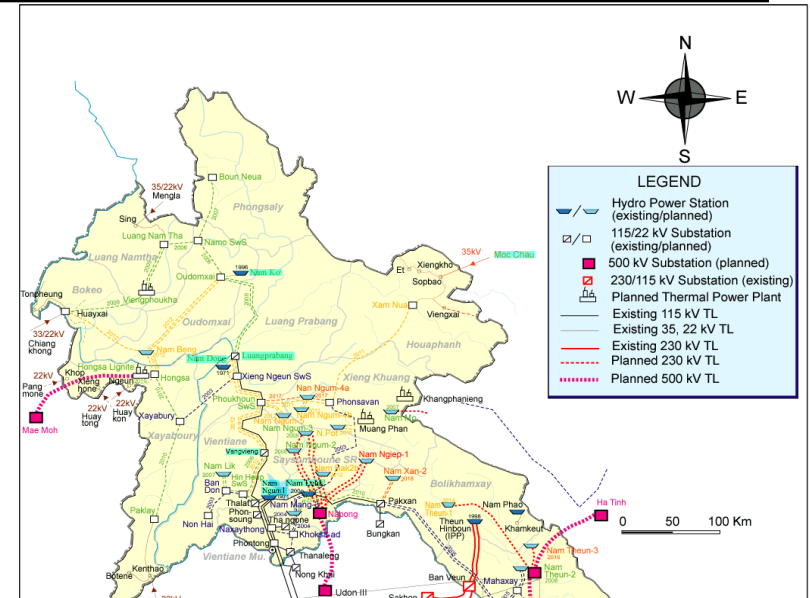
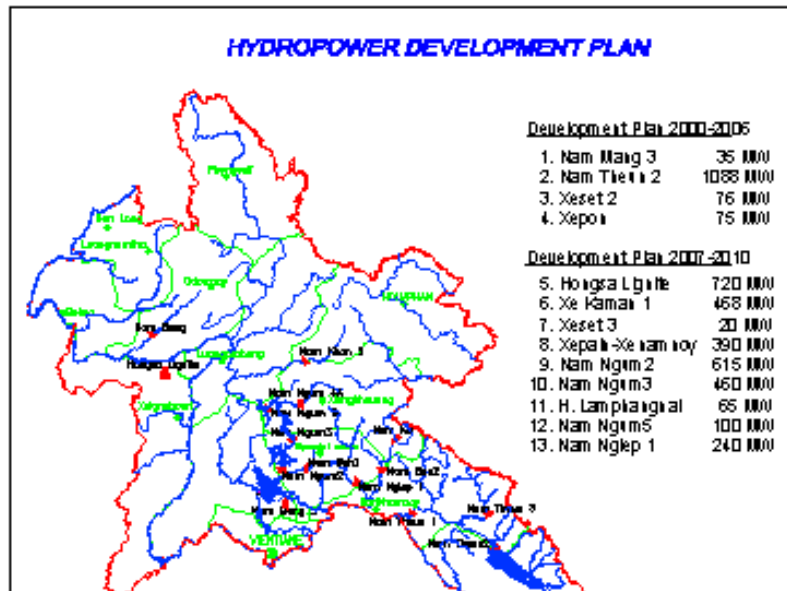


Hydropower development in Laos



Potential for hydropower development in Laos is very high even in the mainstream and tributaries.

Demand for electricity exploited mainly to export to neighboring countries such as Thailand and Vietnam

- Dam
- Reservoir Area
- River
- Border
- Provincial boundary
- Office Governor City of Province

As of May 14, 2003

As of May 14, 2003



LONG-TERM
POWER DEVELOPMENT PLAN
IN LAO PDR

FIGURE 1:

Planned Power System Diagram
in 2020

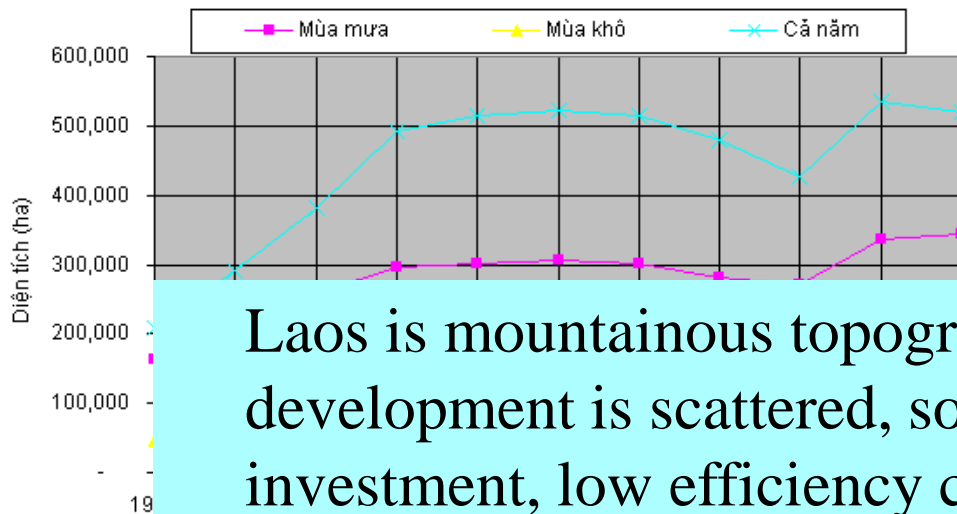


Agricultural Development in Laos

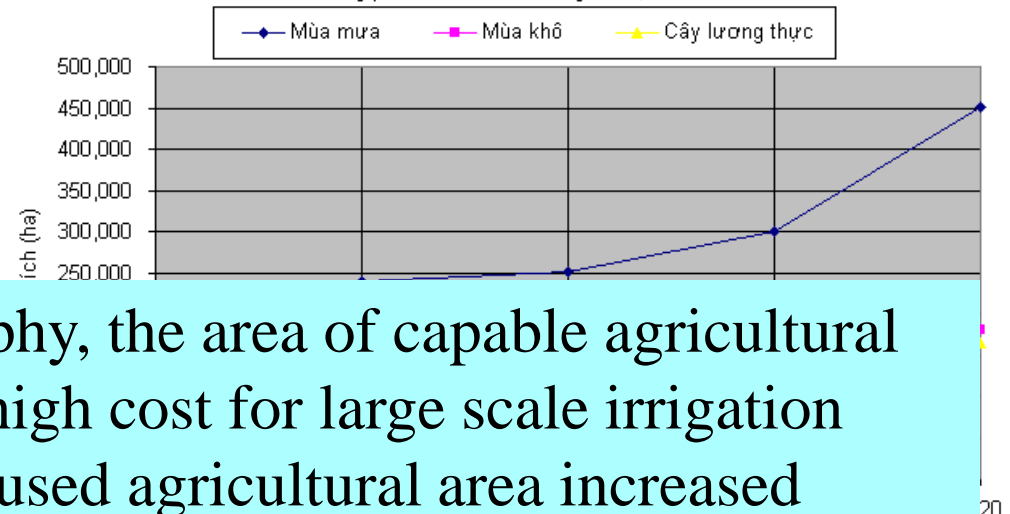
○ Existing Irrigation

○ Irrigation development until 2020

Thay đổi diện tích tưới ở Lào giai đoạn 1997-2007

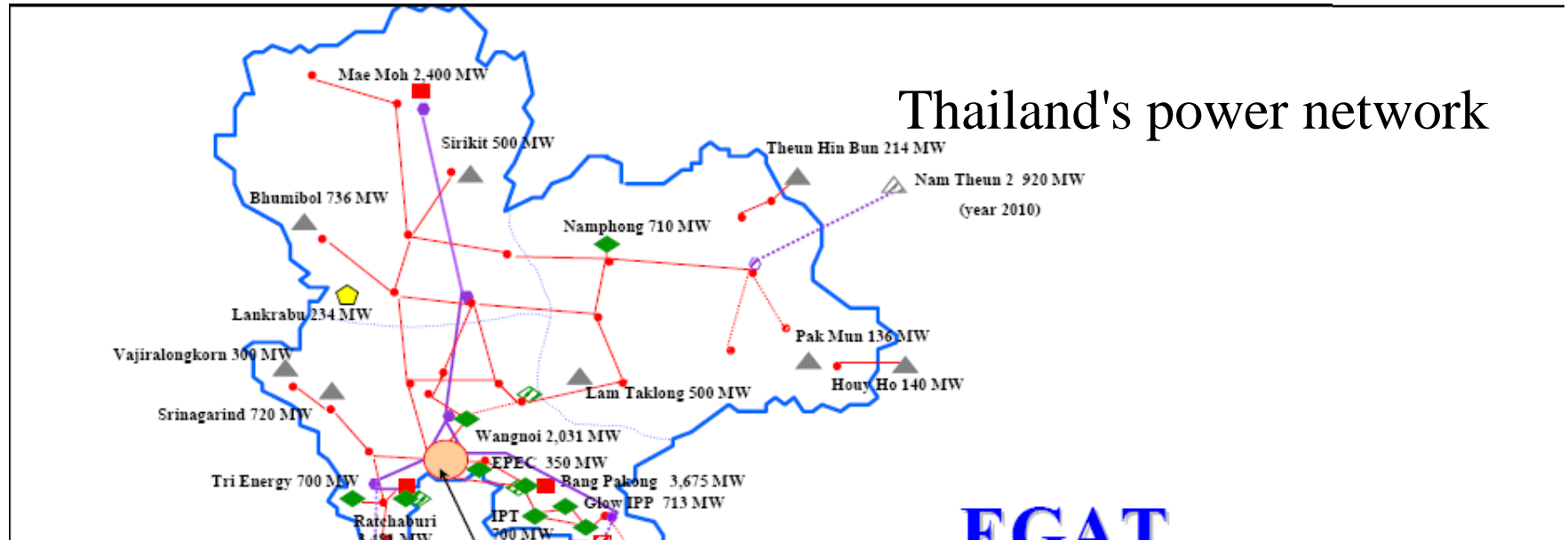


Xu hướng phát triển tưới ở Lào giai đoạn 2008-2020



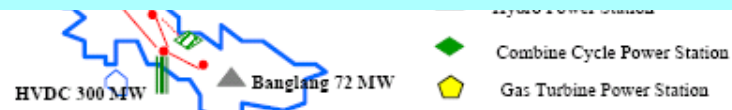
Laos is mountainous topography, the area of capable agricultural development is scattered, so high cost for large scale irrigation investment, low efficiency caused agricultural area increased slowly

Hydropower and reservoir in Thailand



Total useful capacity of reservoirs in the northeastern Thailand at about 8 billion m³, accounting for approximately 10% of the flow contribution from this region.

The hydropower potential has been considered the most exploited

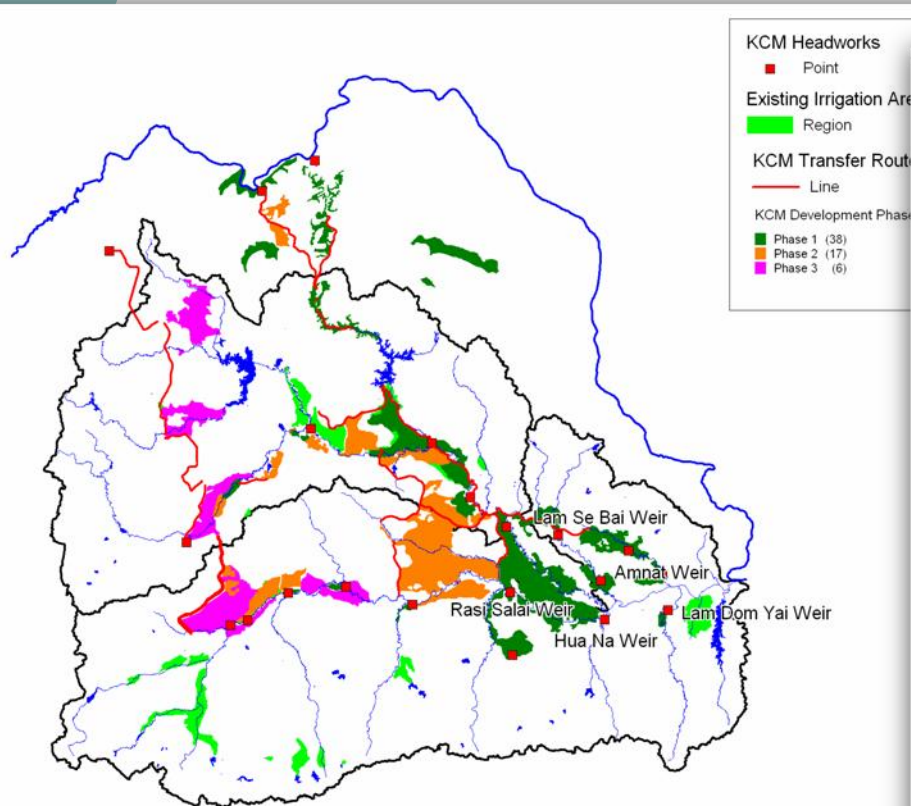


The status of land use in the northeast Thailand 2005

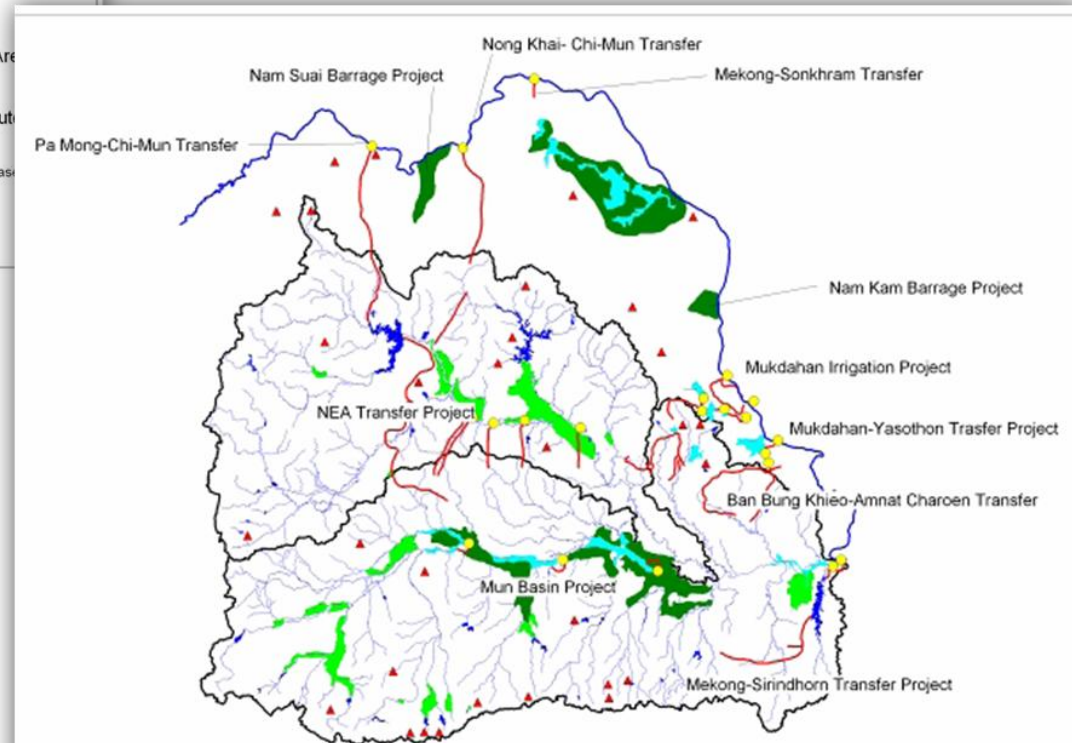
Type of Land Use	Area [million ha]	% area
Food crops	7,408	44
Upland crops	2,858	17
Fruit trees	0,045	0,3
Wasteland	0,541	3,0
Pasture	0,259	1,5
Wetlands	0,078	0,5
Rivers, lakes	0,296	1,8
Residential land	0,472	2,8
Forest	4,928	29
Total	16,885	100

Irrigation development in the northeast Thailand

- Khong-Chi-Mun project and stages



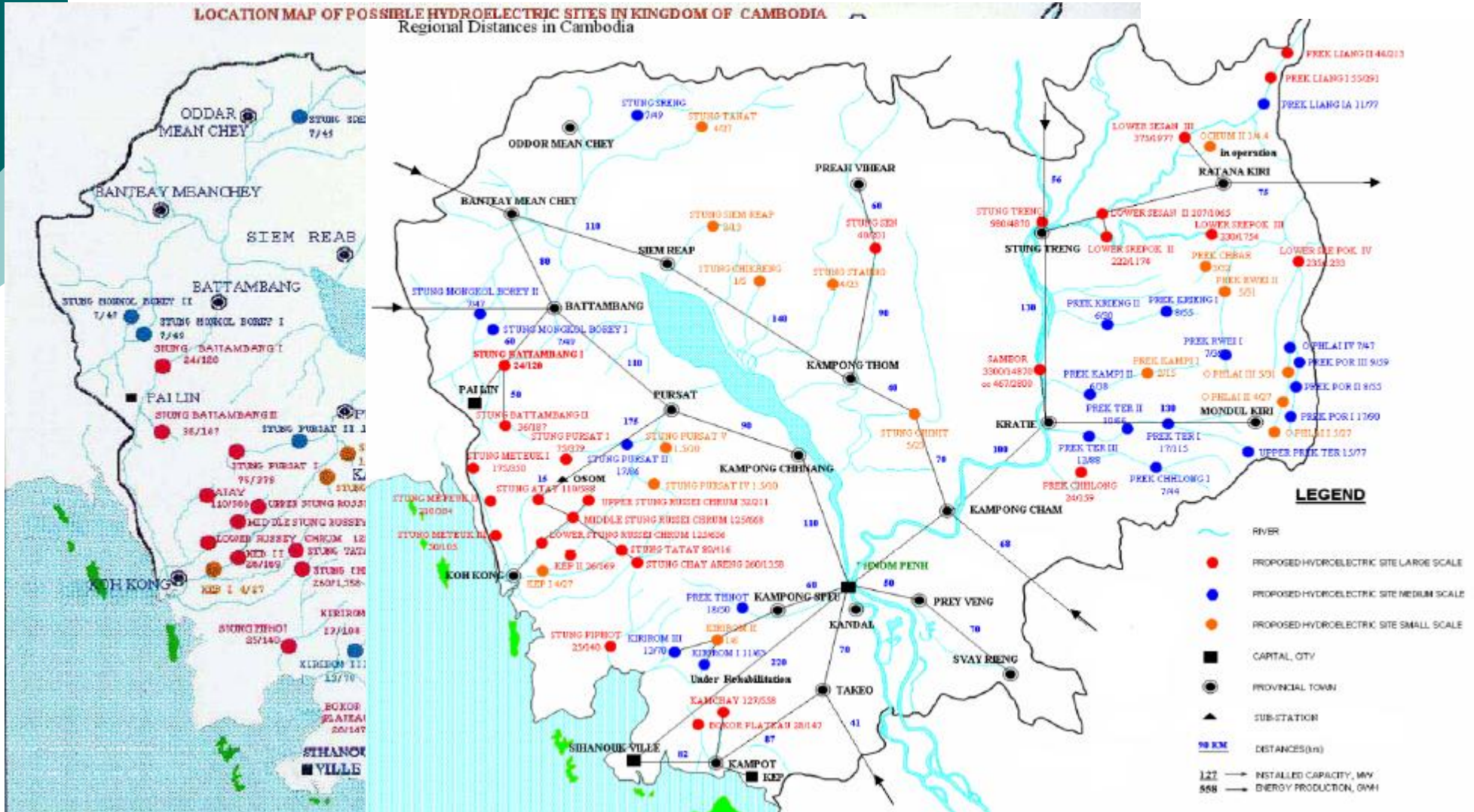
- Water diversion in the northeast Thailand



Hydropower development and power network in Cambodia

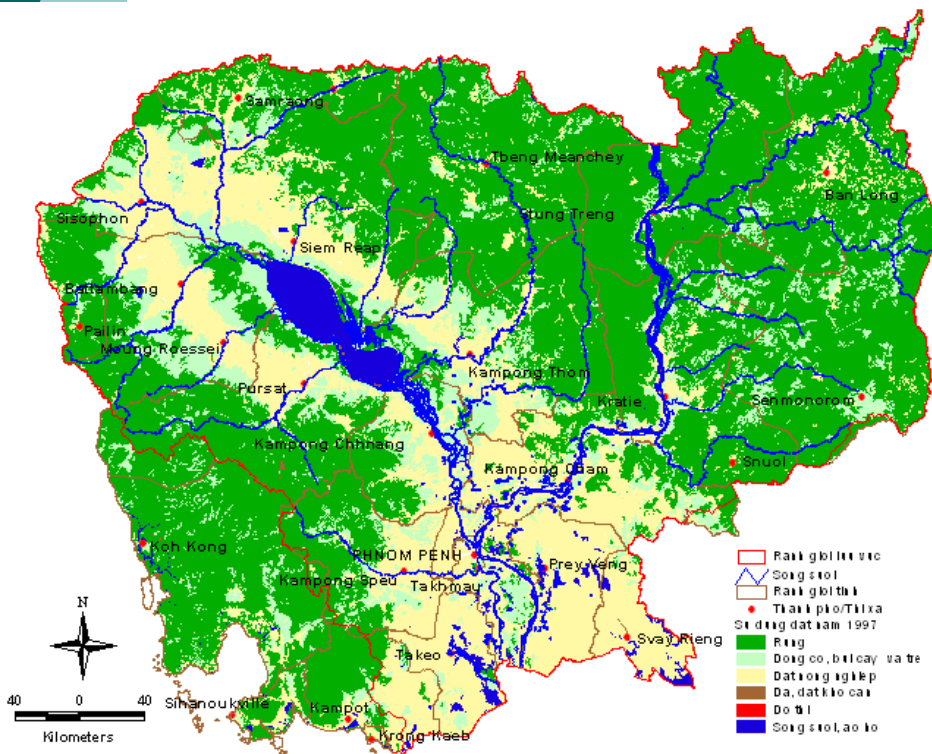
LOCATION MAP OF POSSIBLE HYDROELECTRIC SITES IN KINGDOM OF CAMBODIA

Regional Distances in Cambodia

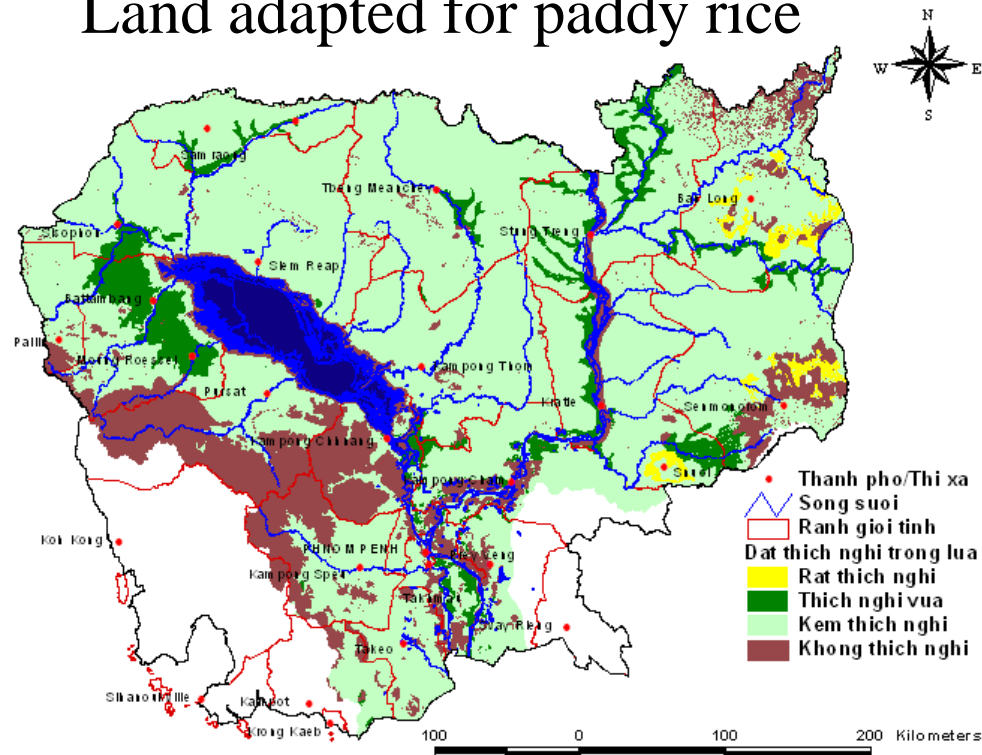


Existing and potential of Agricultural development in Cambodia

○ Land cover in Cambodia

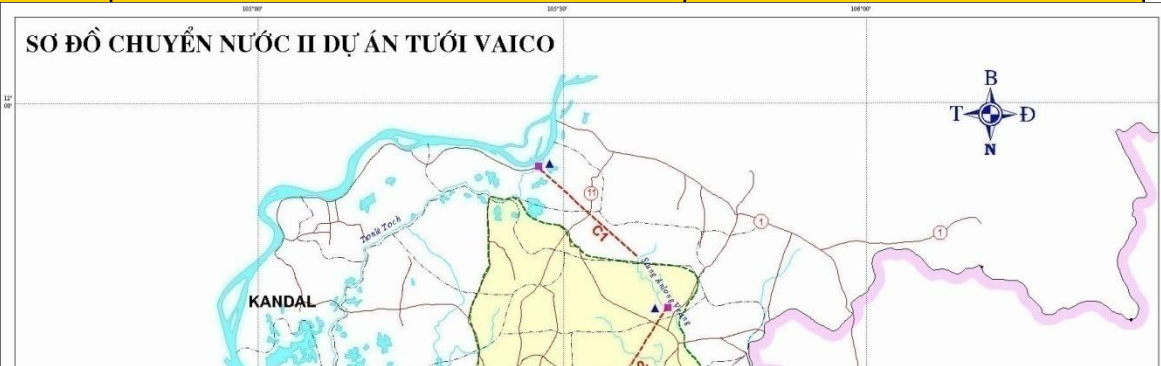


Land adapted for paddy rice



The potential of agriculture development in Cambodia

Forecasting the paddy rice area of Cambodia in 2020

Year	Cultivated area (ha)	
	Paddy rice	
2006	2.296.000	
2007	2.300.000	

Currently, the area of rice fields in Cambodia is mainly dependent on rainfall, irrigated areas are small, about 300 thousand ha.

The potential for agricultural development of Cambodia is very large, increasing water use may cause adverse impacts on the Mekong Delta. Increase the irrigated area is heavily dependent on capital investment in irrigation development

Scenario development of the basin

No.	Scenario	Symbol	Irrigated area (1000 ha)	Useful capacity of reservoirs (10 ⁶ m ³)	
				LMB	China
1	Development Status in 2000	BL00	3.400	13.680	-
2	Hydropower in China	TĐTQ	3.400	13.680	22.700
3	Hydropower in the near future	TLG	3.400	26.230	22.700
4	Low agricultural development	PTT	4.200		
5	High agricultural development	PTC	6.620		

In addition: mainstream hydropower, climate change and sea water level rise

Existing Hydropower dams and mainstream Hydropower



D Expected dams (1982)

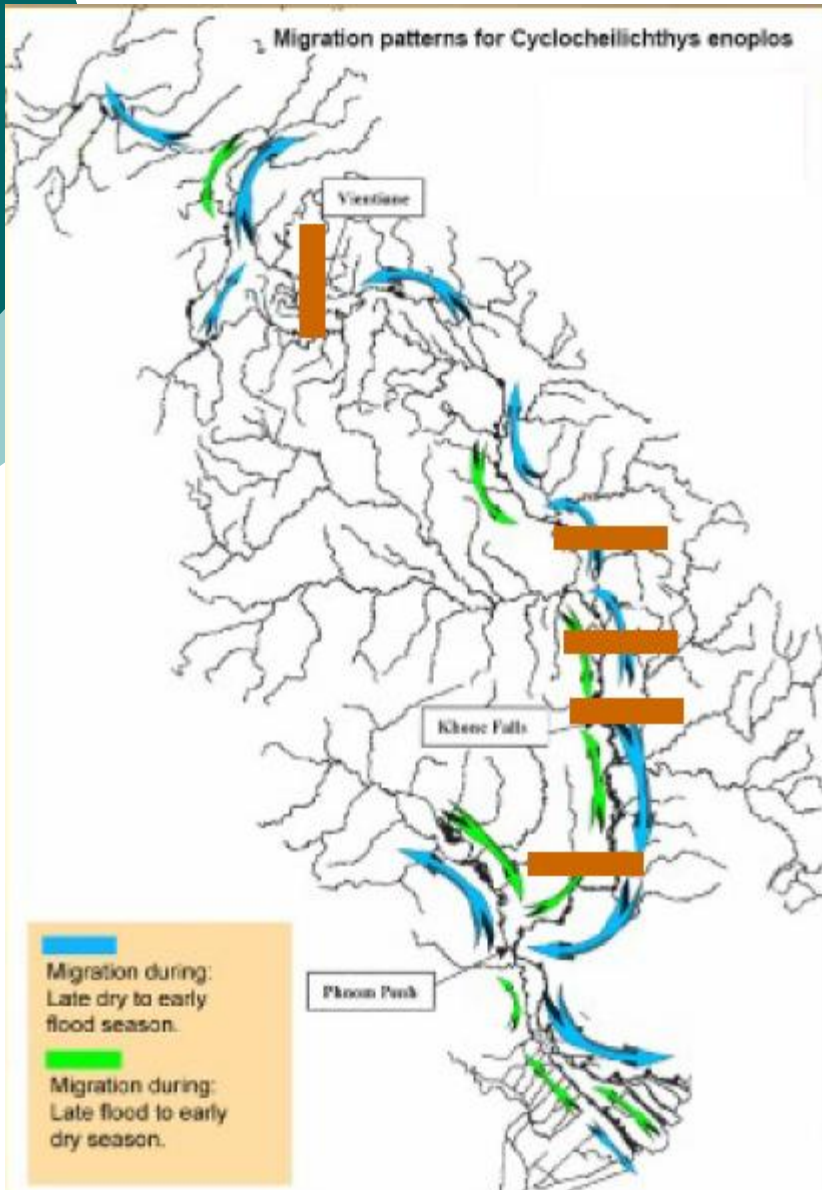


H Existing, planned and expected dams (2008)



I Planned mainstream dams (2010)

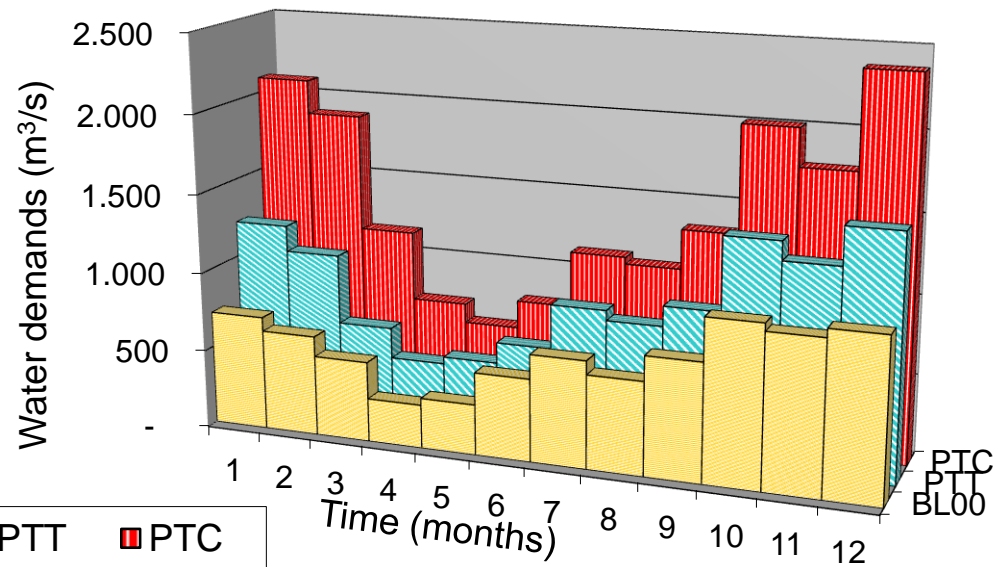
The potential of fisheries



- ❑ Mekong Basin in the 2nd world of aquatic species diversity
- ❑ Annual fish production of about 0.75 to 2.6 million tons, accounting for 7-22% of freshwater fish
- ❑ Mainstream hydropower can affect the fish path, the fish breeding

Change of water demand in the upstream

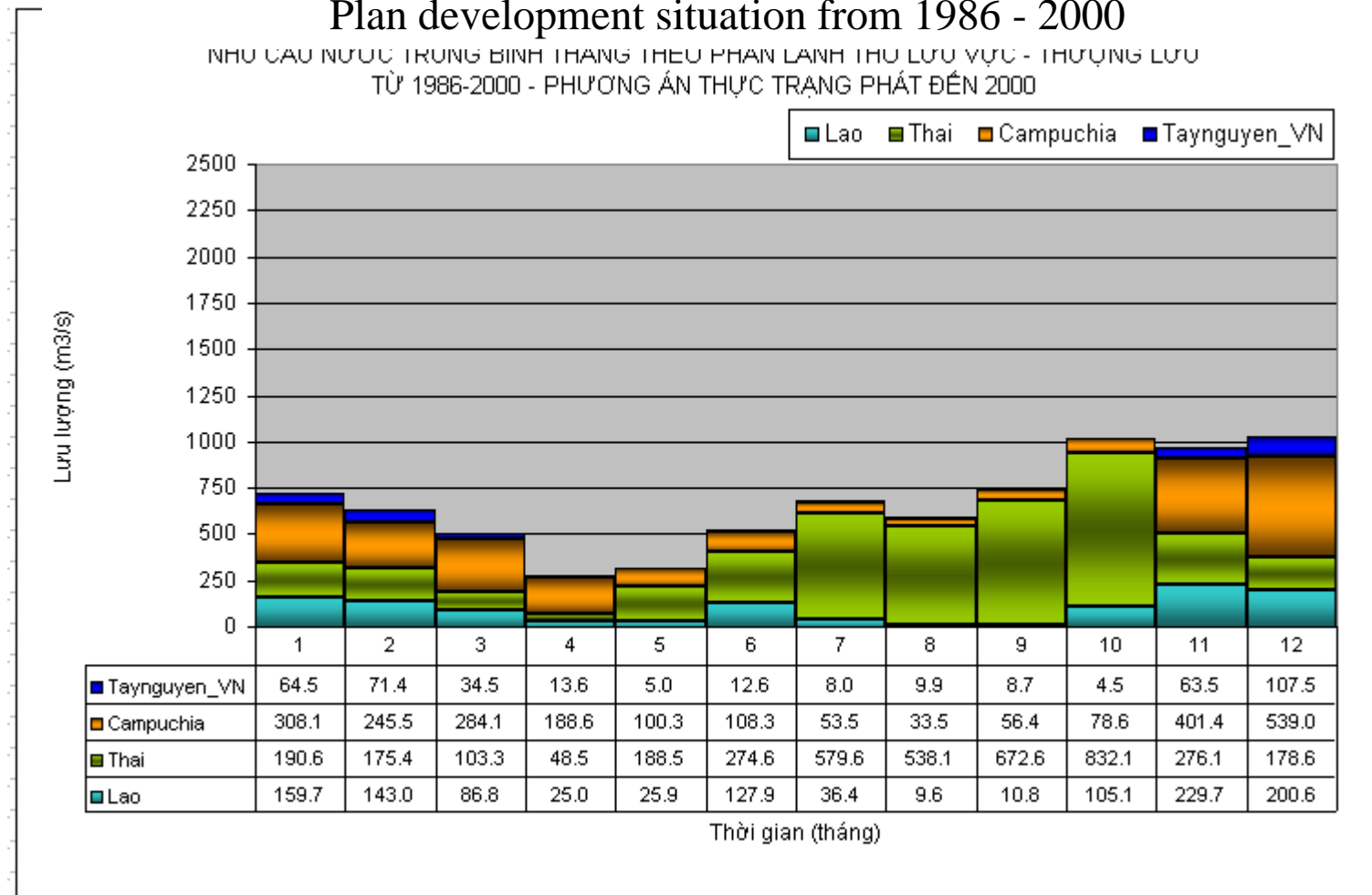
Integrated water demand by monthly average of scenarios for development and change of hydrometeorology condition from 1986-2000



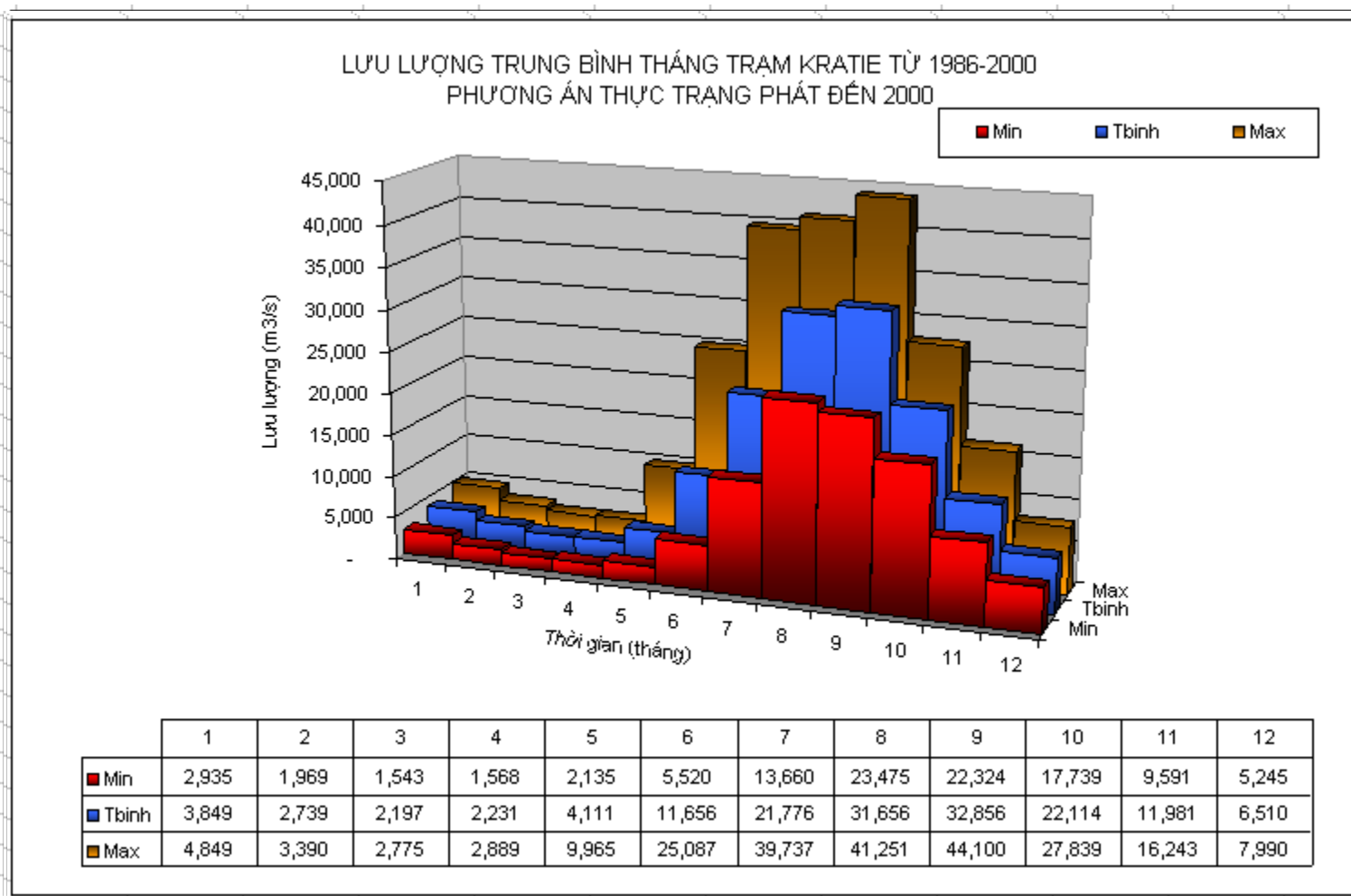
	1	2	3	4	5	6	7	8	9	10	11	12
BL00	723	635	509	276	320	523	677	591	748	1.020	971	1.026
PTT	1.224	1.062	625	432	476	607	886	823	949	1.412	1.292	1.531
PTC	2.094	1.885	1.157	722	602	777	1.127	1.085	1.333	2.007	1.771	2.376

Water demands in the national territory in the basin under the agricultural development scenarios

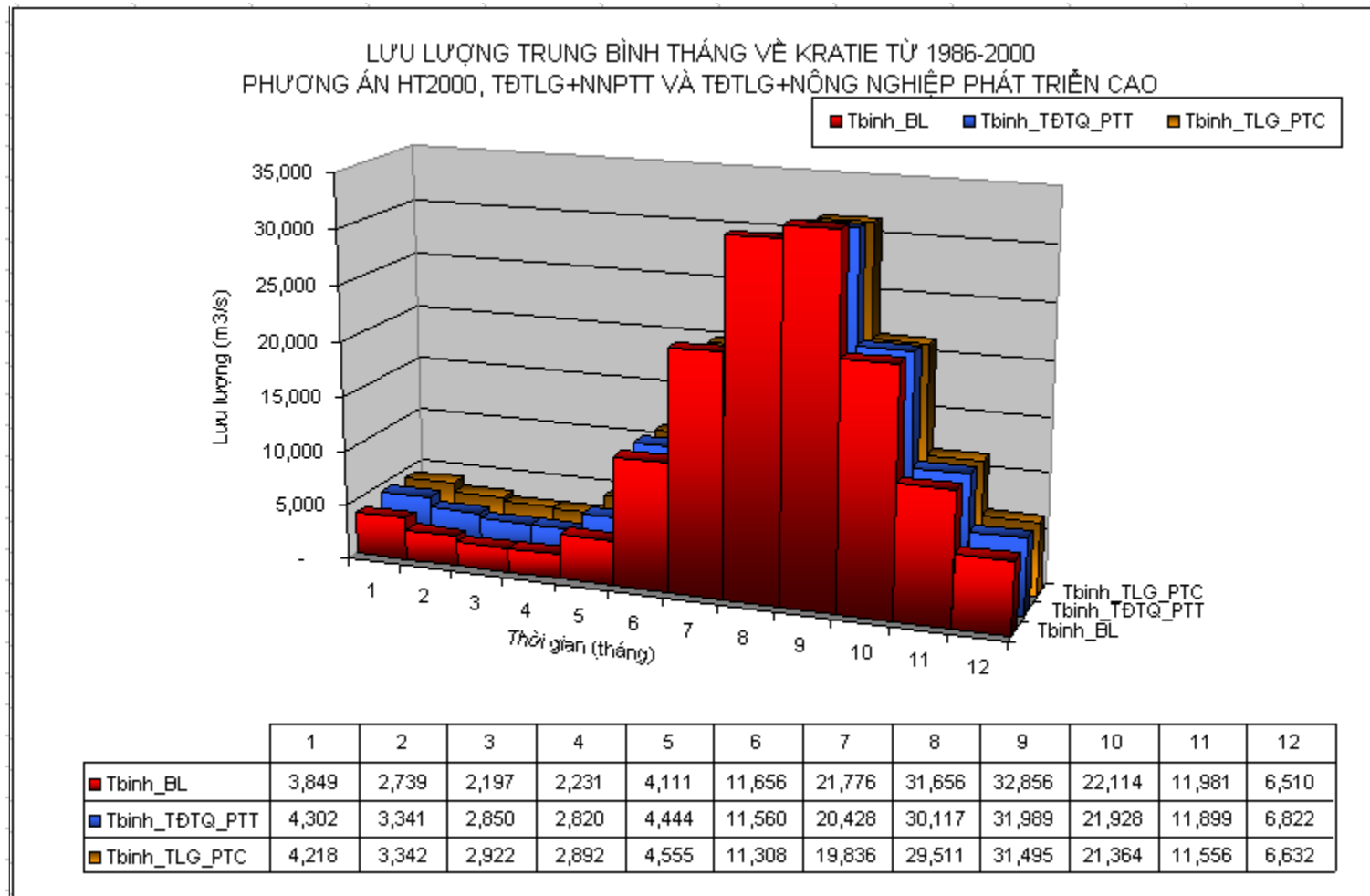
Average monthly water needs in the basin regions - the upper Mekong
Plan development situation from 1986 - 2000



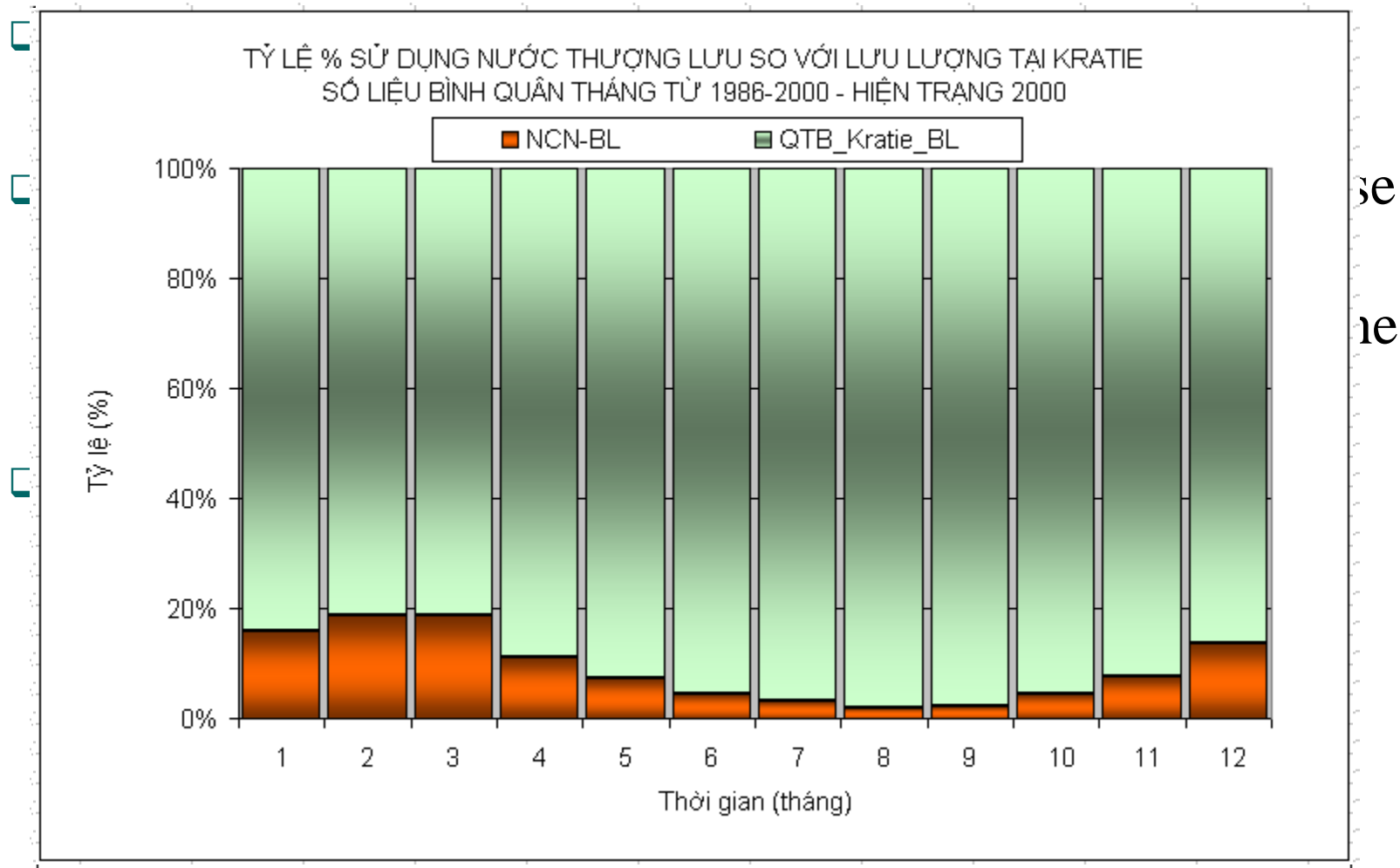
Changes of water flows in Kratie following the scenarios of upstream development



The possible impact on the points of view of changes amount of water in Kratie corresponding to the upstream development scenario



The possible impact on the points of view of the ratio of water use/water potential corresponding to the upstream development scenarios



The variation of salinity intrusion versus scenario of upstream flow at Kratie

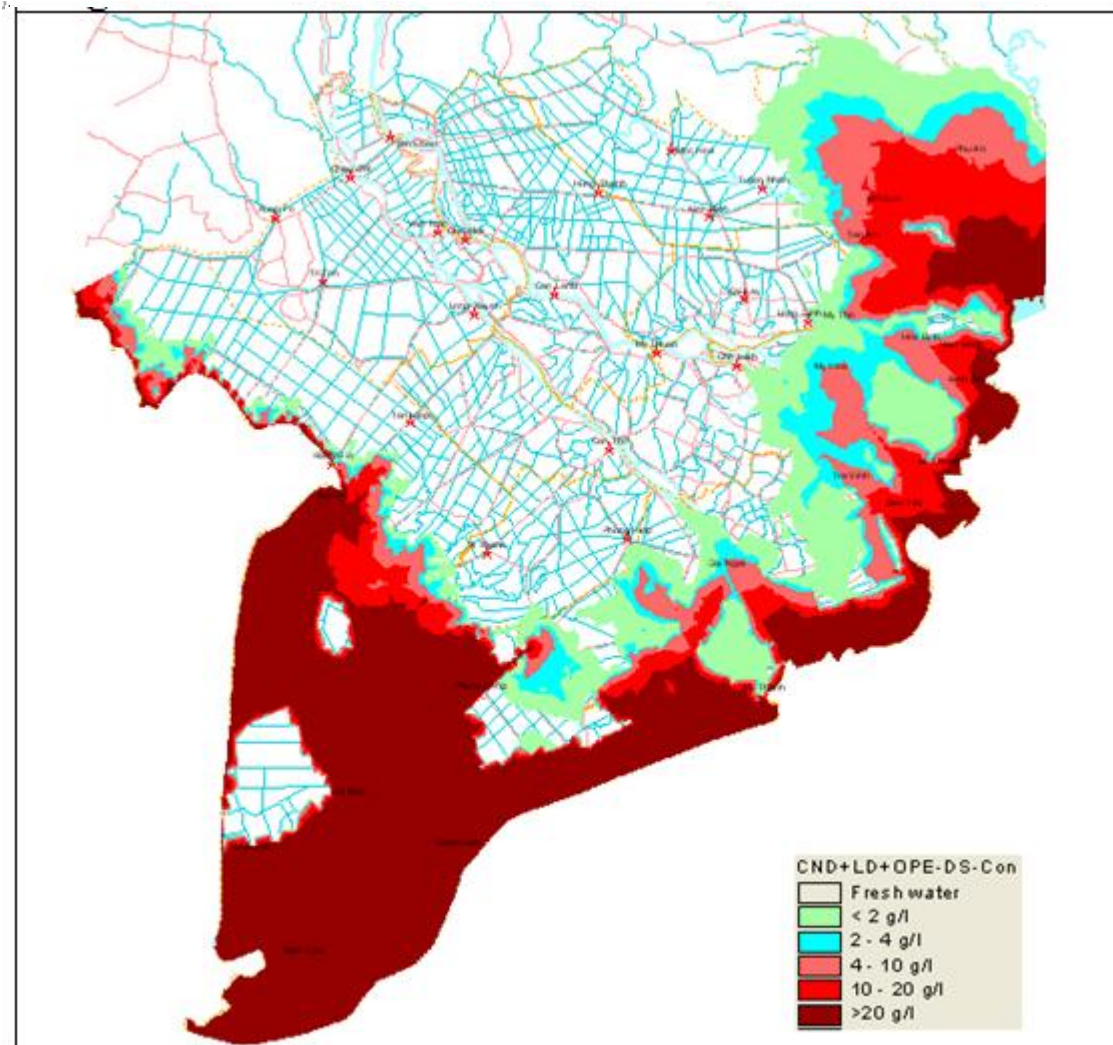
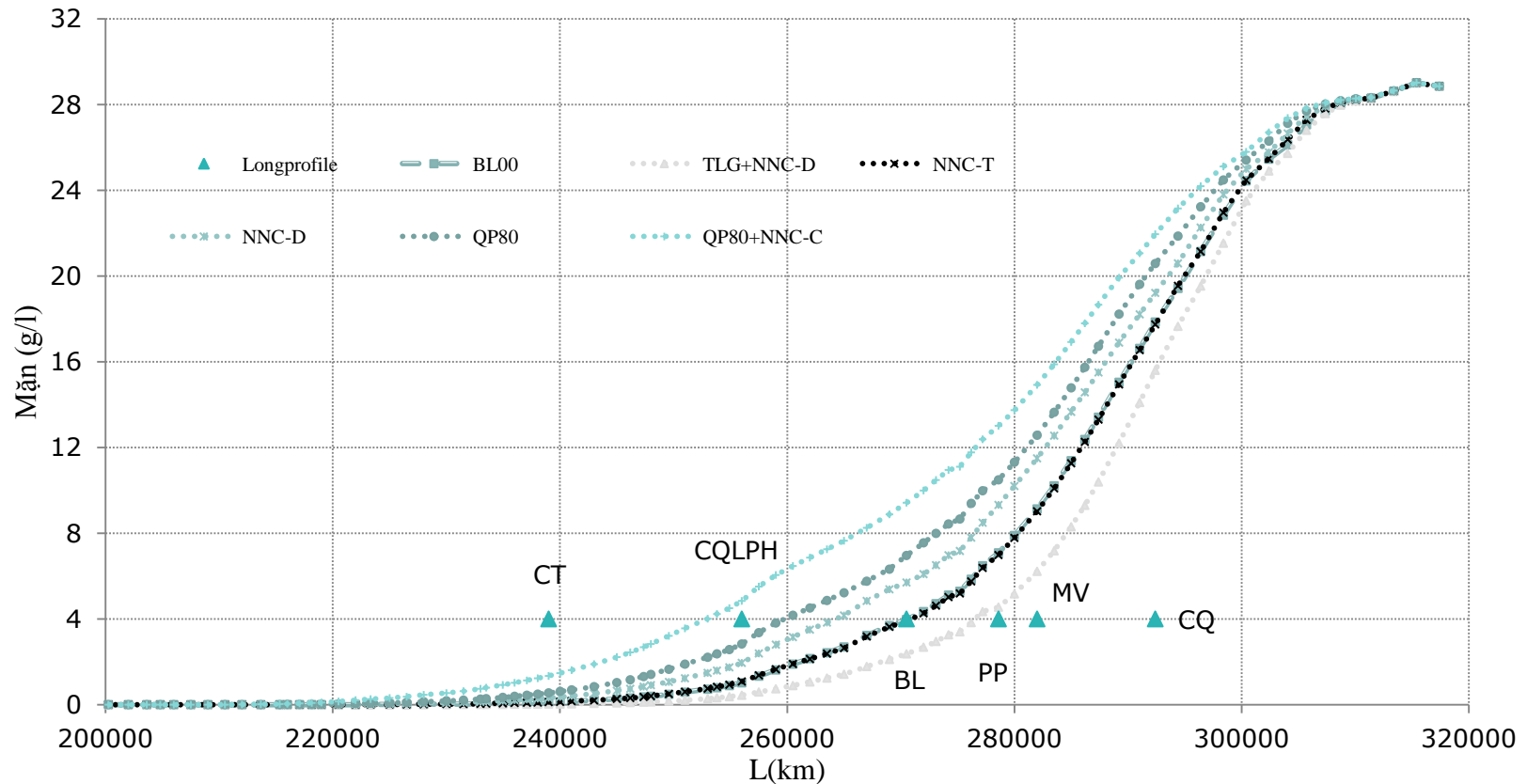


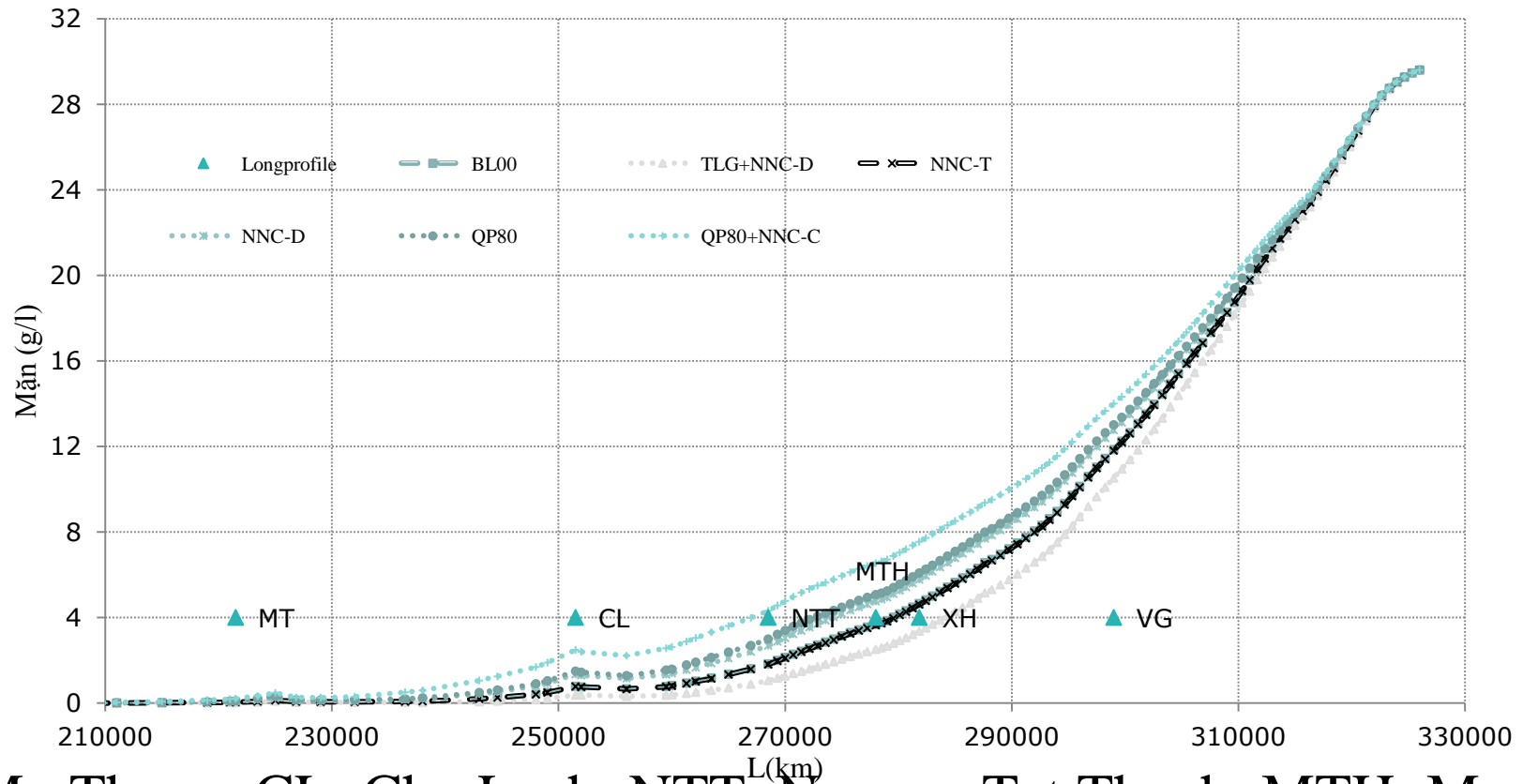
Fig.5.5a: CND+LD+OPE, concentration

Variation of largest saltwater intrusion along Bassac River in some key scenarios



CT: Can Tho; CQLPH: QLPH river mouth; BL: Bong Lot; PP: Phu Phong;
MV: My Van; CQ: Cau Quan

Variation of largest saltwater intrusion along Mekong River in some key scenarios



MT: My Thuan; CL: Cho Lach; NTT: Nguyen Tat Thanh; MTH: My Tho;
XH: Xuan Hoa sluice; VG: Vam Giong sluice

Impact Assessment

- Impact of upstream development scenario especially in the agricultural development and basin water diversion need to be concerned. Because of the upstream hydropower without increasing, the upstream high agricultural development can reduce the average flow of the Mekong Delta is about $600 \text{ m}^3/\text{s}$, which is approximately the annual average water demand – a significant impact on the agricultural situation in the Delta and salinity changes.
- Flood peak can be reduced compared with the current year, especially the small flood, but the flood period will be extended by the regulatory impacts of hydropower reservoirs → shallow flooded area could increase

Impact Assessment

- ❑ Change the water needs for agricultural development hypothesis increase however it also depends on the ability of the regulated hydroelectric,
- ❑ The ability to increase downstream flows due to upstream hydropower in general and China in particular will be less satisfactory,
- ❑ In dry years the flow of water downstream can dramatically reduce about 1 to 2 months, as the low flow years has occurred, it can affect the salinity increasing influence on the time crop..

Considerations

- ❑ Increased agricultural development, particularly in Cambodia is a matter of concern for the Mekong Delta,
- ❑ Abnormal operation of the upstream hydropower plants will have a major impact on downstream,
- ❑ Hydropower cascade will cause downstream flow not follow natural rule so it will be difficult to predict its impacts,
- ❑ Mainstream hydropower reduces sediment, river bed changes, affecting biodiversity and fish production.
- ❑ ...

THANK YOU FOR YOUR ATTENTION

