328571	3.86146928571	0.44770417143	0.00566942143	0.005877	0.0050418
11.2453101429	11.2086722857	24.5915555714	15.4183075714	1.81127405714	0.01134154286	0.01172828571	0.0100863
22.1320942857	22.4173445714	48.6489608571	30.8366151429	3.56106208571	0.02266688571	0.0235026	0.0201564
179.390340566	182.094087736	403.531675472	250.805784057	29.4485608019	0.18728702830	0.19371650943	0.16618372642
1.59908571429	1.81841142857	3.52100571429	2.31678171429	0.263424	0	0	0

Figure A5-6: Final table showing total diversion water use and net diversion water use

Out put of this analysis consists of a series of table stored value calculated by those 18 queries (see Figure A5-7).

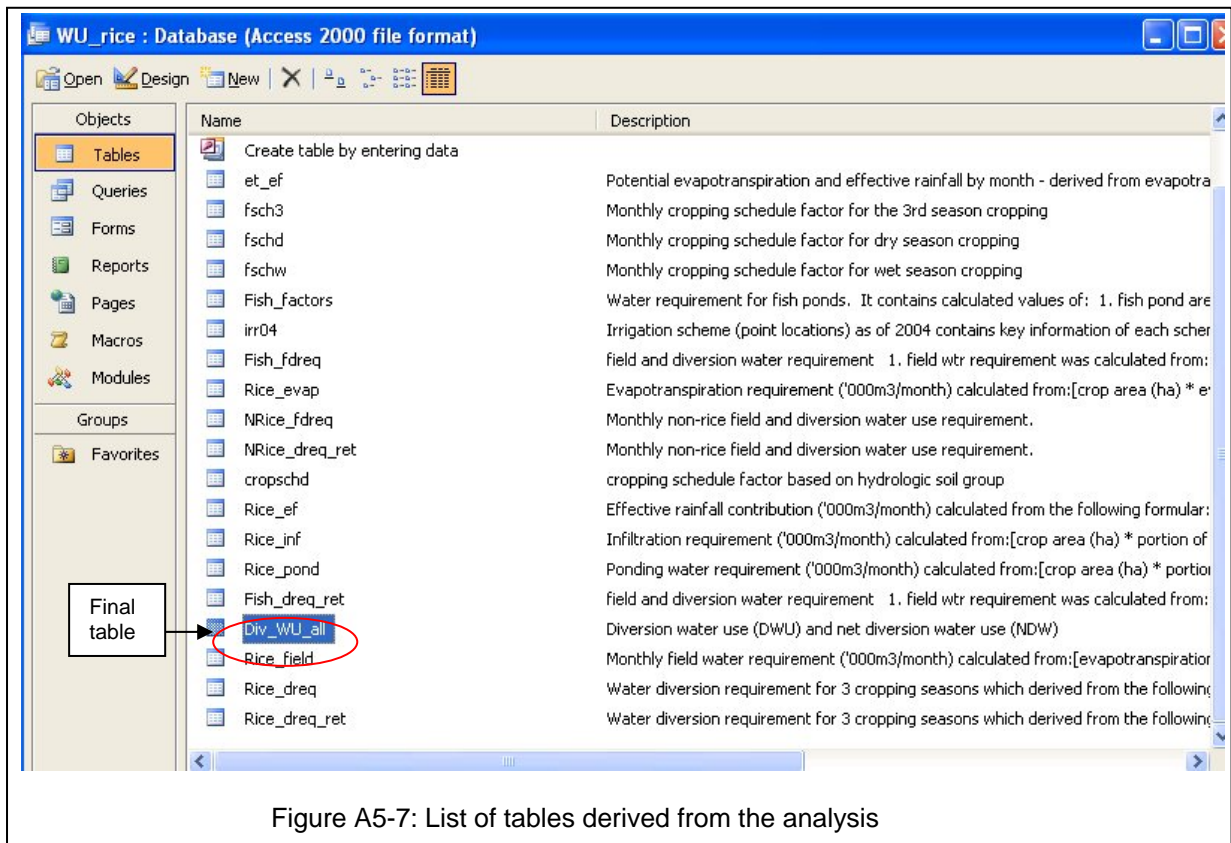


Figure A5-7: List of tables derived from the analysis

In this MS Access database, each table is accommodated with table description and field description. All tables existed in Access database are imported into the Personal geodatabase which would later be incorporated into the MRC geodatabase.

Metadata for each table will be included with the data in the Personal geodatabase which could be read using ArcCatalog.

Annex 5: List of Selected Maps

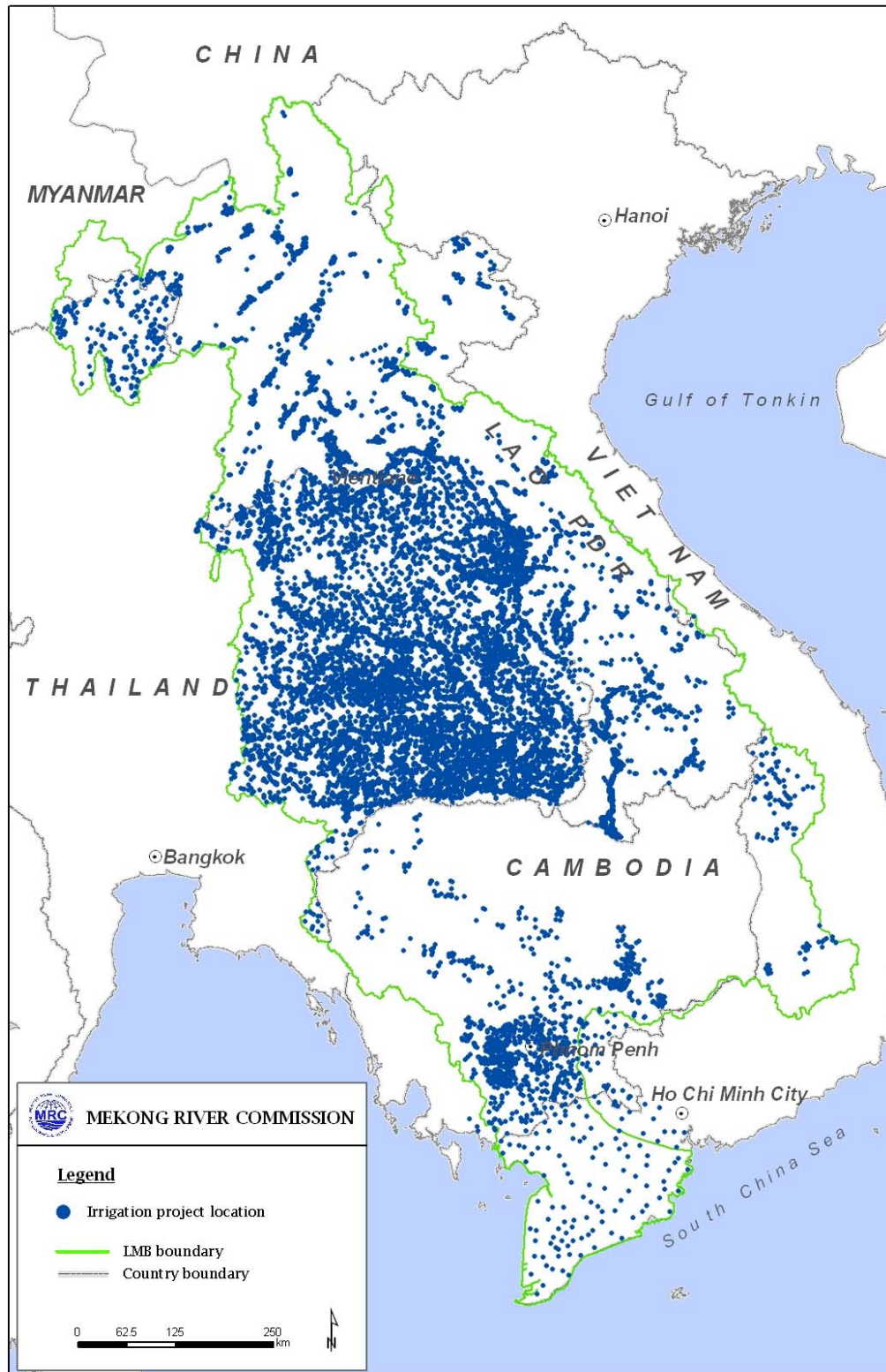
Irrigation schemes 2004

- 1.1 Irrigation projects
- 1.2 Irrigation areas (Actual irrigable area in hectare)
- 1.3 Irrigation headworks
- 1.4 Irrigation areas (Gross area of project in hectare)
- 1.5 Irrigation reservoirs

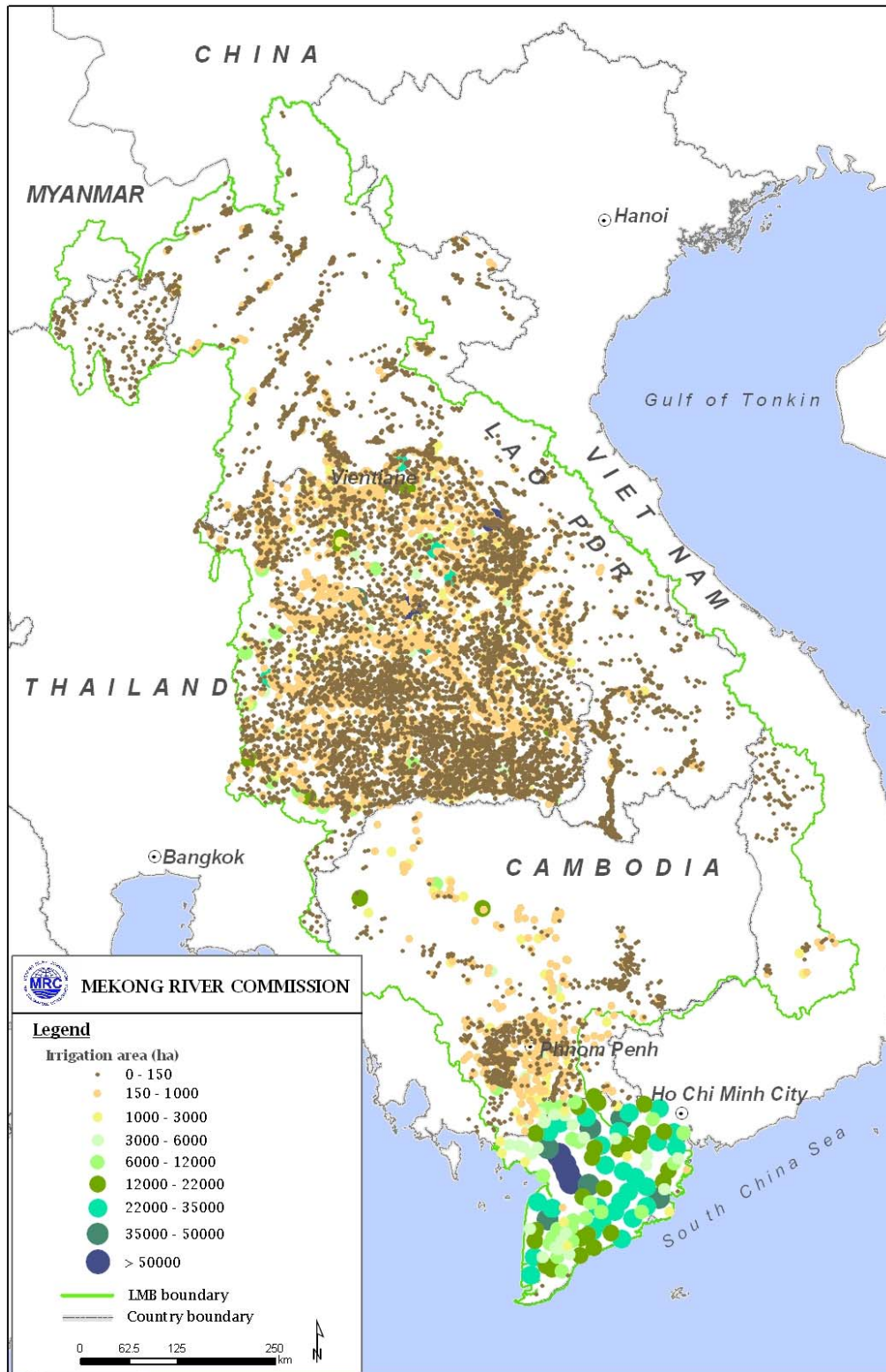
Water use assessment

2. Total diversion water use requirement of each irrigation scheme in monthly basis (January, February, March, April, May, June, July, August, September, October, November, and December)
3. Net diversion water use requirement of each irrigation scheme in monthly basis (January, February, March, April, May, June, July, August, September, October, November, and December)
4. Rice water use factors = (estimated water use / estimated water requirement)
5. Trend of irrigation requirement in monthly basis (January, February, March, April, May, June, July, August, September, October, November, and December). This is based on the 'evapotranspiration' minus the 'effective rainfall' Eto-Ef rainfall

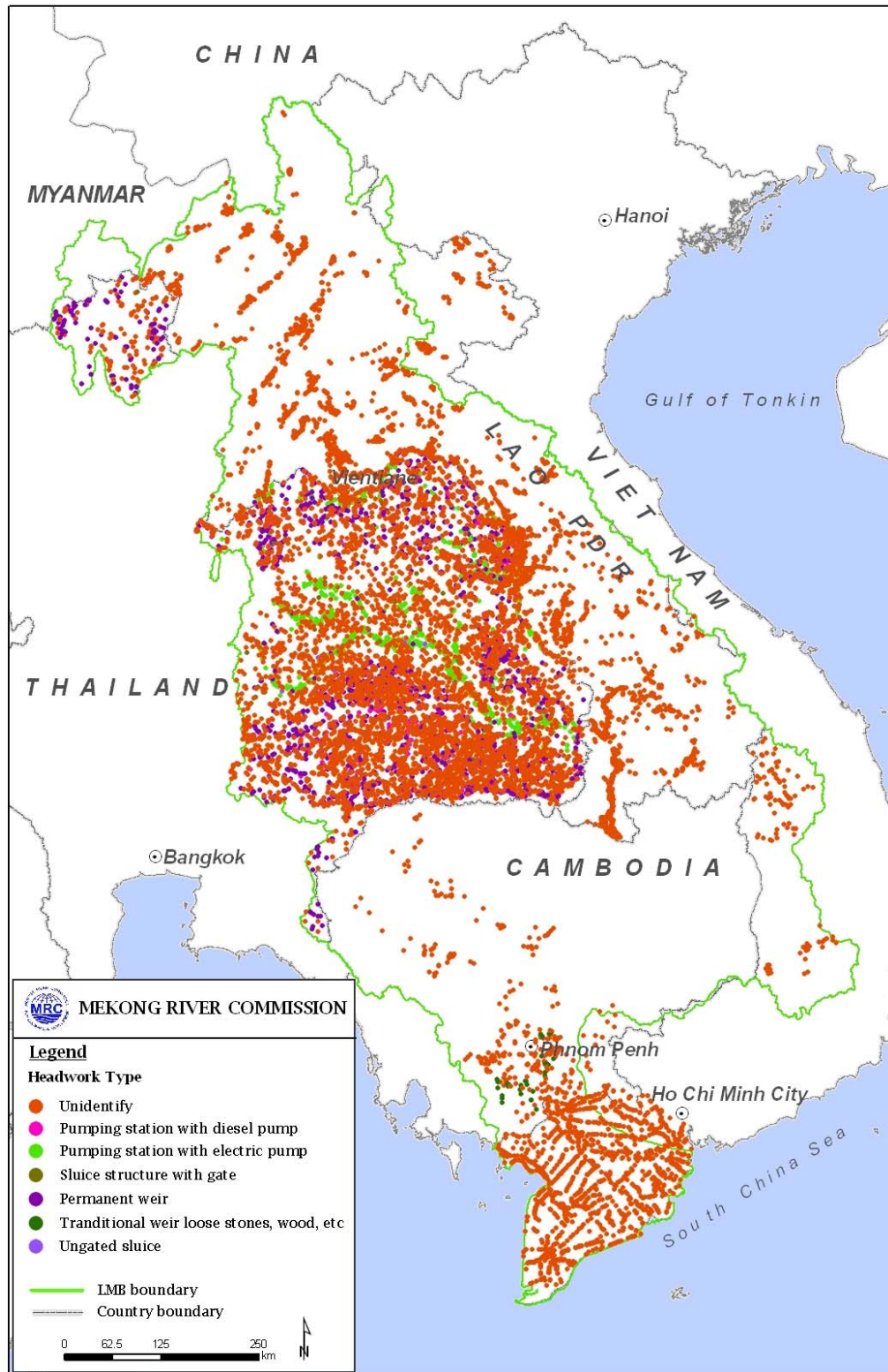
1.1 Irrigation Project



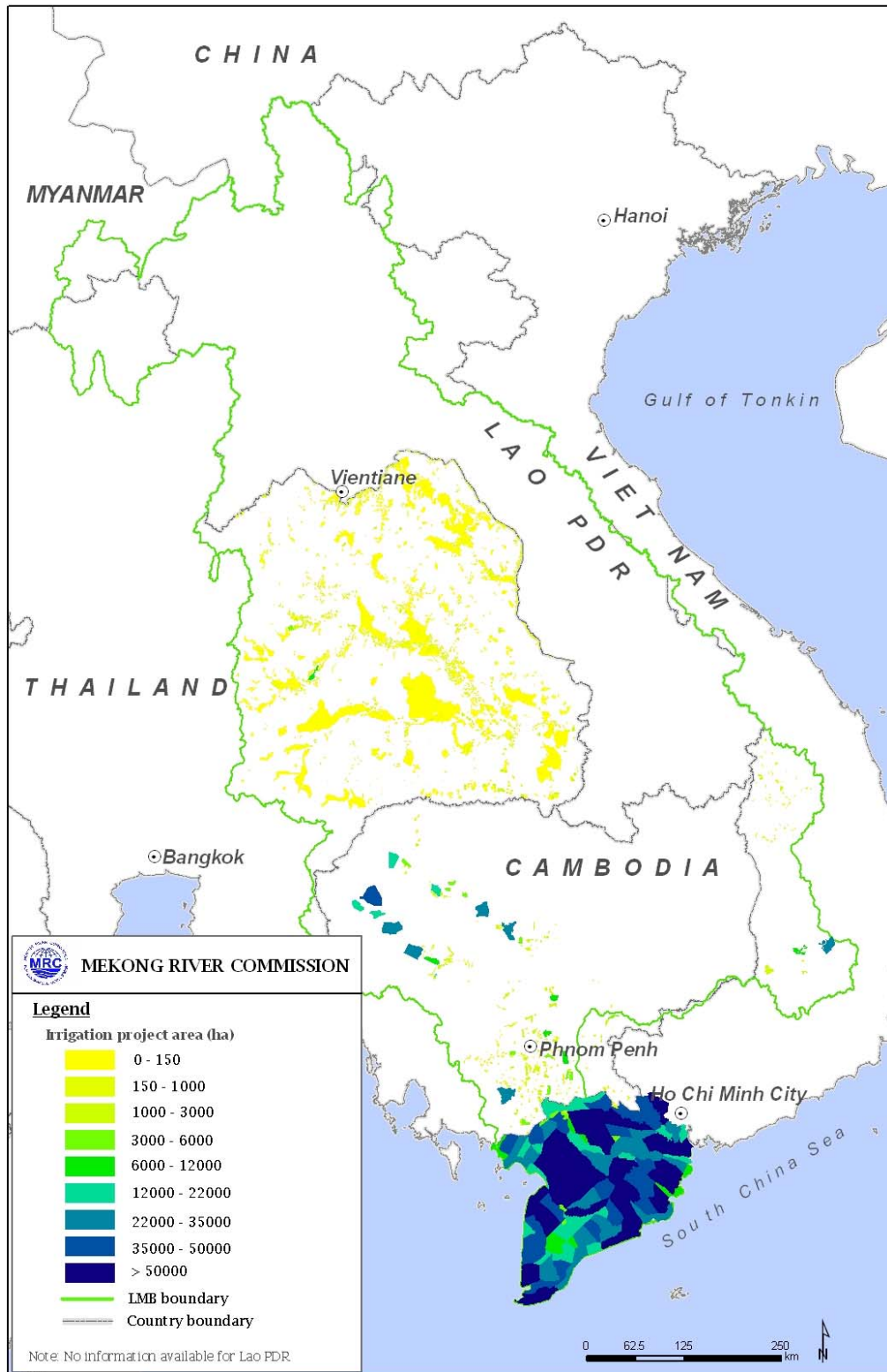
1.2 Irrigation project by area



1.3 Irrigation Headworks



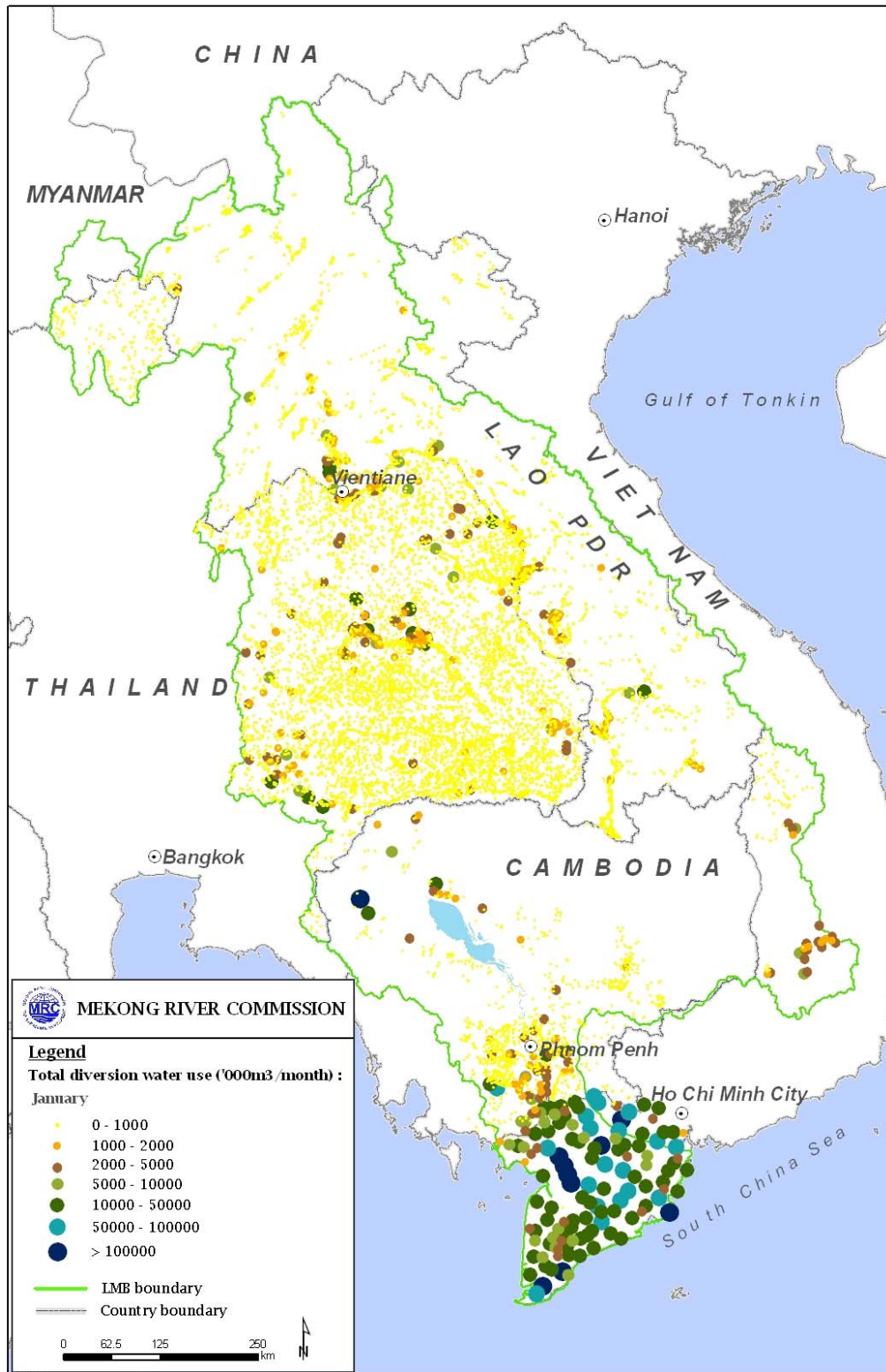
1.4 Irrigation area



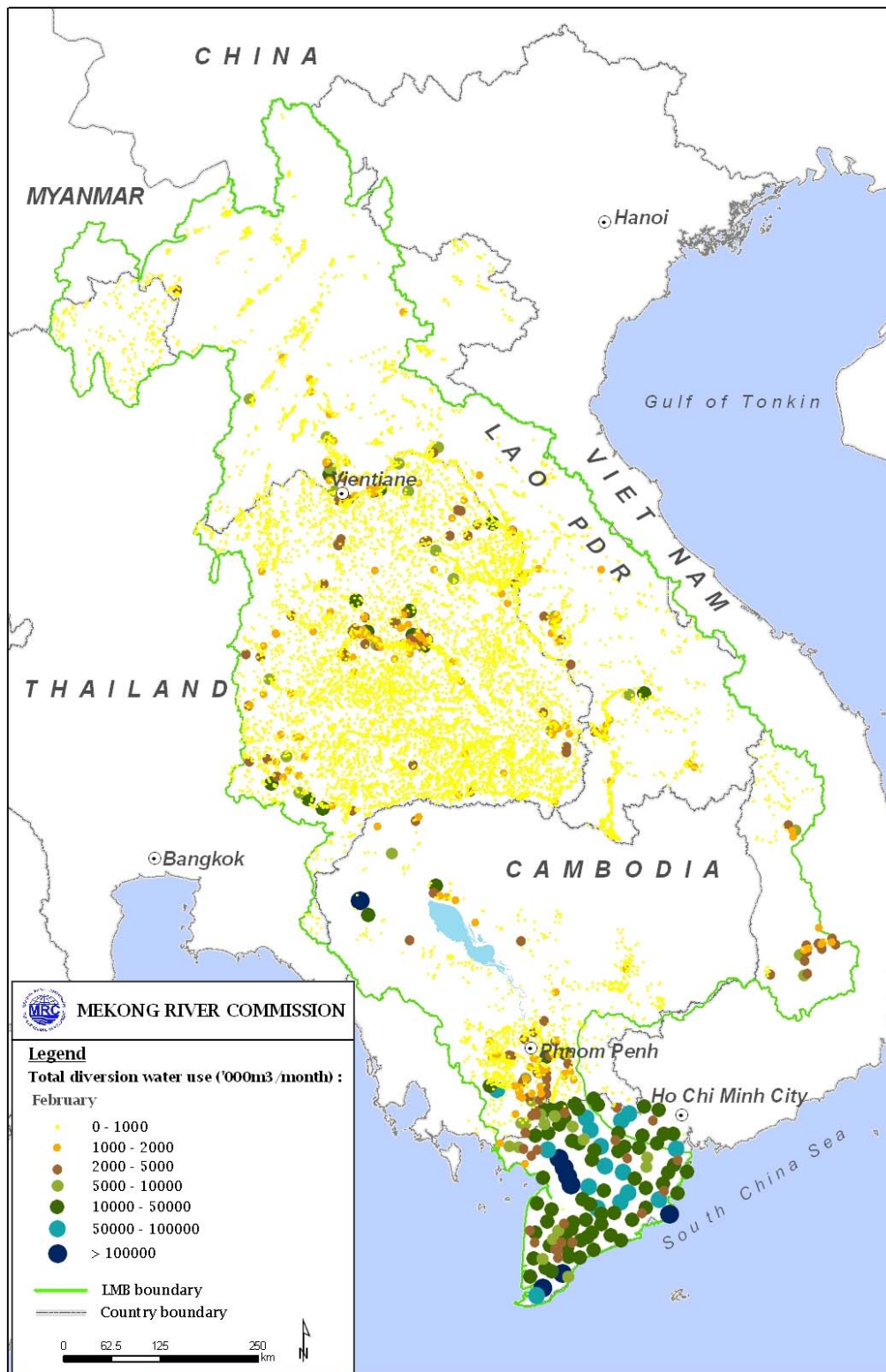
1.5 Irrigation reservoir



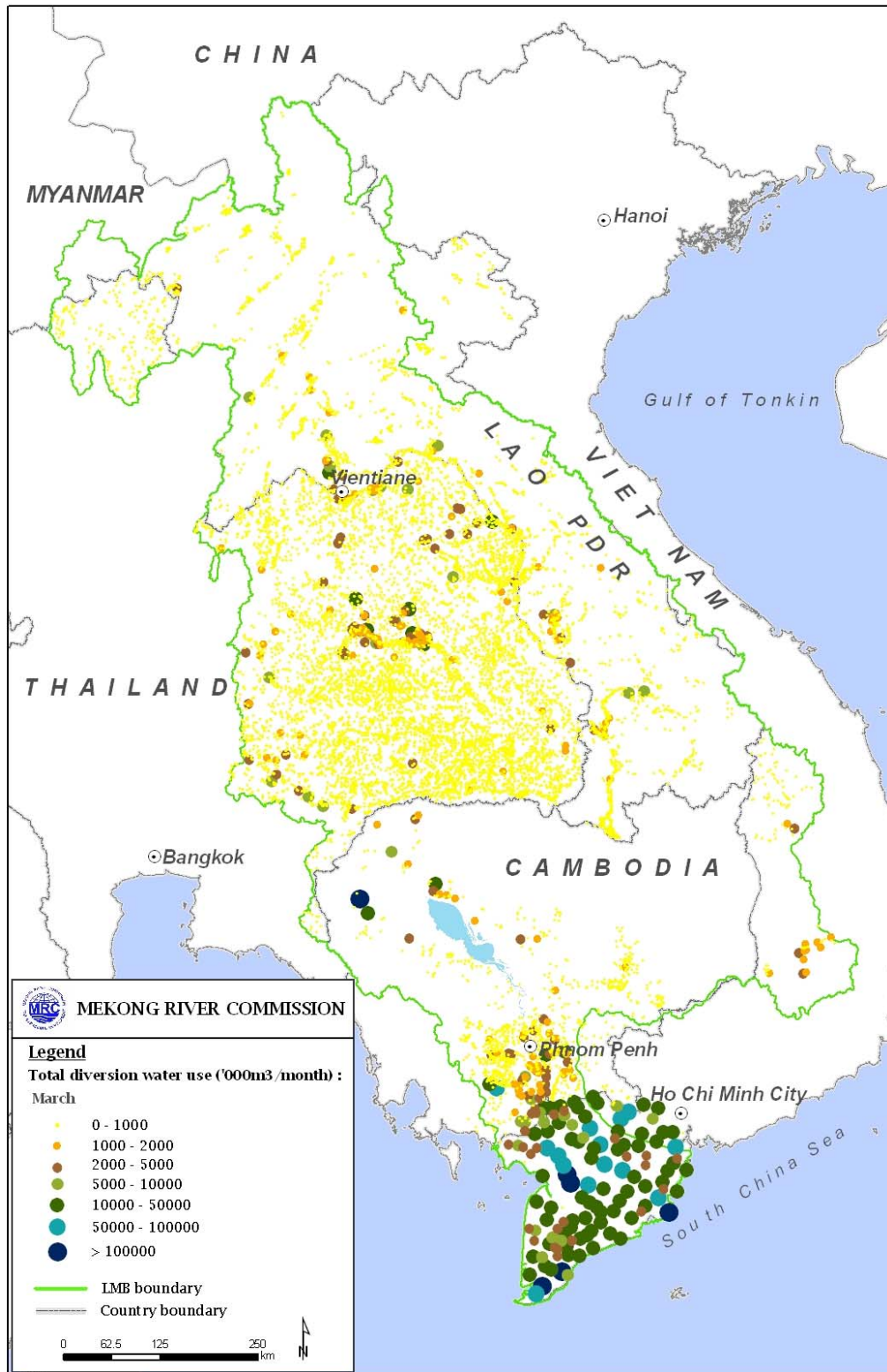
2.1 Total diversion water use – January



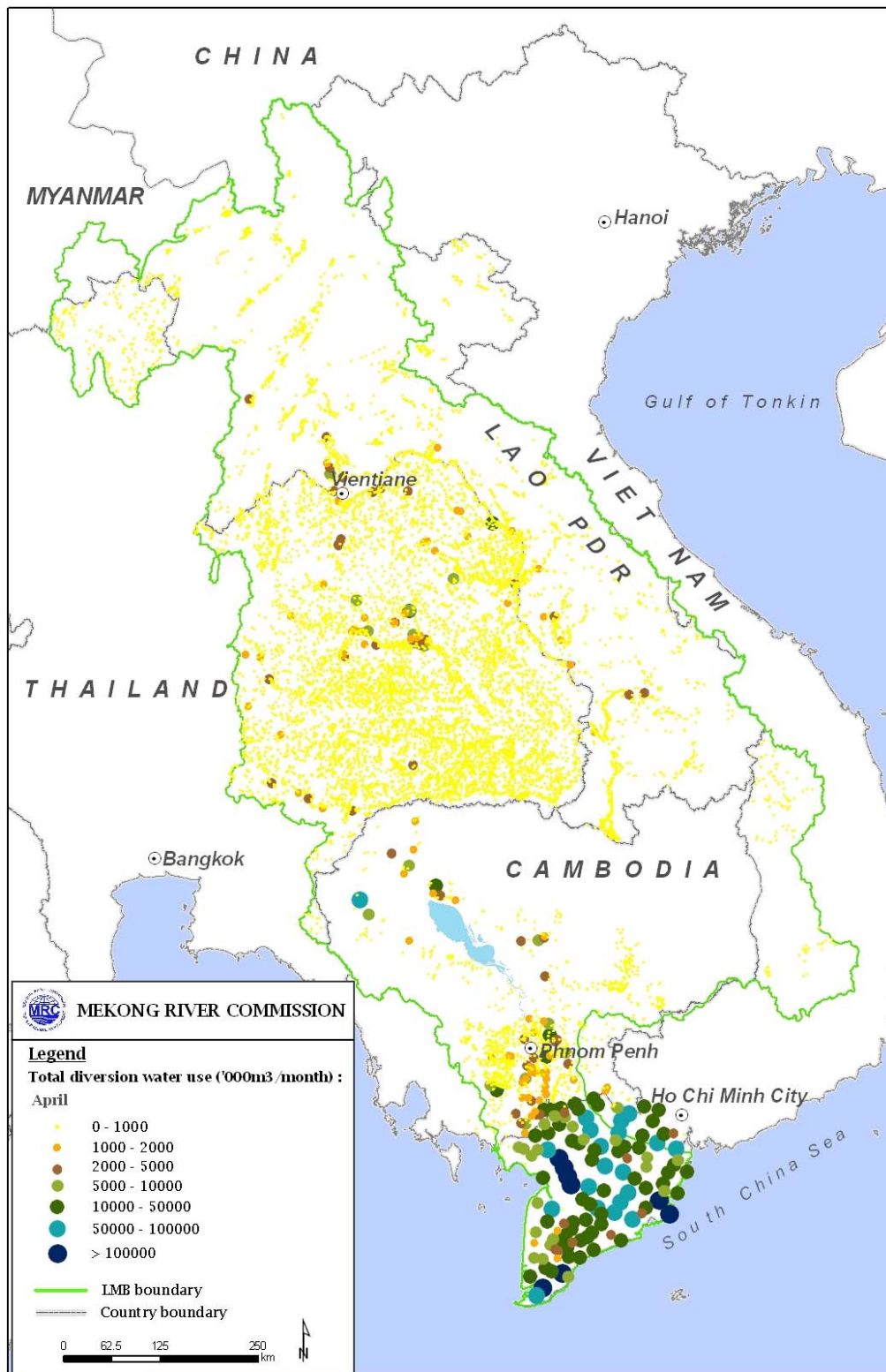
2.2 Total diversion water use – February



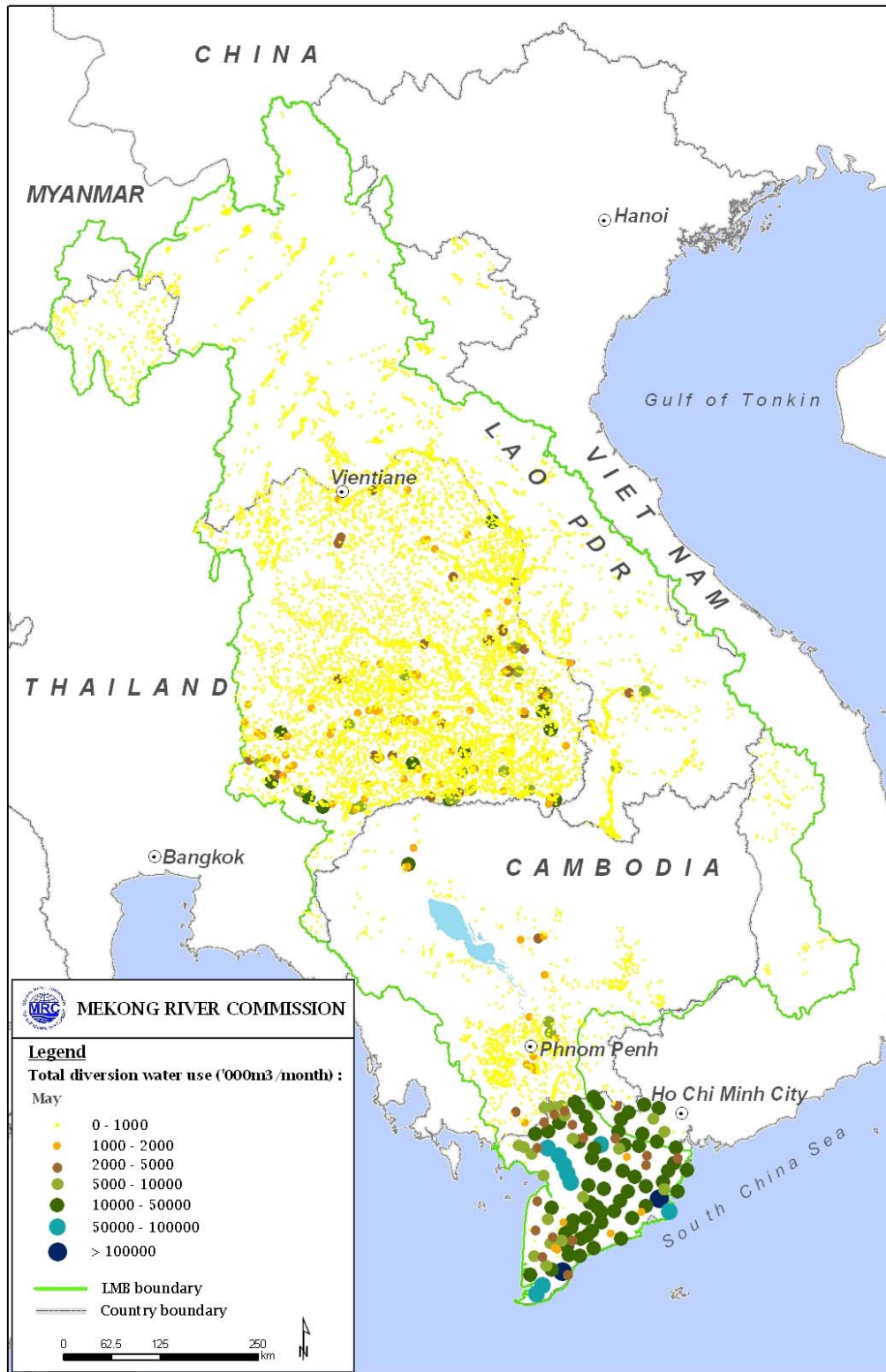
2.3 Total diversion water use – March



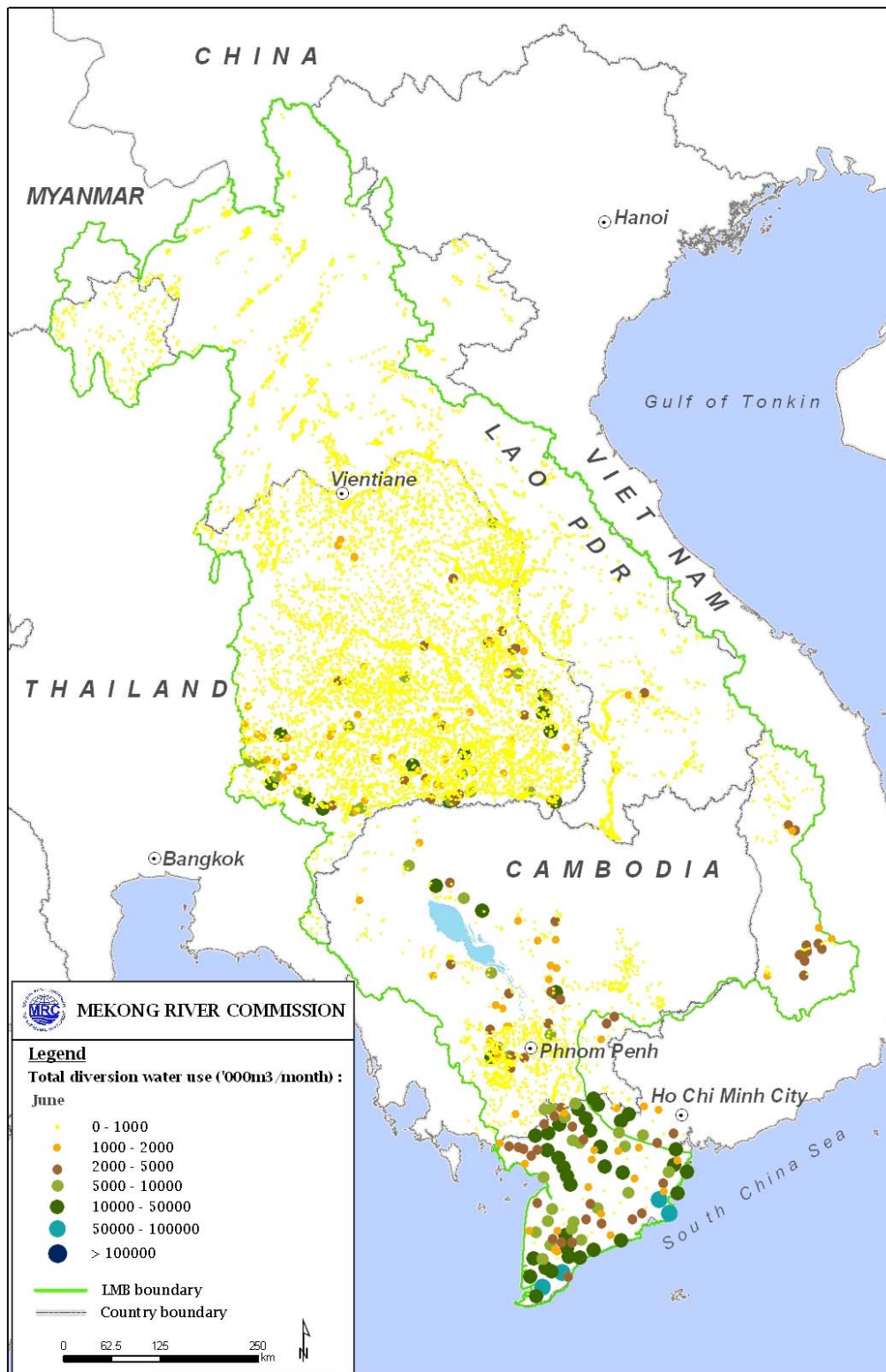
2.4 Total diversion water use – April



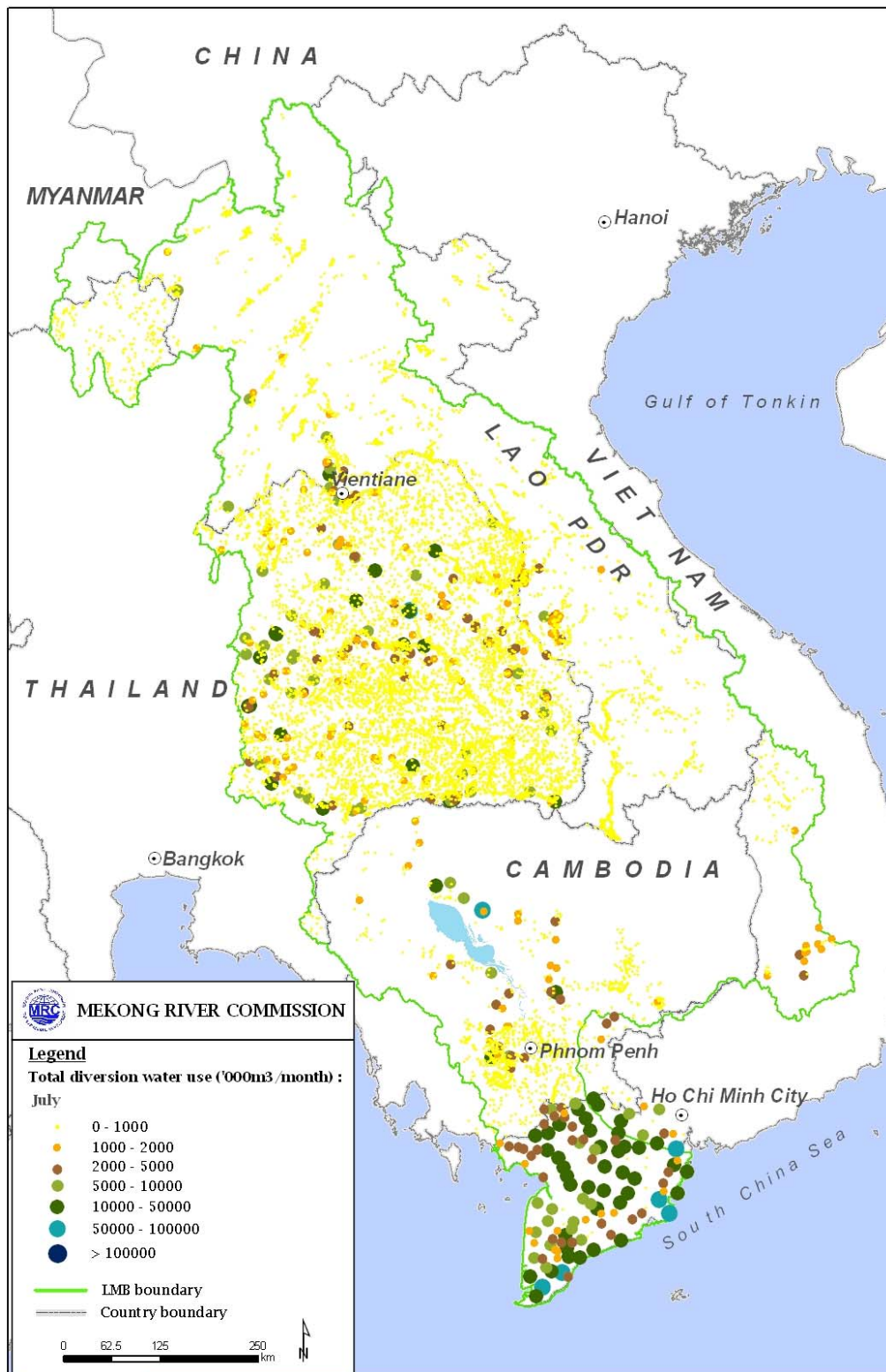
2.5 Total diversion water use – May



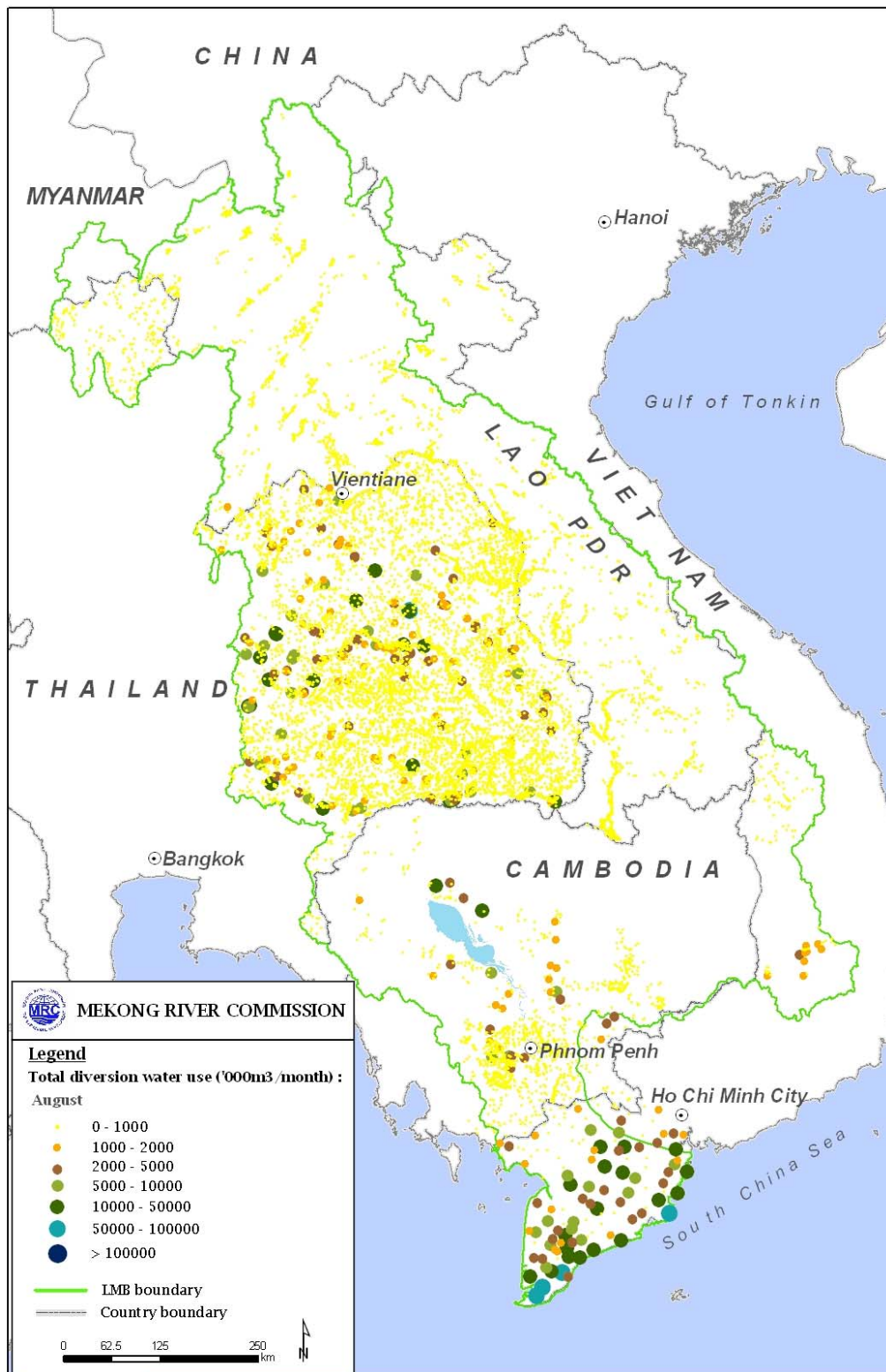
2.6 Total diversion water use – June



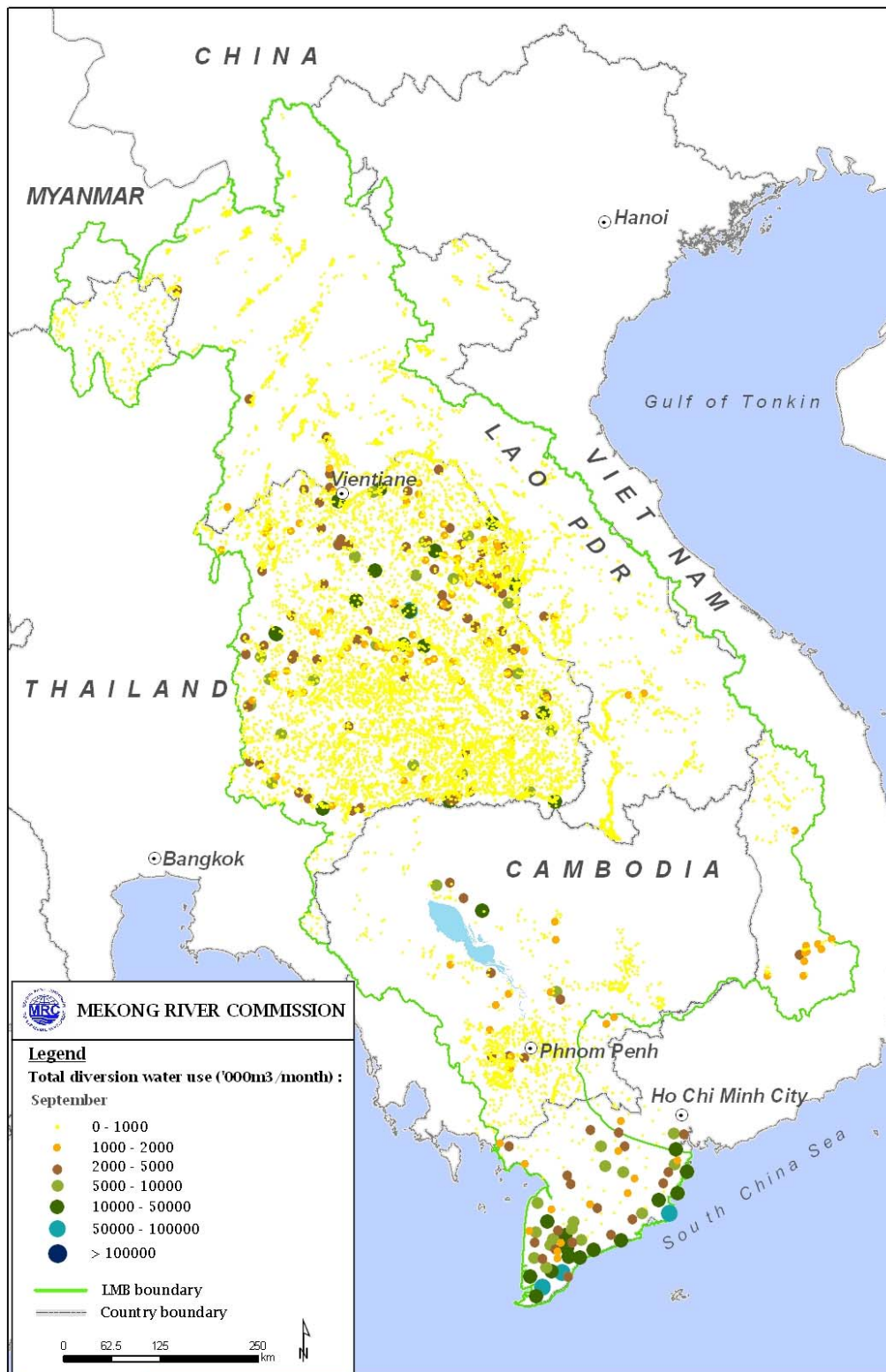
2.7 Total diversion water use – July



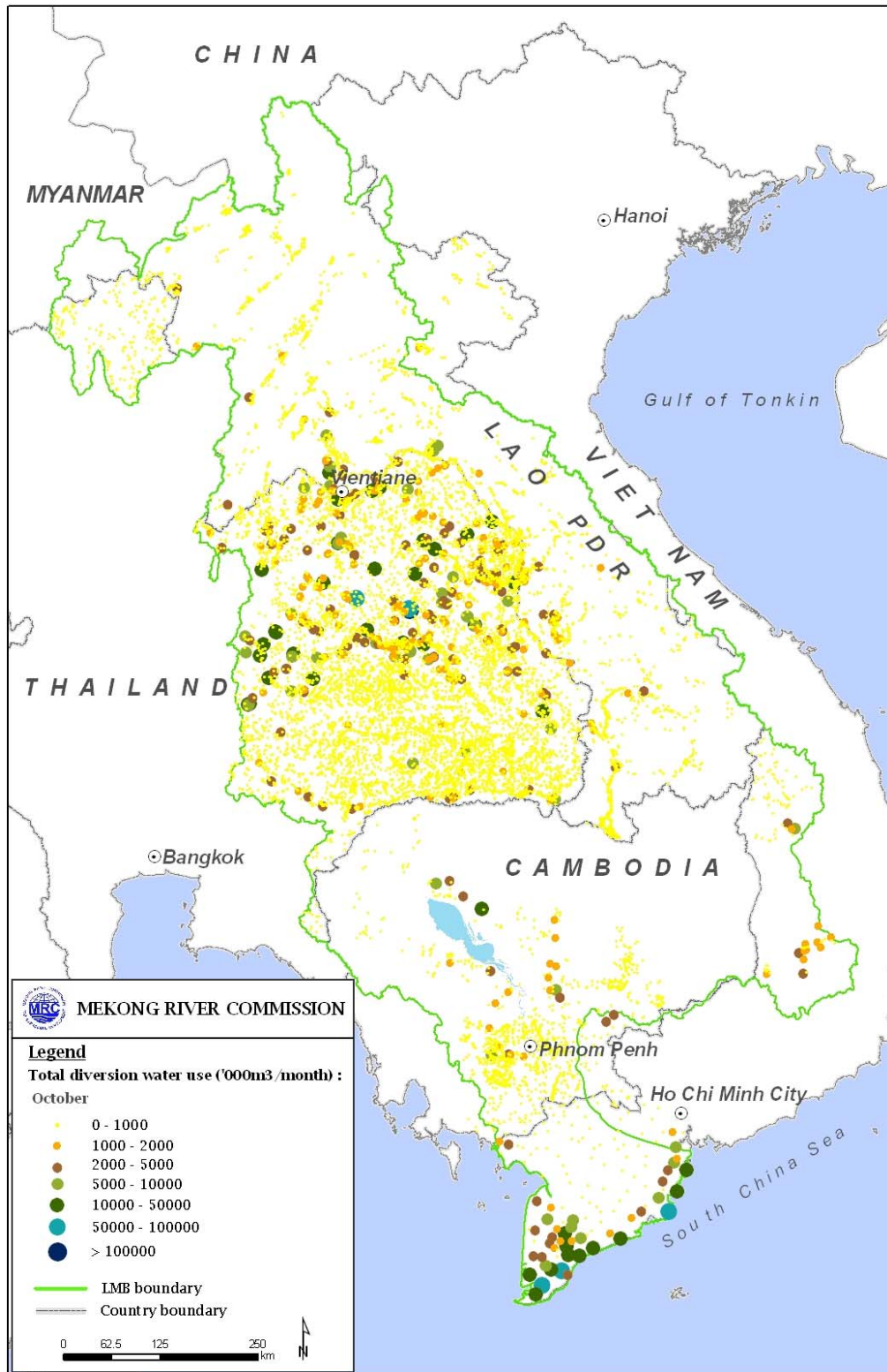
2.8 Total diversion water use – August



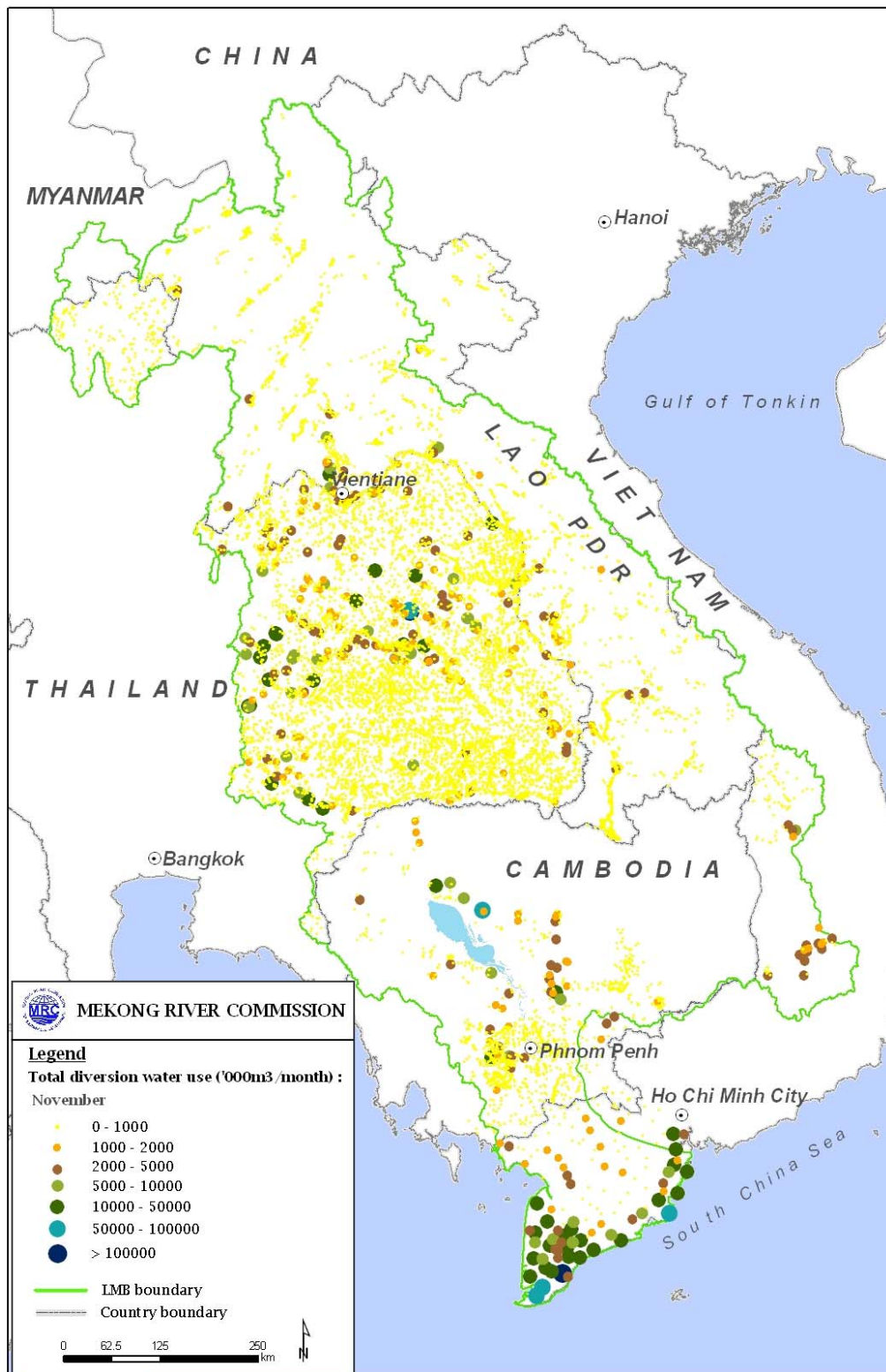
2.9 Total diversion water use – September



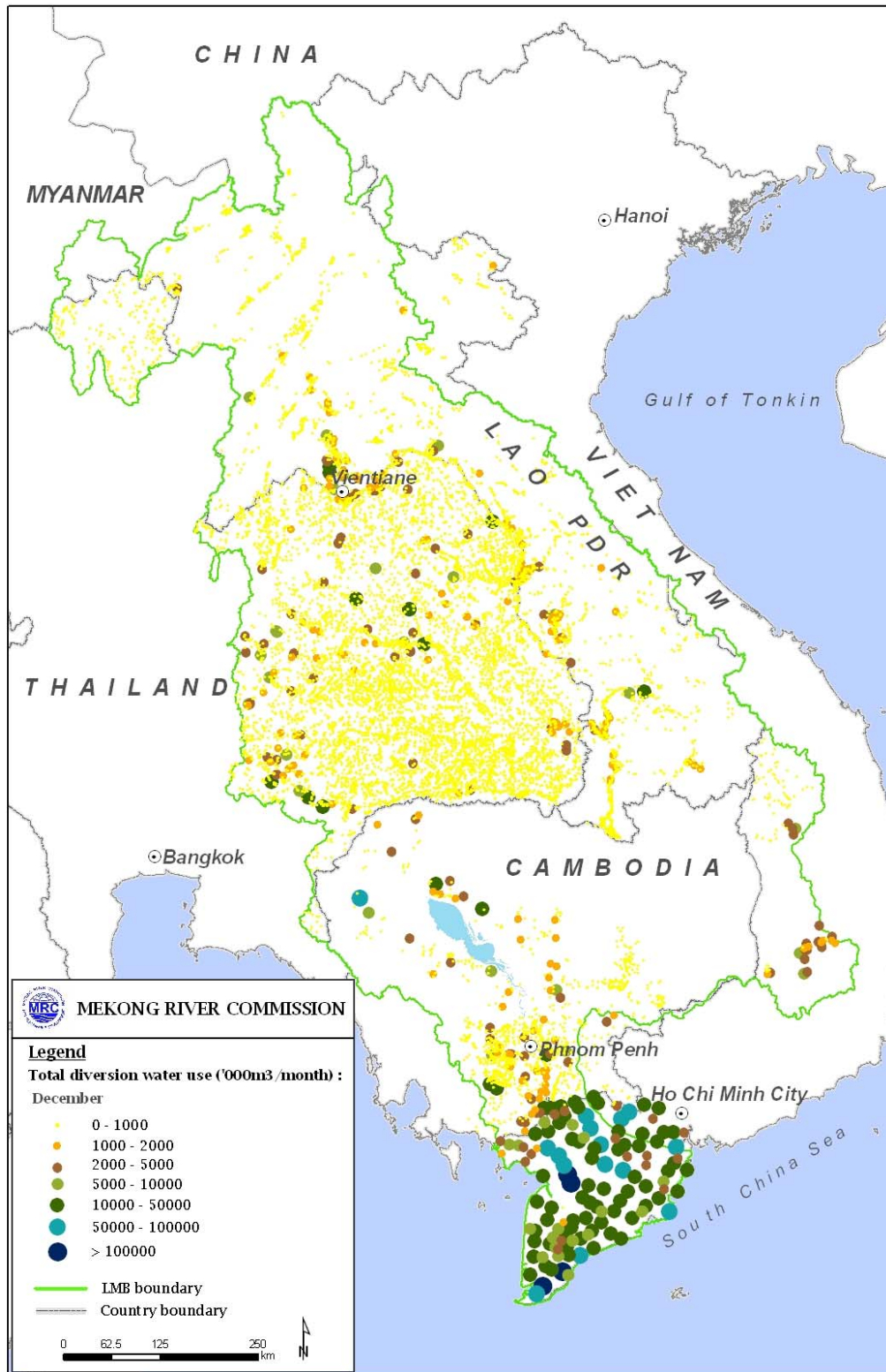
2.10 Total diversion water use – October



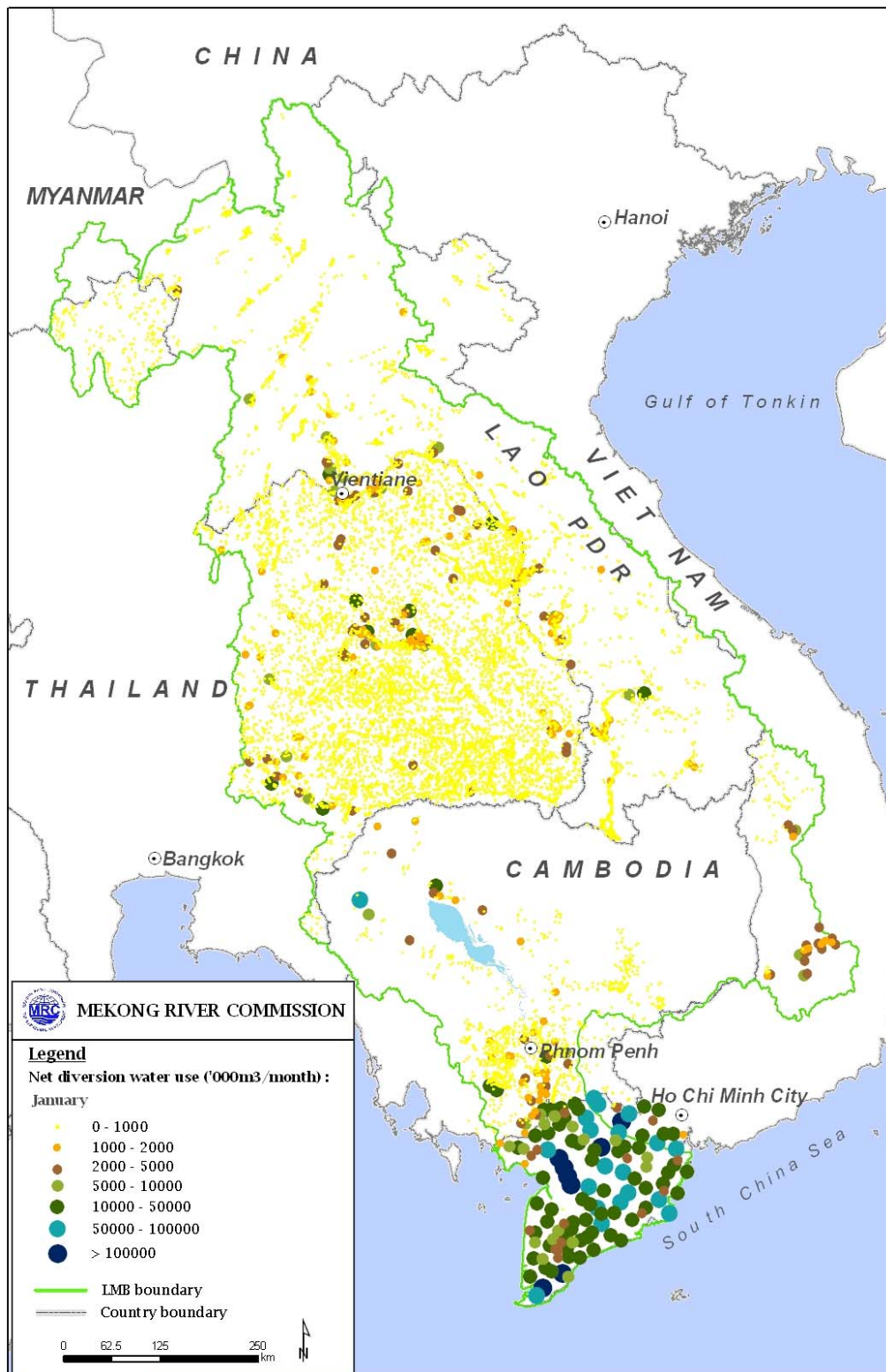
2.11 Total diversion water use – November



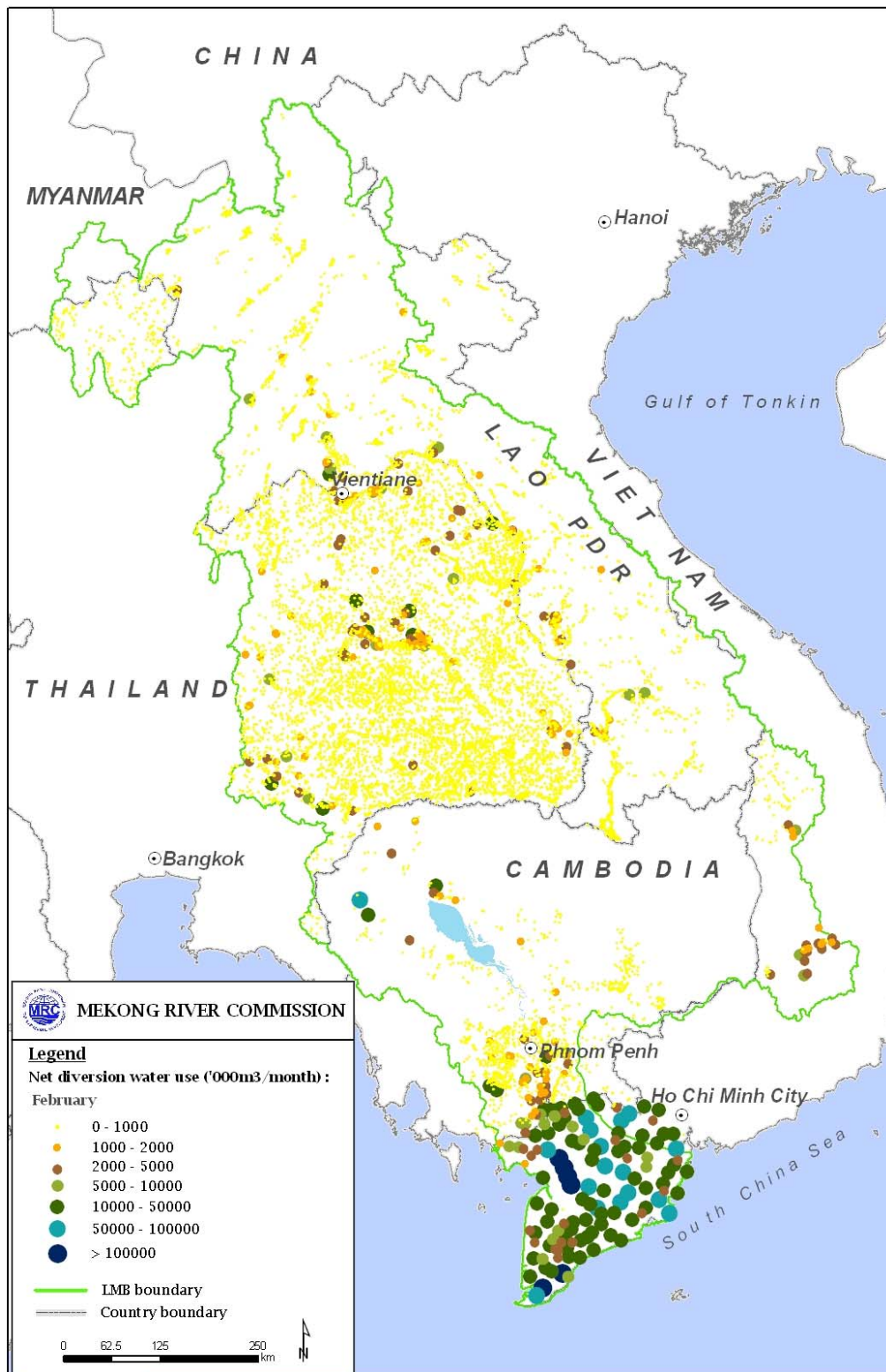
2.12 Total diversion water use – December



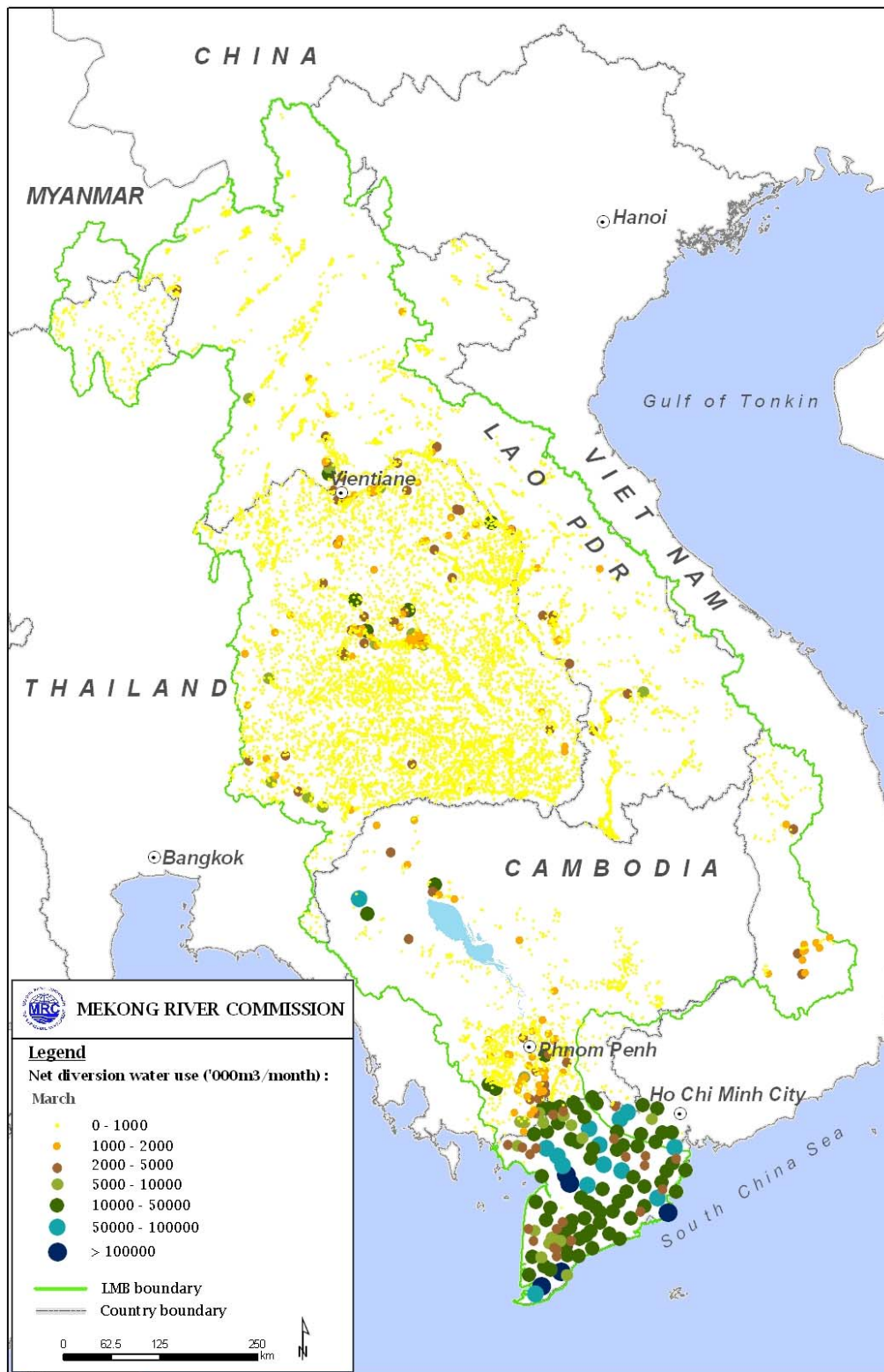
3.1 Net diversion water use – January



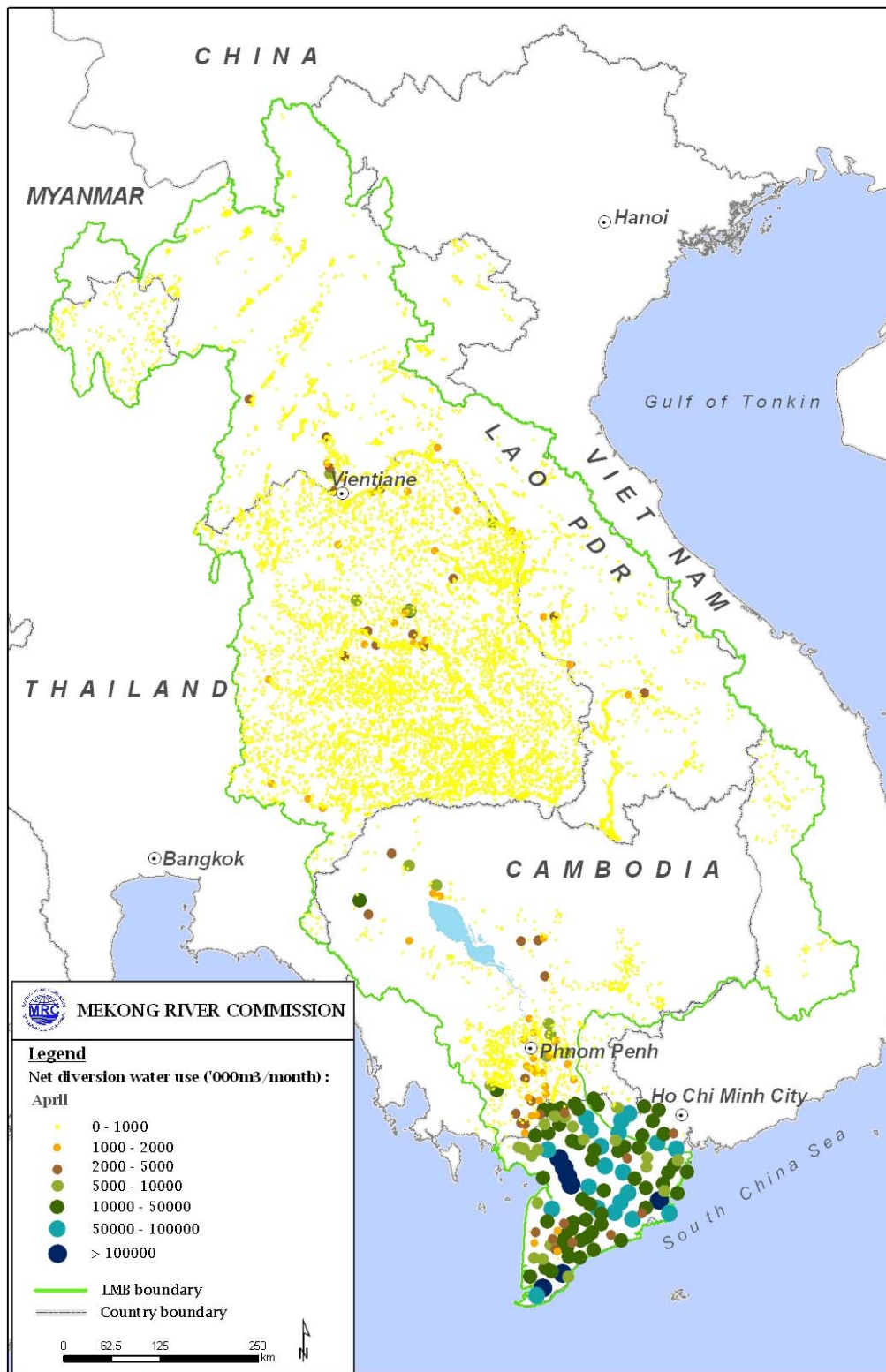
3.2 Net diversion water use – February



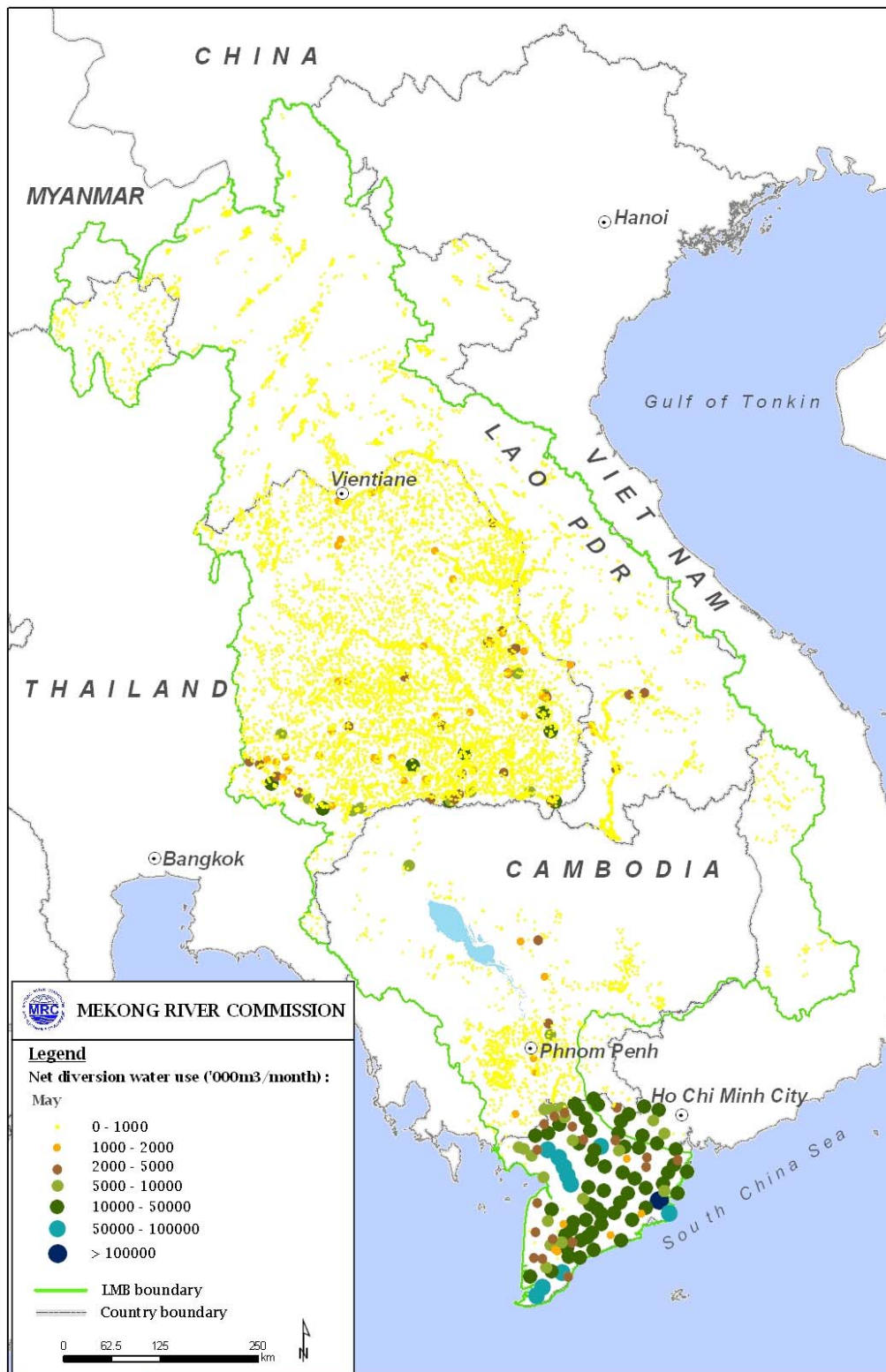
3.3 Net diversion water use – March



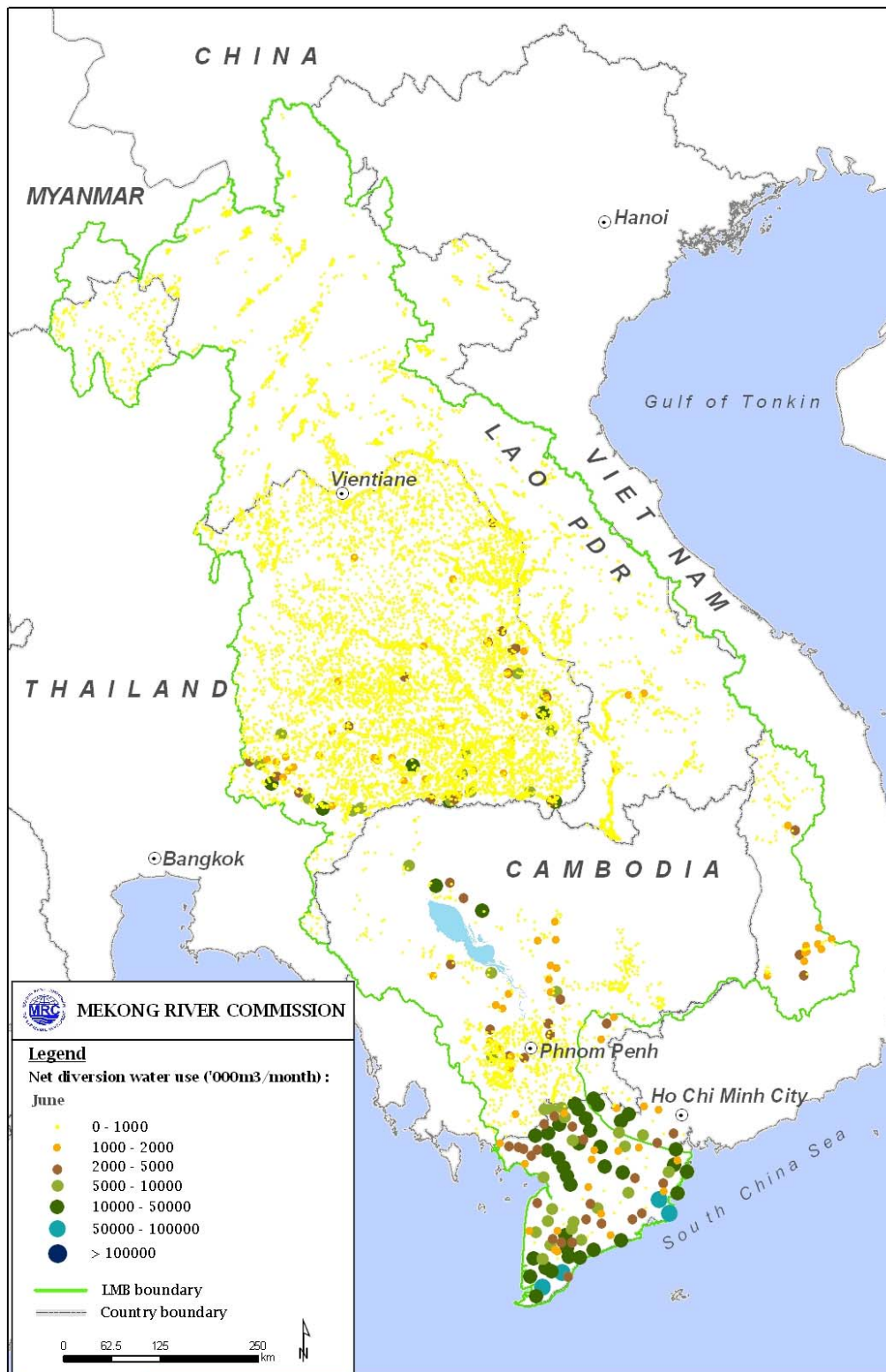
3.4 Net diversion water use – April



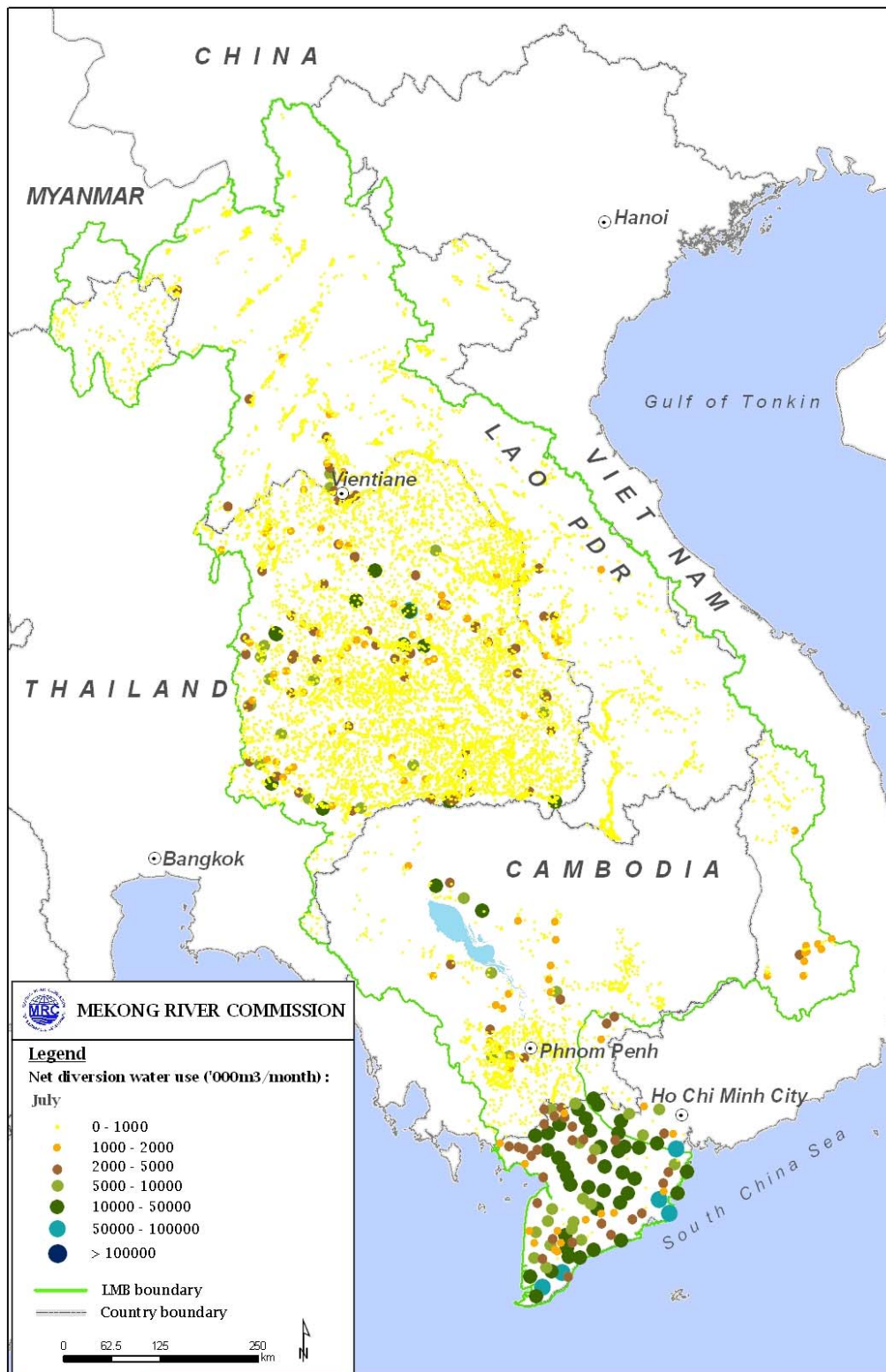
3.5 Net diversion water use – May



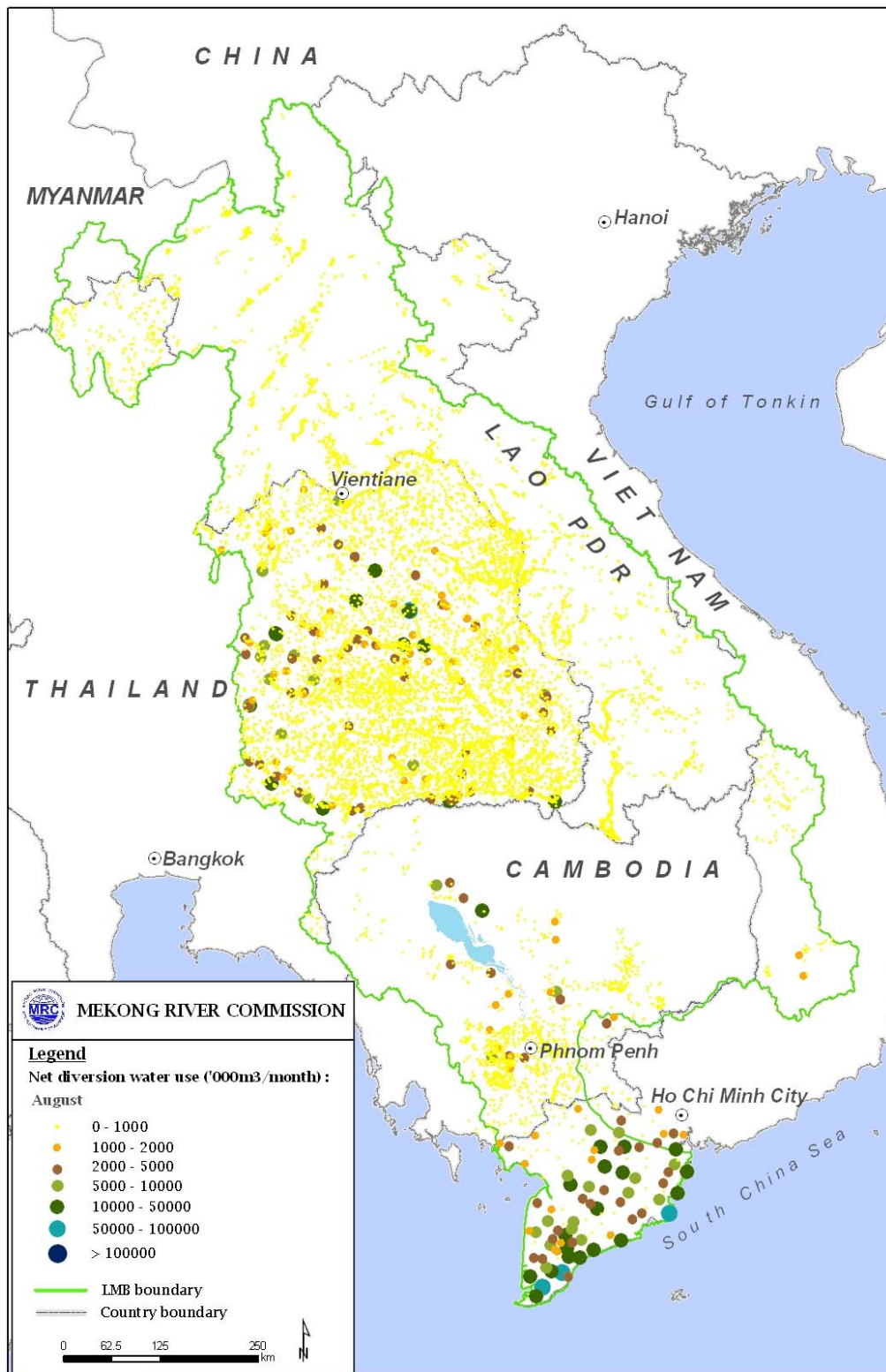
3.6 Net diversion water use – June



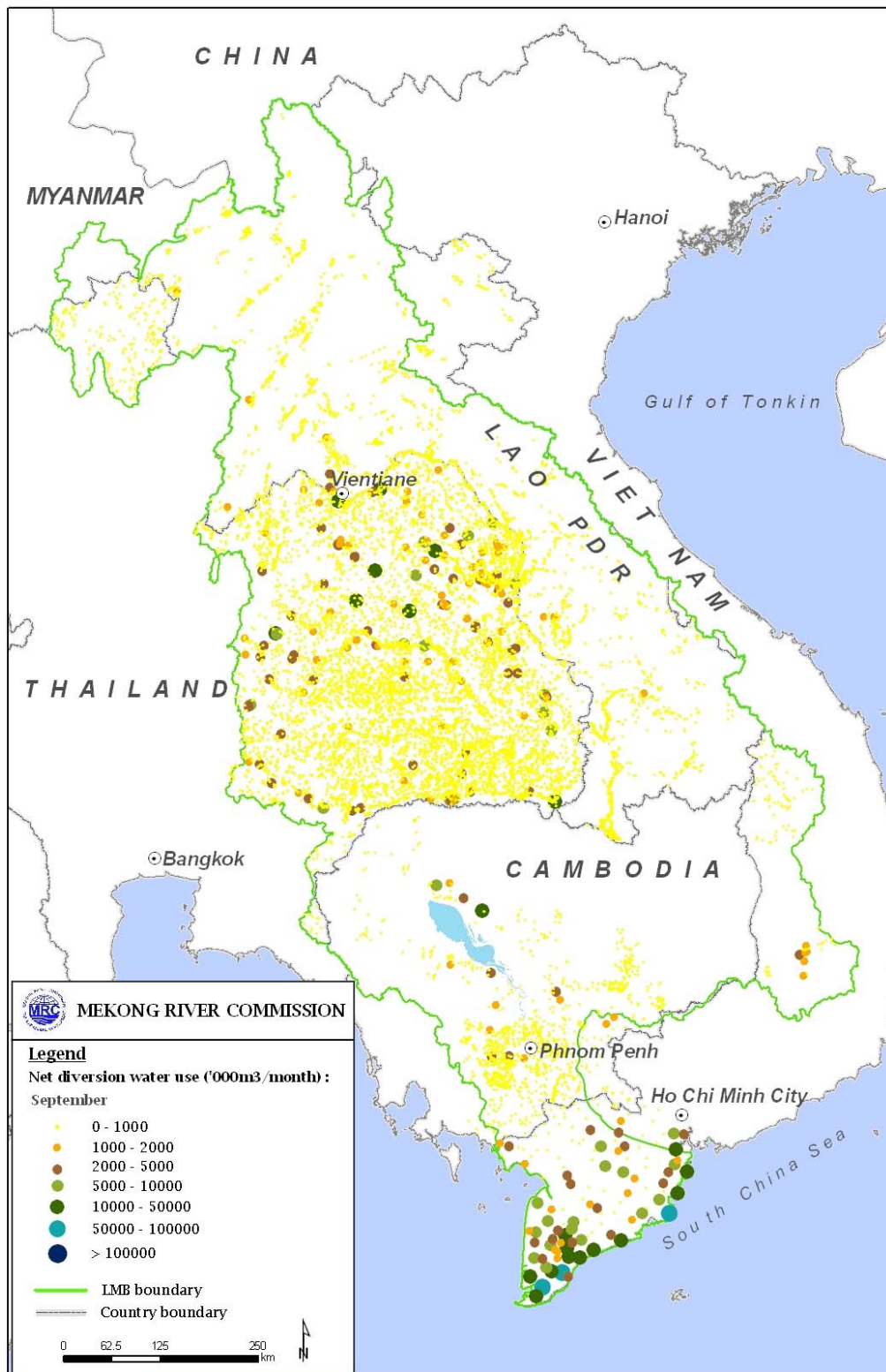
3.7 Net diversion water use – July



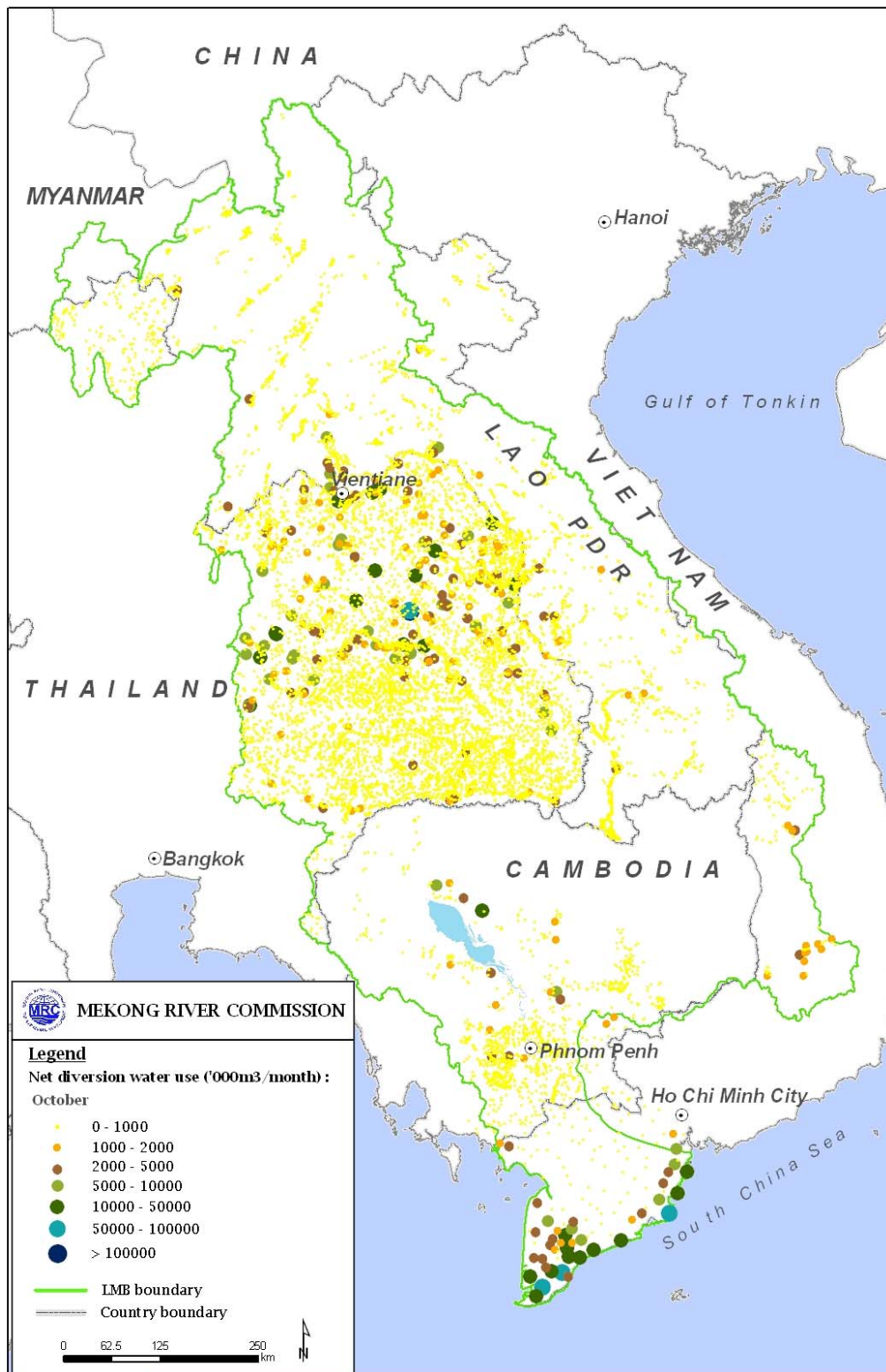
3.8 Net diversion water use – August



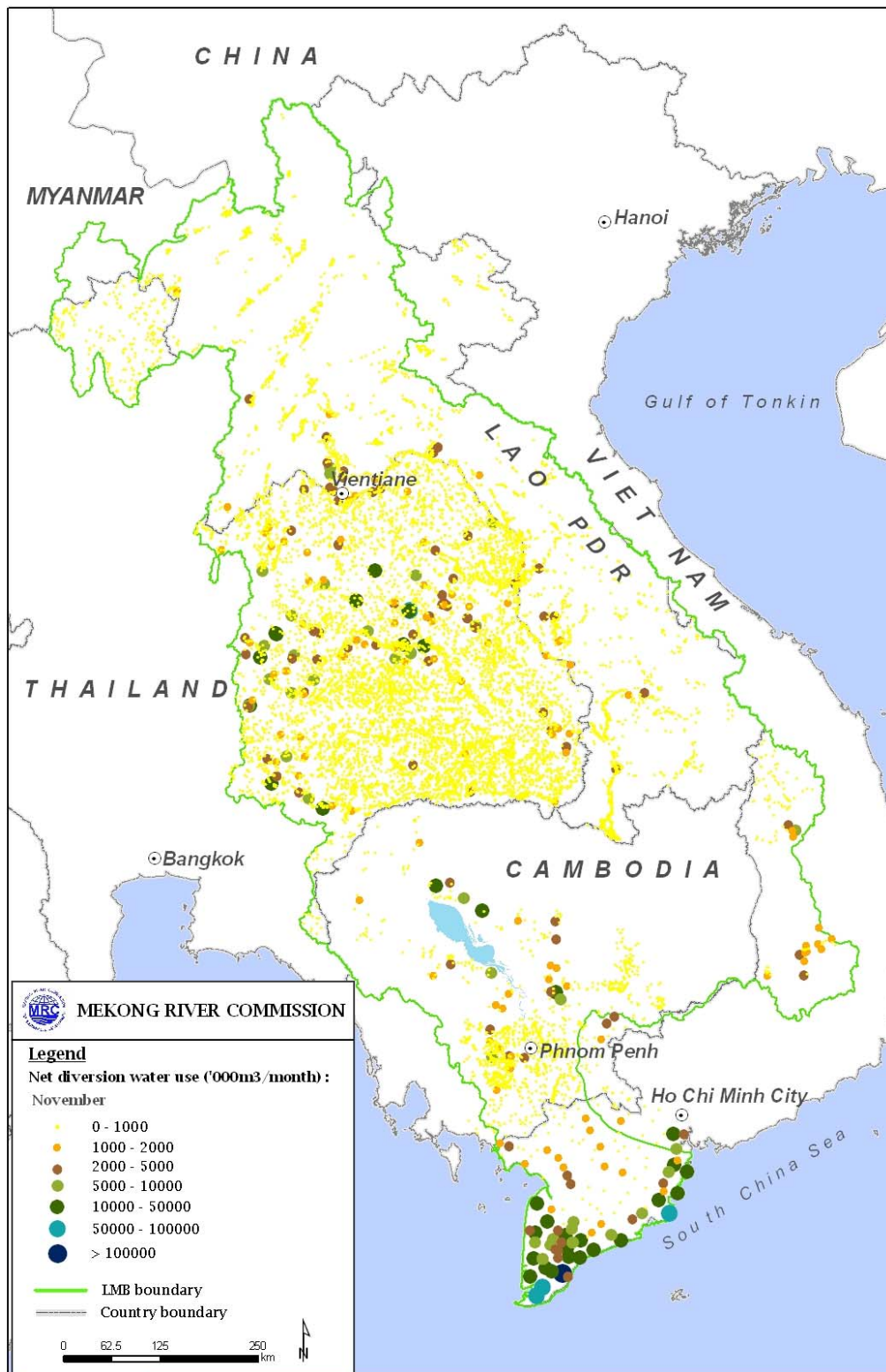
3.9 Net diversion water use – September



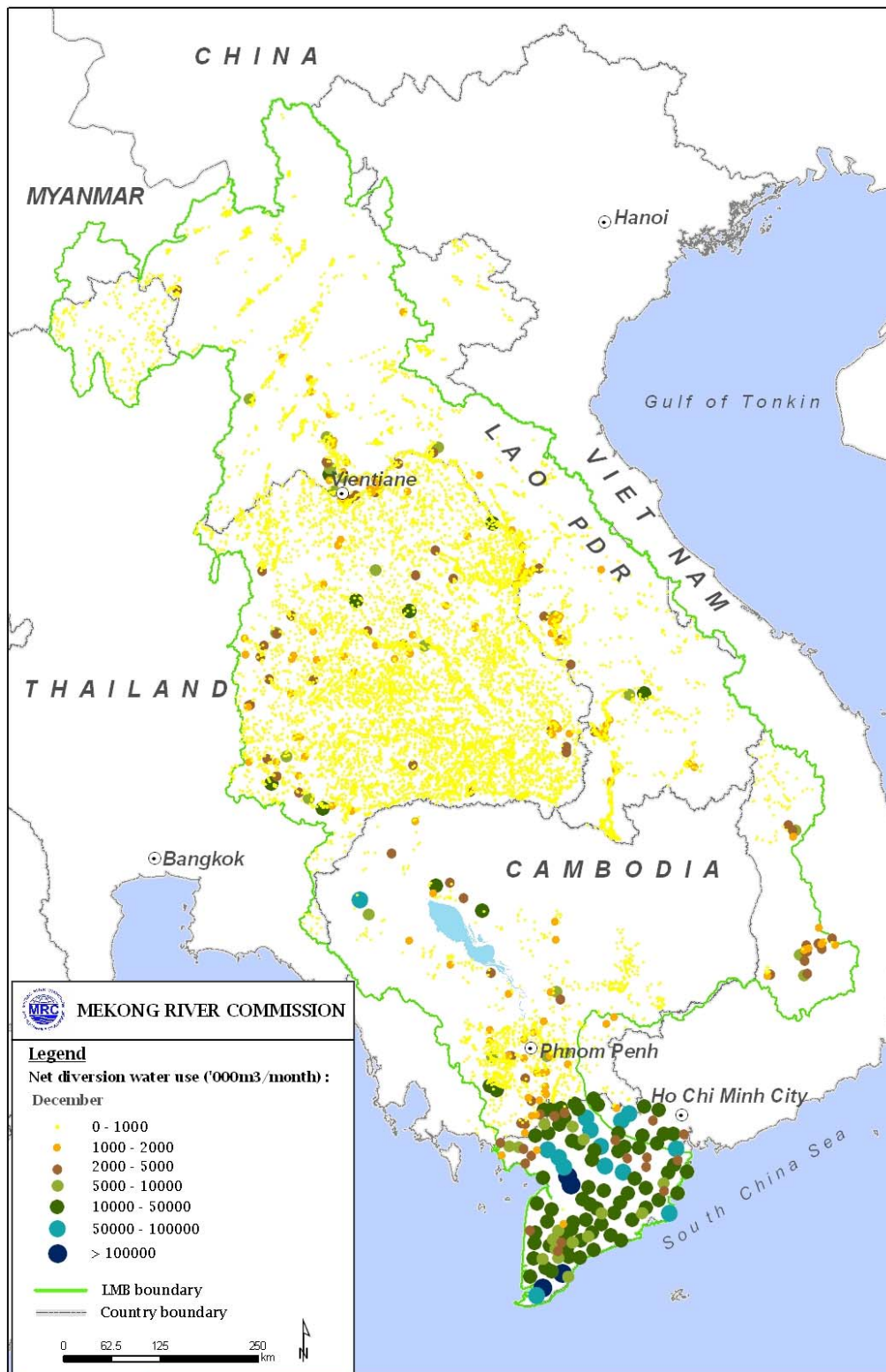
3.10 Net diversion water use – October



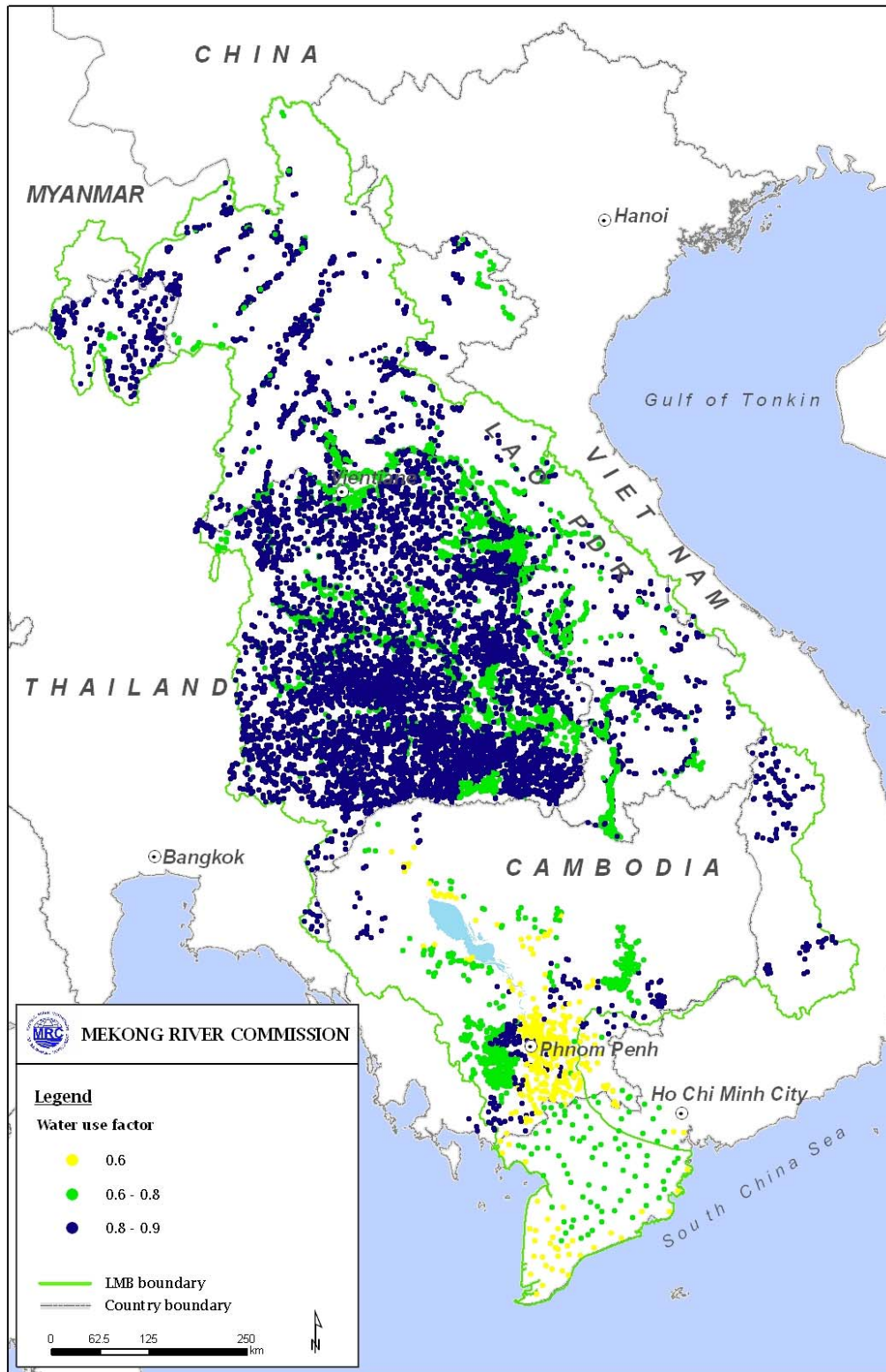
3.11 Net diversion water use – November



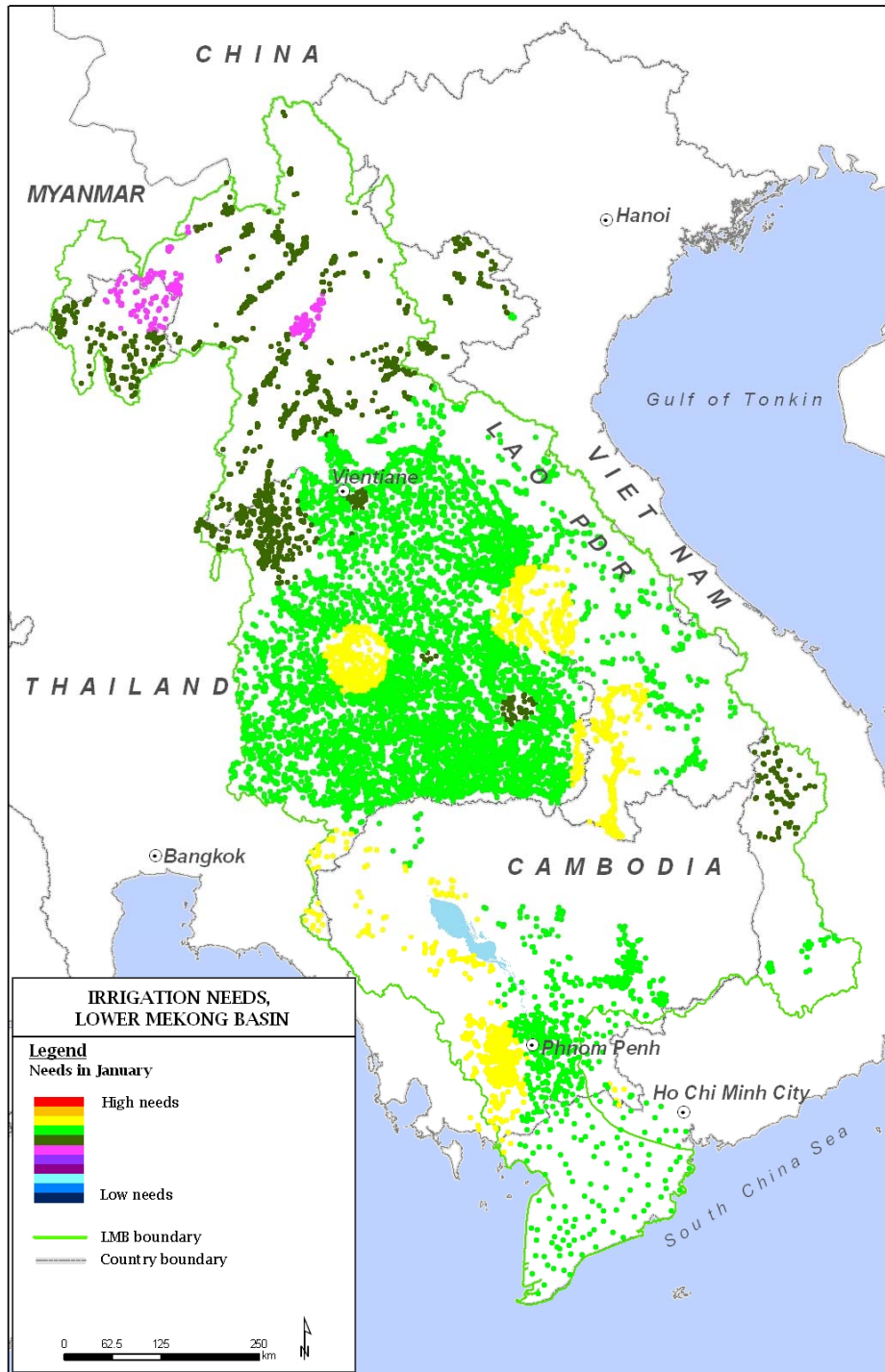
3.12 Net diversion water use – December



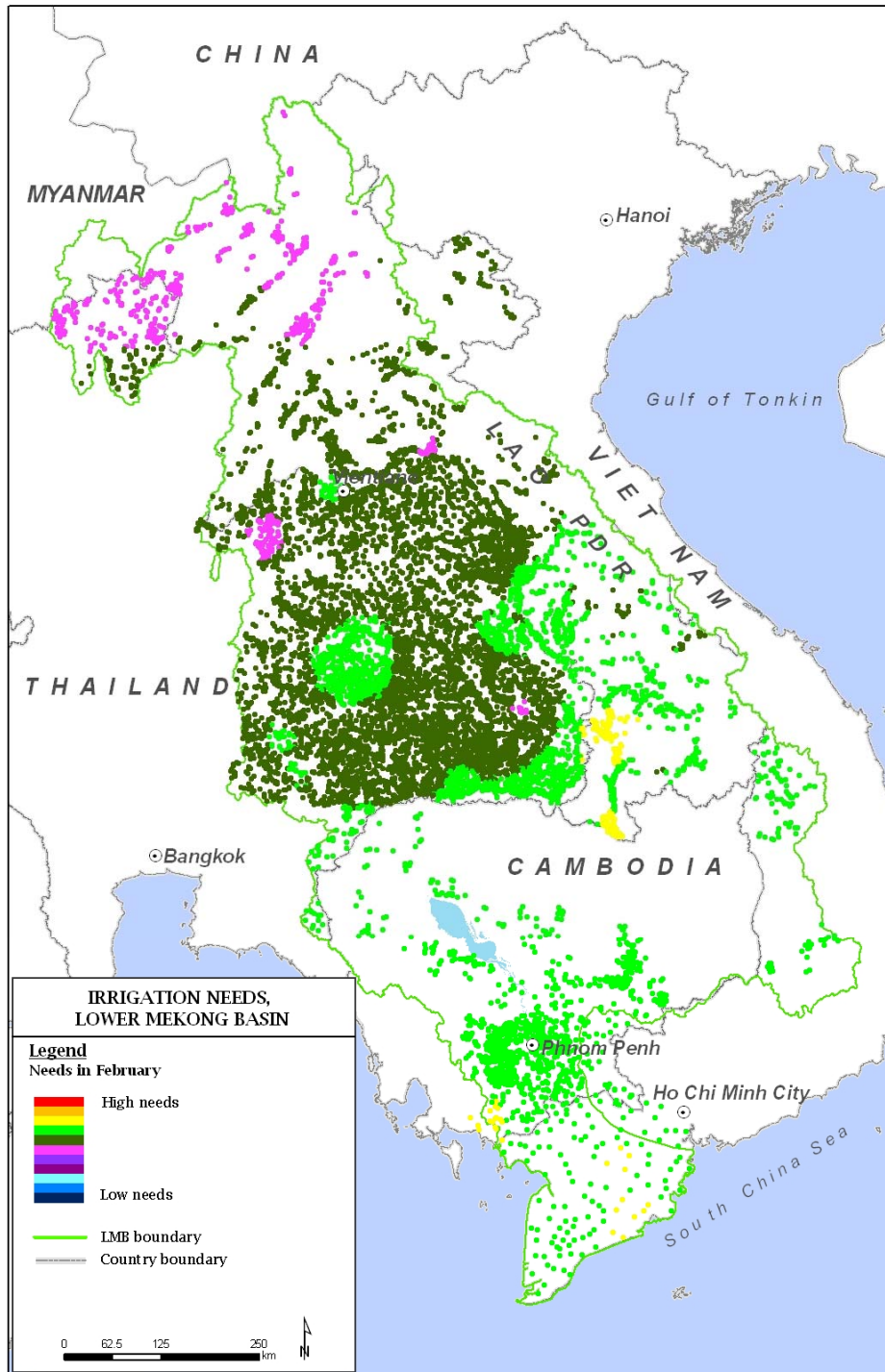
4.1 Rice water use factors



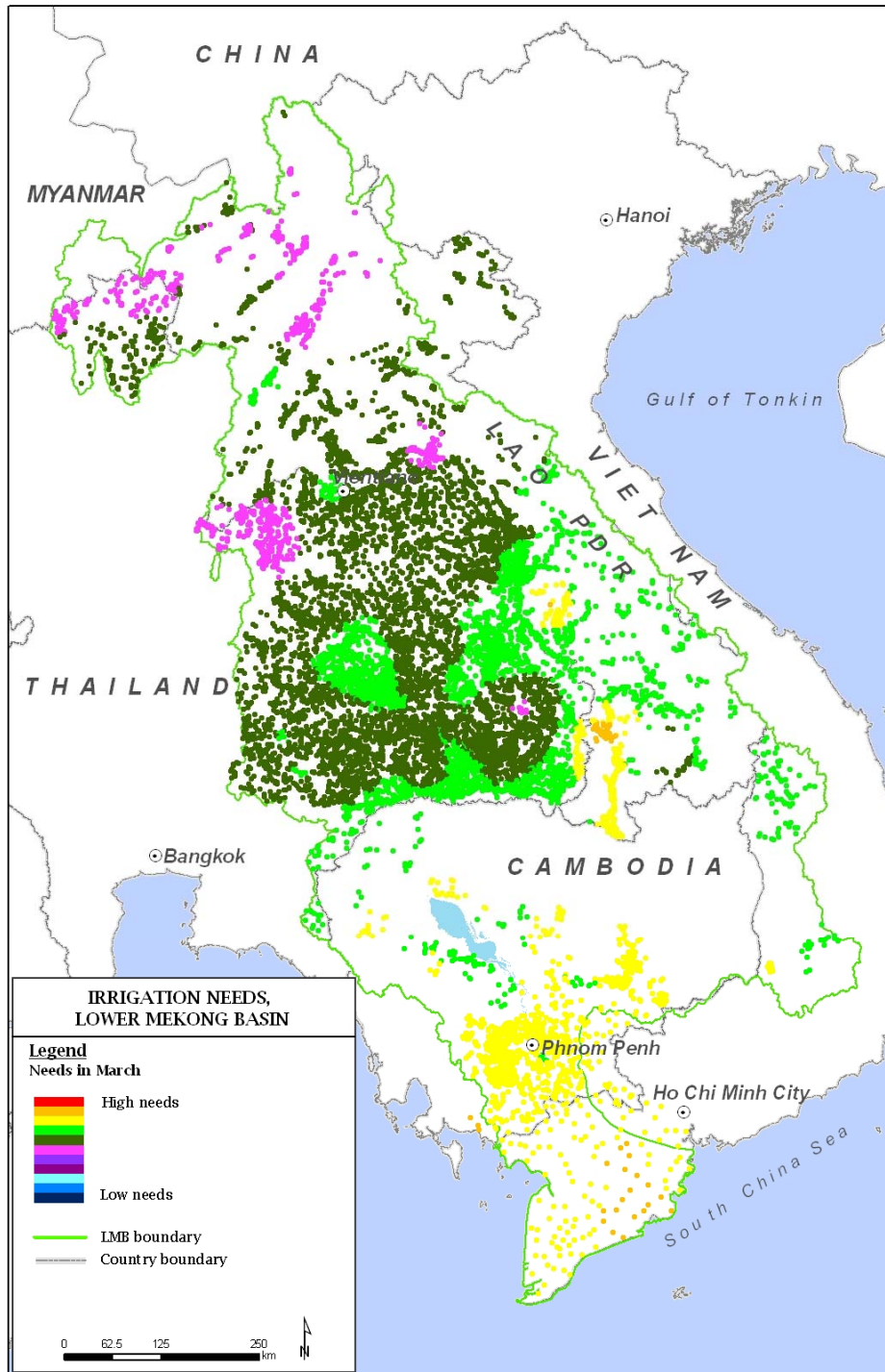
5.1 Trend of irrigation requirement (Eto-Effective rainfall) – January



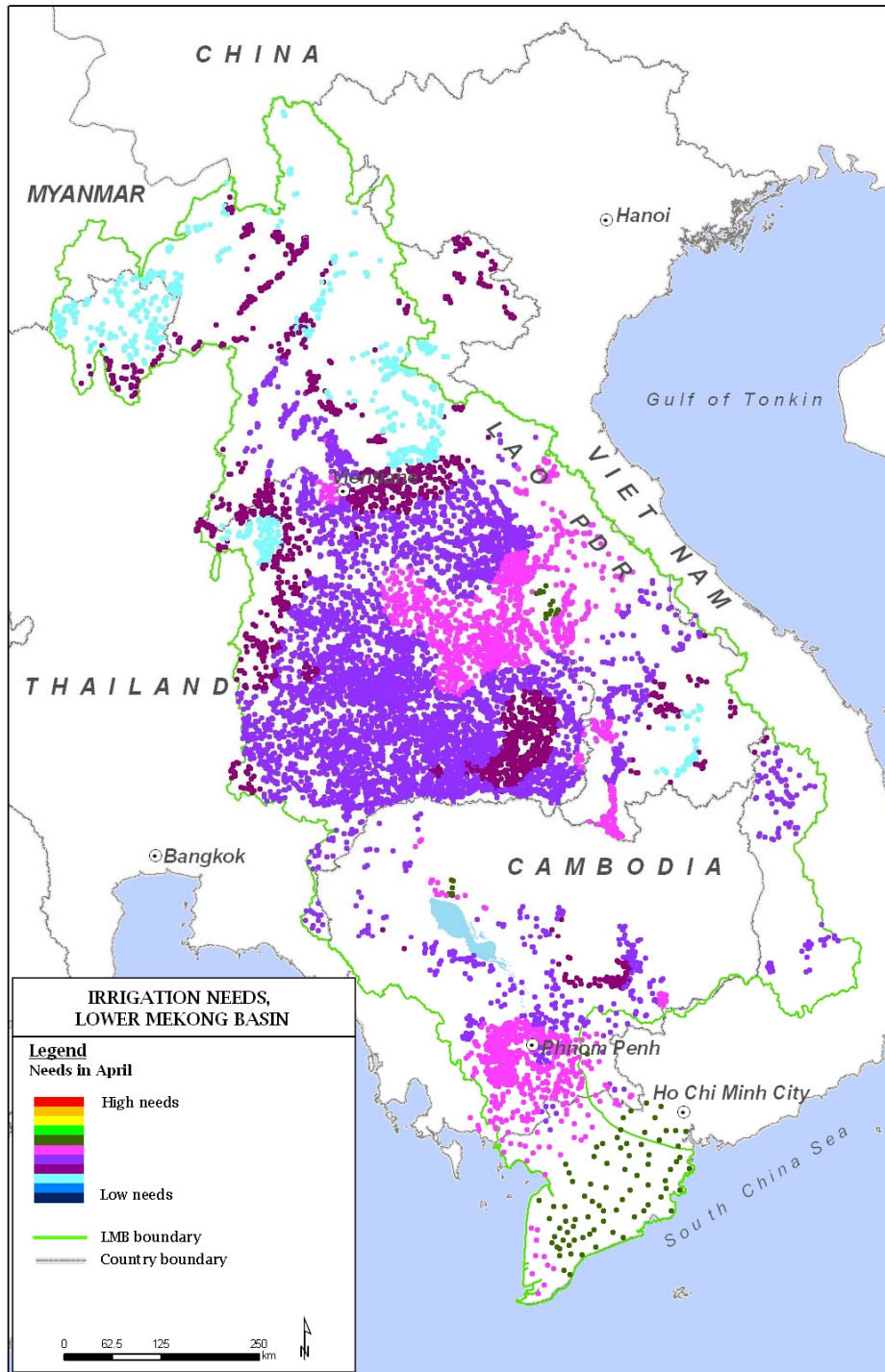
5.2 Trend of irrigation requirement (Eto-Effective rainfall) – February



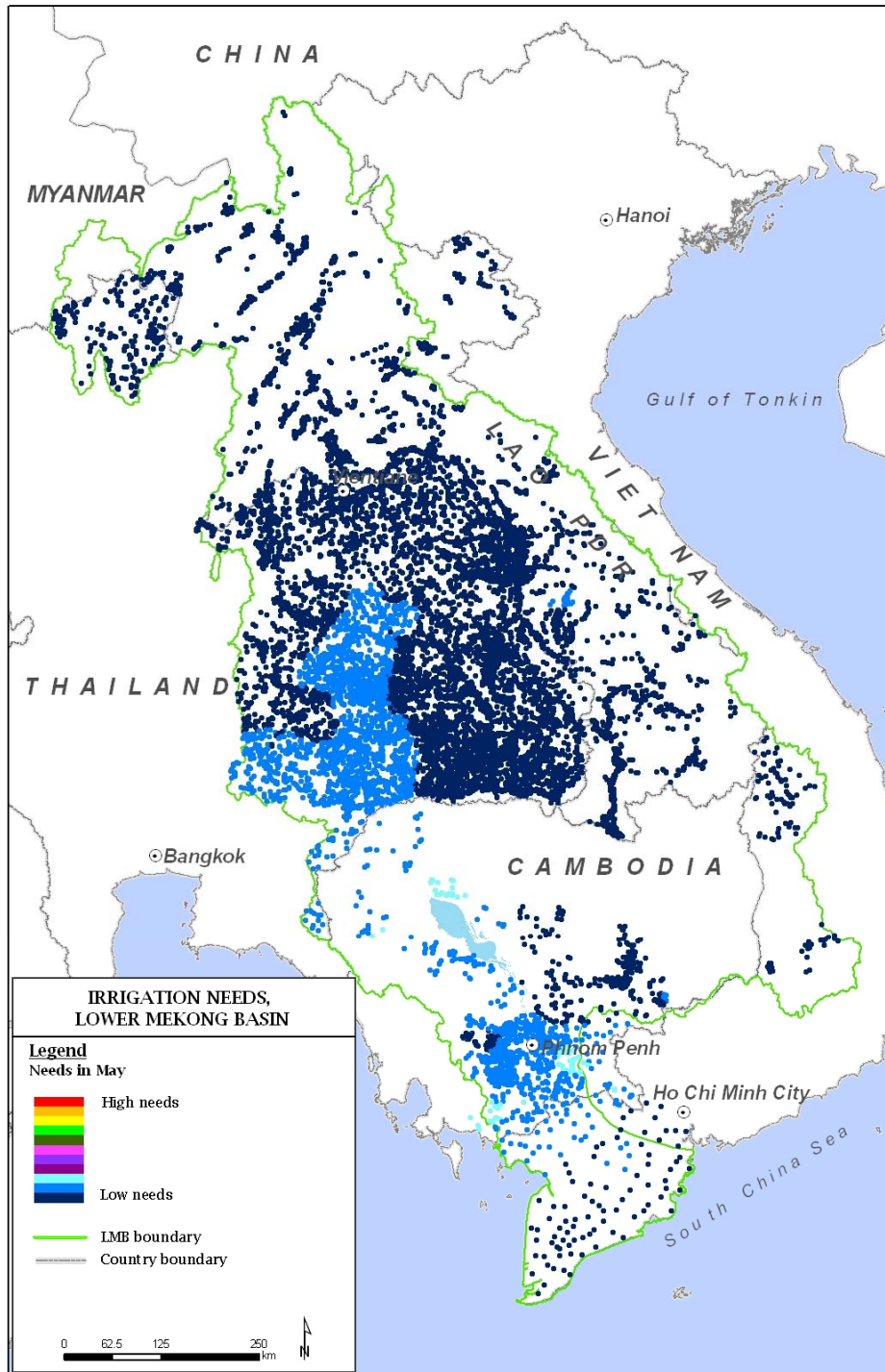
5.3 Trend of irrigation requirement (Eto-Effective rainfall) – March



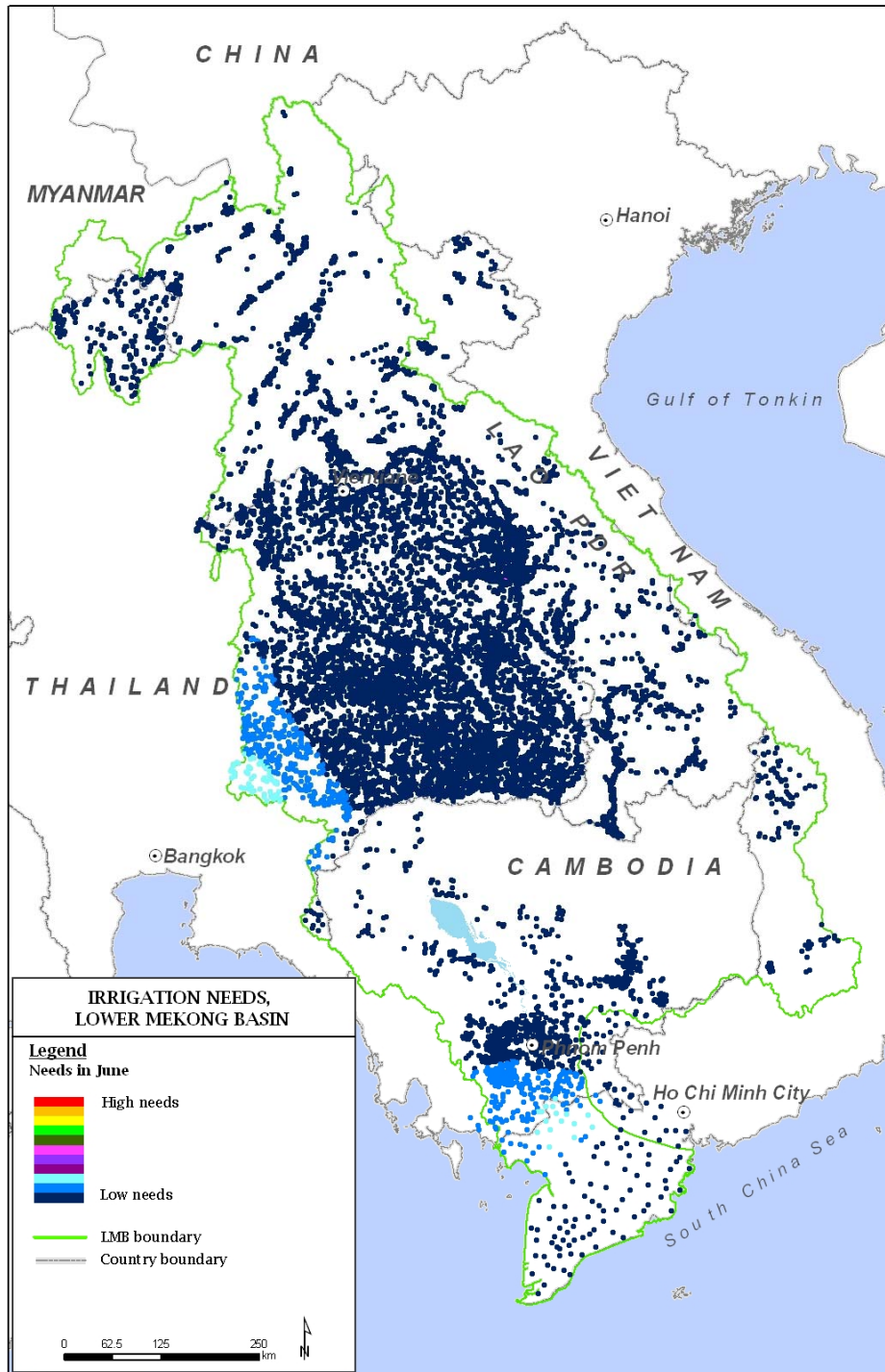
5.4 Trend of irrigation requirement (Eto-Effective rainfall) – April



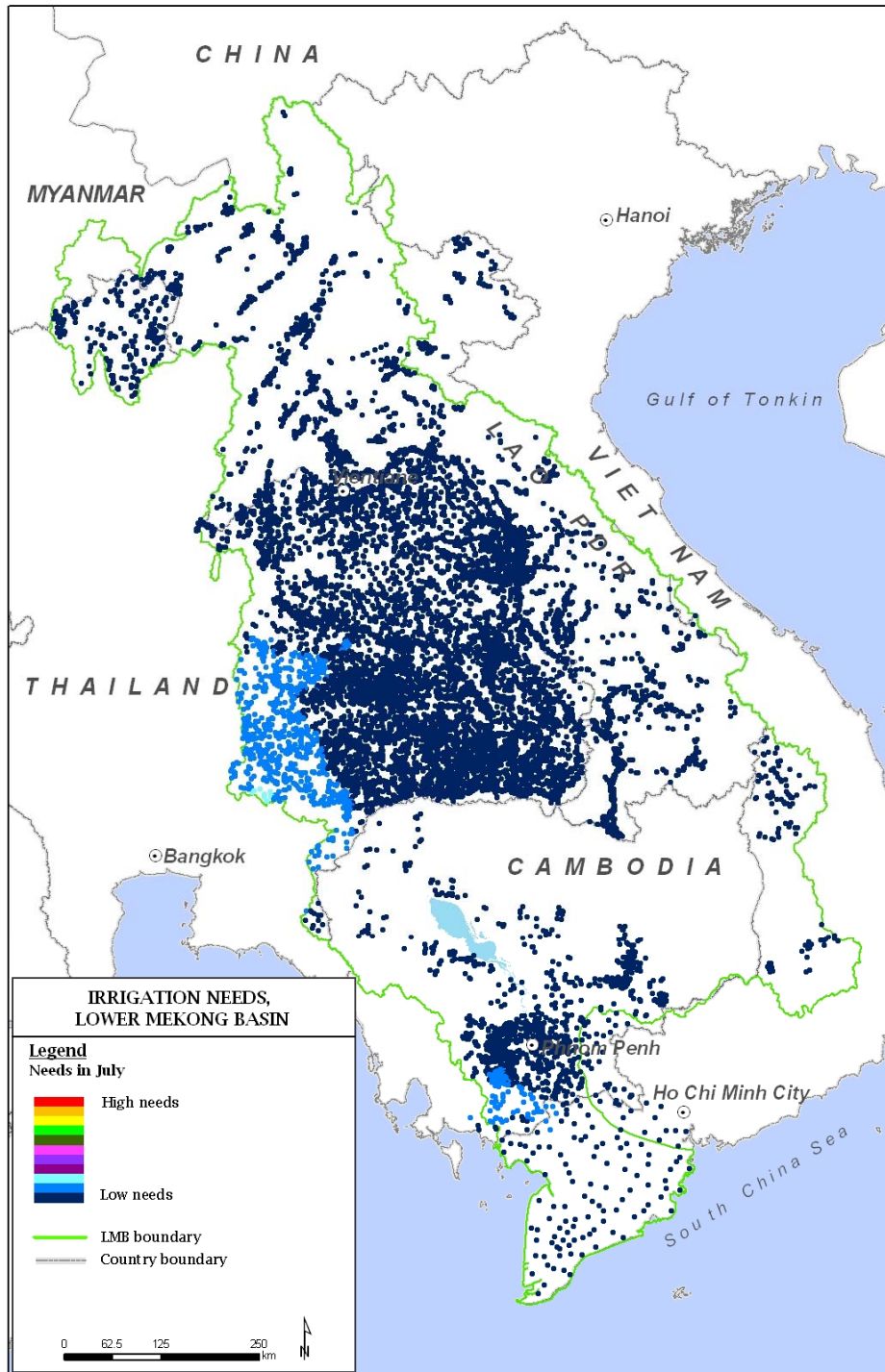
5.5 Trend of irrigation requirement (Eto-Effective rainfall) – May



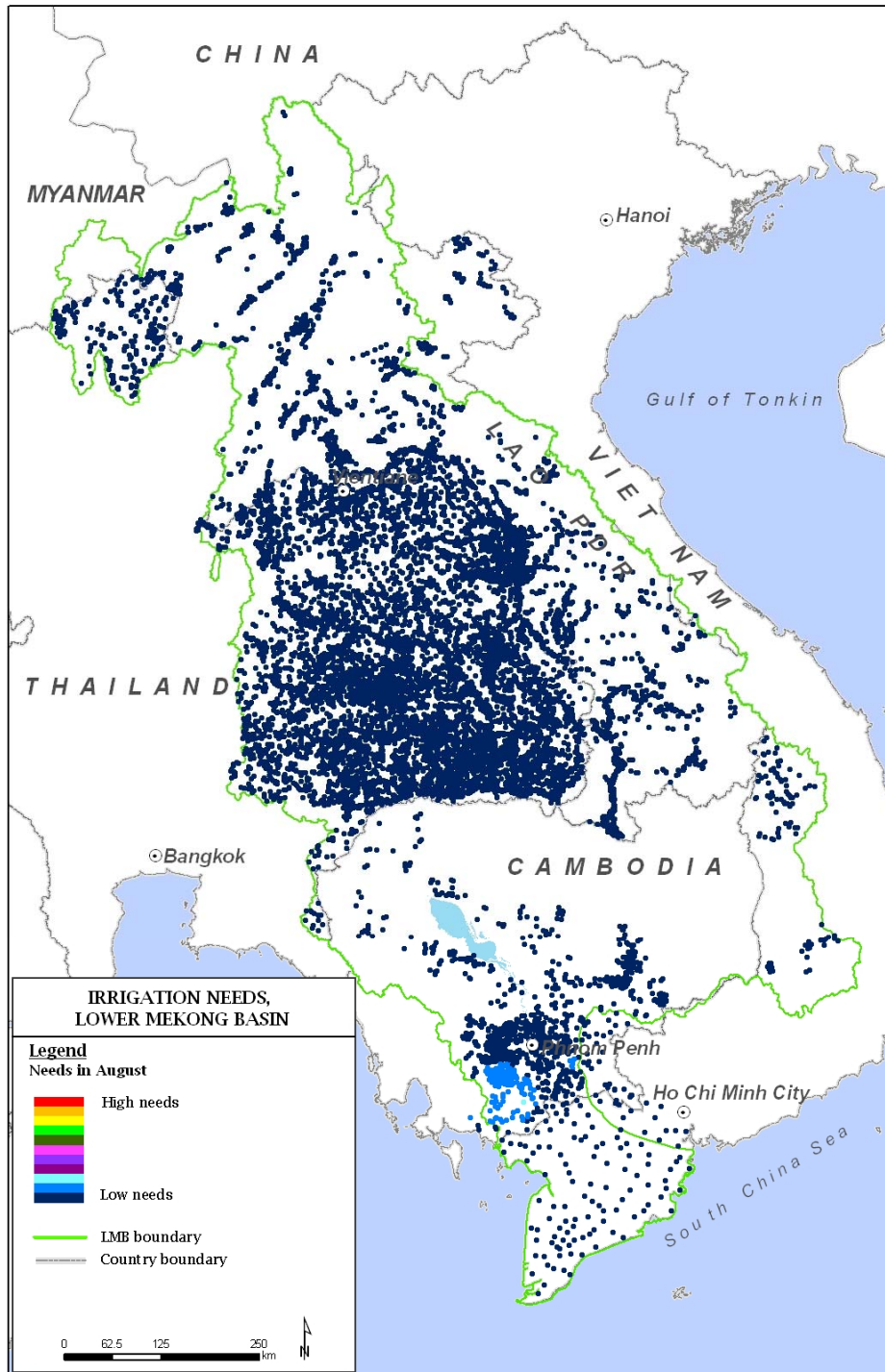
5.6 Trend of irrigation requirement (Eto-Effective rainfall) – June



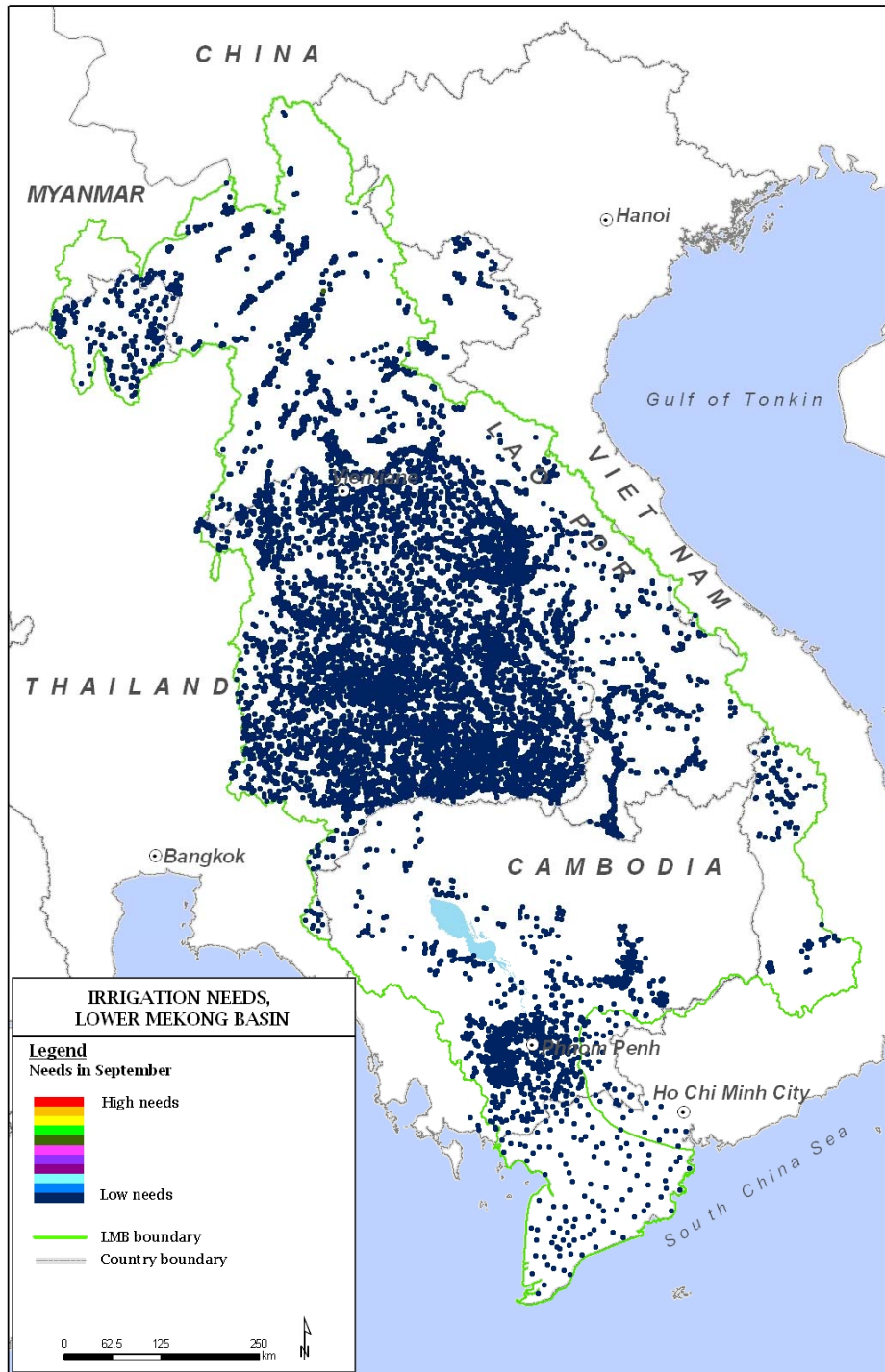
5.7 Trend of irrigation requirement (Eto-Effective rainfall) – July



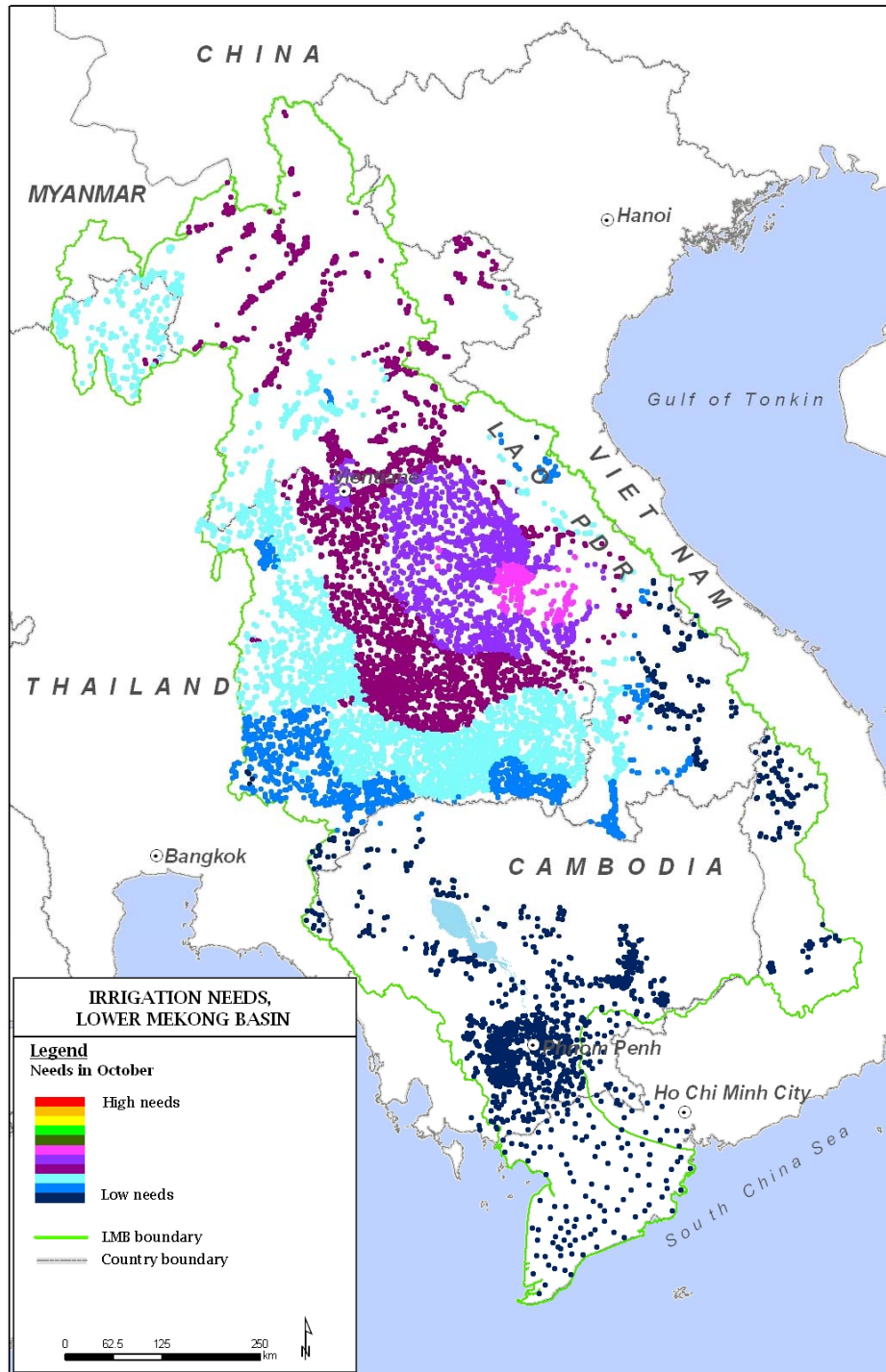
5.8 Trend of irrigation requirement (Eto-Effective rainfall) – August



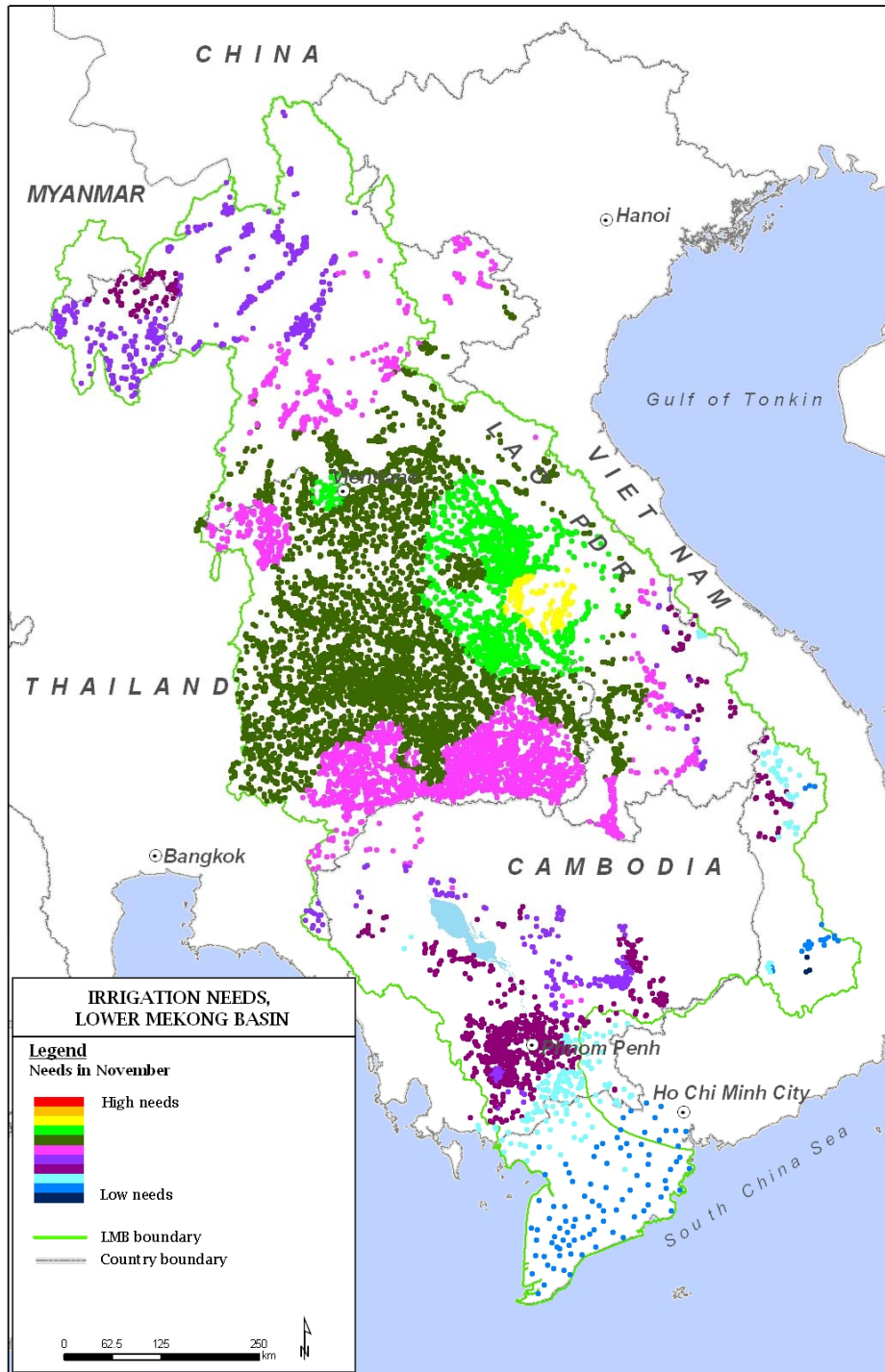
5.9 Trend of irrigation requirement (Eto-Effective rainfall) – September



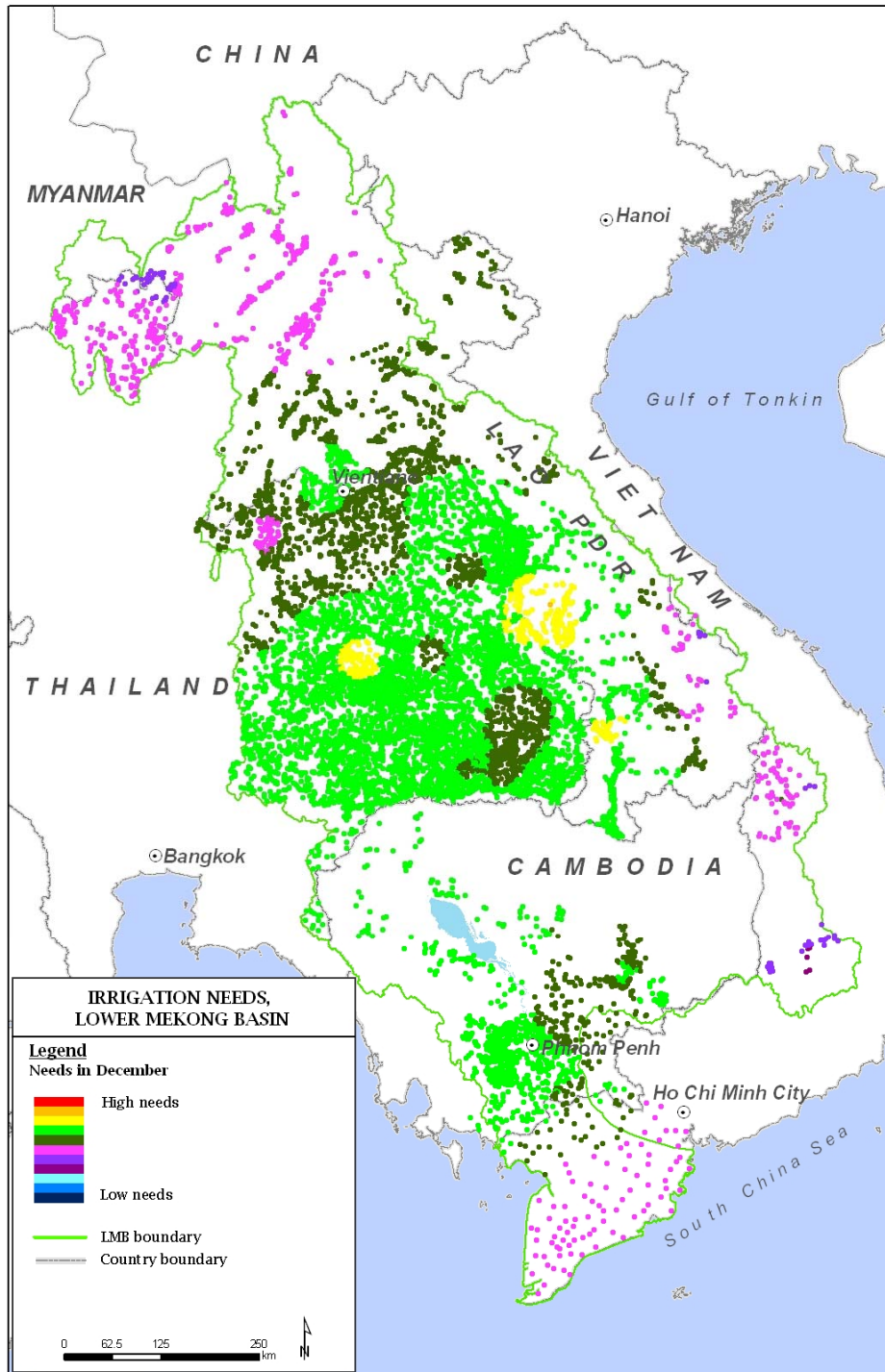
5.10 Trend of irrigation requirement (Eto-Effective rainfall) – October



5.11 Trend of irrigation requirement – November



5.12 Trend of irrigation requirement – December



Annex 6: Proposed Analysis of Water Use in a Selected Area (Landsat Image 12848)

Landsat image number 12848 covers the southern part of the Vientiane Plain and part of the north part of Thailand. The image which covers an area of 26,400 km² would include a total of 947 irrigation schemes 80 in Laos and 867 in Thailand. It is proposed that an analysis of the irrigation should be carried out during the 2005 dry season. The required period would be from November 2005 until May 2006-a total of six months. The proposed activities would focus on the selected area and would include:

1. Acquisition of landsat imagery on the same date every months for six months November 2005 to May 2006.
2. Analysis of the imagery to define the rice growing and other irrigated areas in each month.
3. Conduct ground truthing using GPS of selected areas to confirm the real areas of irrigated crops.
4. Conduct infiltration tests in selected schemes.
5. Carry out daily irrigation water flow monitoring for selected schemes.
6. Check and update the irrigation database and the irrigation water use databases based on the validated data.
7. Prepare an assessment based on the selected area how the irrigation databases could feasibly be upgraded for the rest of the basin.
8. Acquisition of samples of other types imagery to assess the most appropriate for estimation of crop areas.

Annex 7: Terms of Reference for the Assignment

TERMS OF REFERENCE

for

Irrigation/GIS specialist

(Second stage for evaluation of water use)

Project Title

Programme to Demonstrate Multi-functionality of Paddy Fields over the Mekong River Basin (DMPF)

Title of Consultancy

Irrigation/GIS specialist

Duty station

MRCS, Vientiane, Lao PDR

Background and Objective of the project

Under the Program to Demonstrate Multi-functionality of Paddy Fields over the Mekong River Basin (DMPF), the Mekong River Commission (MRC) has carried out a process of improving the information on irrigation water use for the purpose of preparing basic information on rice farming and agricultural water use in the Lower Mekong Basin. The work to date has included; the updating of GIS datasets, measurements of the water balance in some selected experimental paddy fields and preparation of an approach and plan to assess the irrigation water use for the whole basin.

The next stage is to apply the available information to prepare estimates of irrigation water use throughout the whole Mekong Basin..

It is now proposed to recruit the services of an Irrigation Specialist with GIS skills to carry out this assignment..

Tasks of consultant

The consultant will be assigned under a Special Service Agreement (SSA) with the MRC Secretariat. The main tasks of the Irrigation/GIS specialist shall include:

1. To review the proposed plan and approach to estimate the Irrigation Water Use in the LMB. Based on the review prepare a detailed methodology to complete the work in the agreed time frame.
2. From the detailed methodology develop a work programme to carryout the assignment.
3. To coordinate with the various programme in the MRC with interests in the evaluation and to assess what are the most appropriate outputs and formats.
4. Prepare the detailed formats for the analysis and work with the MRC GIS Professional and other supporting staff to plan and undertake the compilation and processing of the data.
5. To research and develop information on crop factors, cropping calendars, irrigation efficiencies, regime efficiencies and other factors that will be required to complete the assessment..
6. To estimate "irrigation efficiency rate" from the relation between the irrigated area, the quantity of water intake (or amount of water discharge from reservoir), and the amount of the unit water requirement obtained from on-farm experiment.

7. To provide guidance for the analysis of data from the experimental sites and irrigation flow data to enable the data to be effectively incorporated into the Water Use Assessment.
8. Provide support to carry out the analysis including the appropriate use of GIS and other appropriate software.
9. Prepare a review of the analysis commenting on the strengths and weaknesses and prepare proposals for future development.

Expected Outputs

The outputs required to be delivered by the Irrigation/GIS Specialist include:

1. A detailed methodology and work plan to carry out the analysis.
2. A detailed assessment of Irrigation Water Use in the Lower Mekong Basin.
3. An analysis report on irrigation water use estimation from the experimental site and monitoring information.
4. A Technical Report to support the Irrigation Water Use Assessment.
5. A final report including a review of the analysis, commenting on the strengths and weaknesses and outlining proposals for future development...
6. A summary progress report at the completion of the first input.

The MRCS reserves the right to reject any delivered products that do not comply with the specified outputs.

Contract Period

Total five weeks for seven working days per week totalling not exceed 38 days (including travel days) to be undertaken in two separate periods starting late June 2005.

The first period covers from 27 June 2005 to 15 July 2005 including 2 days workshop in Vietnam in late July (maximum 21 days for the first period).

The second period covers 2 weeks during September – October 2005 (exact dates will be agreed with the consultant later but not later than 30 October 2005), maximum 17 days for the second period.

Working Principles

The specialist will work under supervision of program officer (PO) of DMPF project.

Modality of Payment

Payment in two parts:

50% after the first input subject to approval of the progress report.

50% at completion of the assignment and approval of the final report.

Qualification

The Irrigation specialist should hold a master degree in Irrigation and/or Water resources management or related subjects. She/he should have at least 10 years comprehensive practical experience (including experience from the Lower Mekong Basin) in the study and analysis for irrigation water use especially paddy rice farming. She/he should have adequate skills in GIS data preparation, auditing and integrating using ERDAS/GIS-ArcView software. She/he should be fluent in spoken and written English, and is committed to complete the work in time.

Budget

First input to be charged to the following budget line: 3.2\23\03\JPN BL-11 and 3.2\23\04\JPN BL-11 of the final input.

TERMS OF REFERENCE

for
GIS Professional

Project Title

Programme to Demonstrate Multi-functionality of Paddy Fields over the Mekong River Basin (DMPF)

Title of Consultancy

Duty station

MRCS, Vientiane, Lao PDR

Background and Objective of the project

Under the Program to Demonstrate Multi-functionality of Paddy Fields over the Mekong River Basin (DMPF), the Mekong River Commission (MRC) has carried out a process of improving the information on irrigation water use for the purpose of preparing basic information on rice farming and agricultural water use in the Lower Mekong Basin. The work to date has included; the updating of GIS datasets, measurements of the water balance in some selected experimental paddy fields and preparation of an approach and plan to assess the irrigation water use for the whole basin.

The next stage is to apply the available information to prepare estimates of irrigation water use throughout the whole Mekong Basin.

It is now proposed to recruit the services of a GIS Professional to support the ongoing work being carried out by the Irrigation/GIS Specialist.

Tasks of consultant

The consultant will be assigned under a Special Service Agreement (SSA) with the MRC Secretariat. The main tasks of the GIS consultant shall include:

1. To provide GIS and analytical support to the Irrigation/GIS specialist to estimate the Irrigation Water Use in the LMB
2. To check and revise the preliminary analysis based on the agreed changes
3. To document the analysis, and all databases/geospatial datasets produced according to MRC standards
4. To provide assistance and support to TSD staff for incorporation of database/datasets and metadata into the MRC geospatial database
5. To carry out selected analyses of water use and prepare appropriate outputs in hard and soft copies
6. To review the role of GIS and other appropriate software to carry out irrigation water use analysis in the future
7. To introduce the applied methodology and analysis to TSD GIS staff.

Expected Outputs

The outputs required to be delivered by the GIS Professional will be combined with the outputs from the Irrigation/GIS specialist and will include:

1. An analysis of irrigation water use in the Lower Mekong Basin
2. The Irrigation Water Use Data base properly documented and incorporated into the MRC geospatial database.
3. A final report including a review of the work carried out and commenting on the strengths and weaknesses of the GIS aspects of the analysis and outlining proposals for future development of GIS for future work in this type

The MRCS reserves the right to reject any delivered products that do not comply with the specified outputs.

Contract Period

Fourteen (14) working days, but not exceed 18 days in case additional work is required, starting from 3 October 2005. Travel days are not included.

Working Principles

The specialist will work under supervision of program officer (PO) of DMPF project and in close association with the Irrigation/GIS specialist and the TSD GIS Staff.

Modality of Payment**Qualification**

The Irrigation Professional should hold at least a university degree in Geographic Information Systems and at least 7 years comprehensive practical experience (including experience from the Lower Mekong Basin). She/he should have adequate skills in GIS data preparation, auditing and integrating using ERDAS/GIS-ArcView software. She/he should be fluent in spoken and written English, and is committed to complete the work in time.

Budget

To be charge to the following budget line:
3.2\23\04\JPN BL 21