Vietnam Baseline Perspective

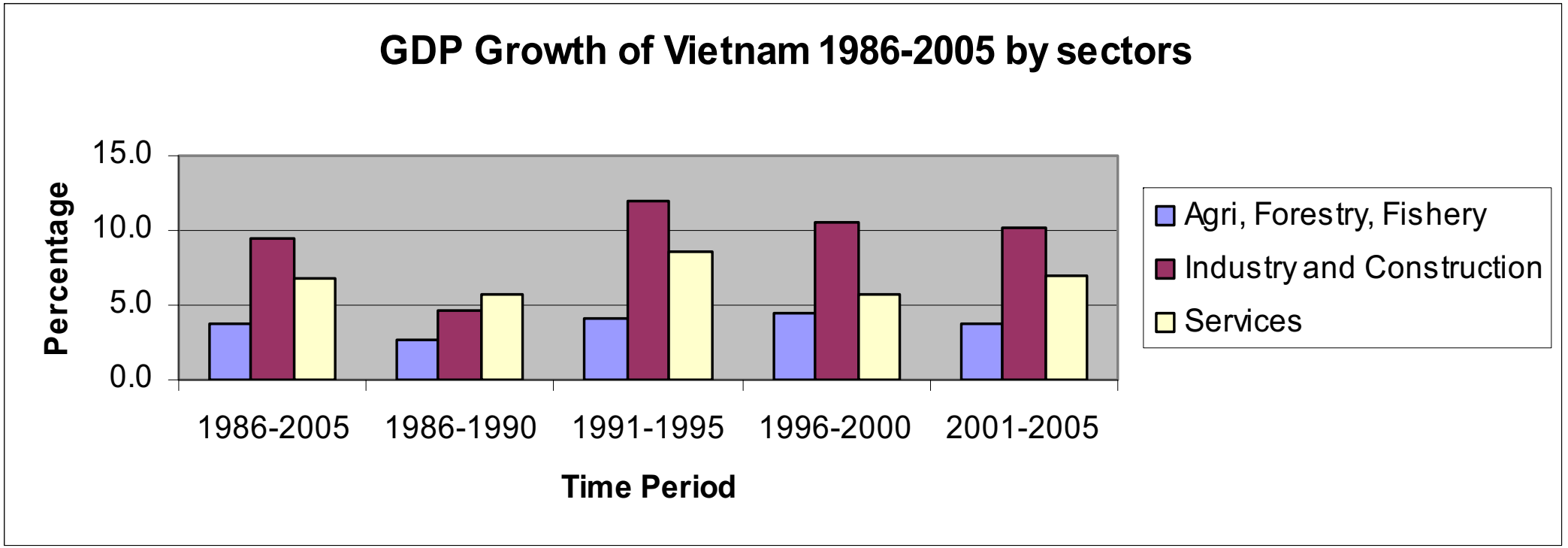
Key issues and trends in the Mekong Delta

Structure of presentation

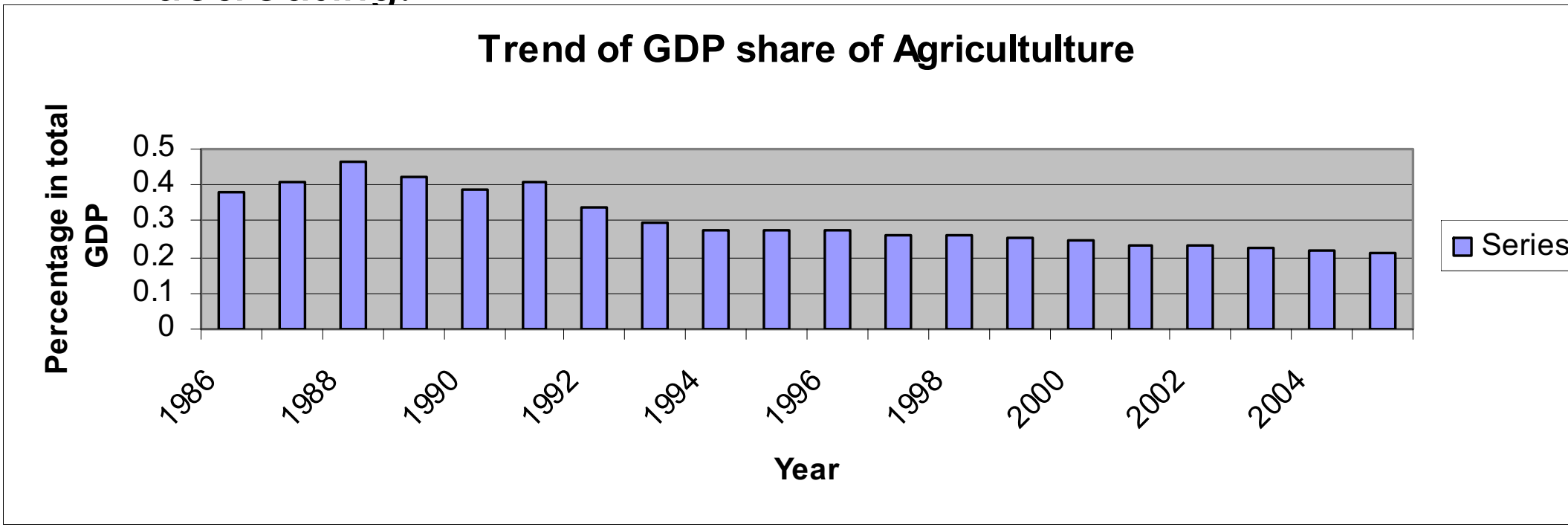
- National macro-economics
  - Total national GDP trend
  - Key growing sector
  - Drivers of the trend
  - Government targets
- Mekong Delta
  - Role of Mekong Delta
  - Population trend
  - Land use trend
  - GDP trend and structure
  - Income trend
  - Poverty trend
  - Sampled province of Dong Thap
- Hydrology and chemico-physical environment
  - Characteristics
  - Acidification
  - Saline intrusion
- Water need for agriculture

National Macro Economics

- All sectors were growing
- Fastest in 1991-1995
- Industry and Construction was the fastest growing sector.



- Countrywide, GPD share of Agriculture has been decreasing.



Drivers of the Past Trends

- Shift to market oriented economy.
- Laws in place (Enterprise law, Foreign investment law, 1992 constitution recognizing multi-element economy, land law)
- Rapid increase in investment capital
- Rapid increase of FDI

(http://www.gso.gov.vn/default.aspx?tabid=382&idmid=2&ItemID=4699)

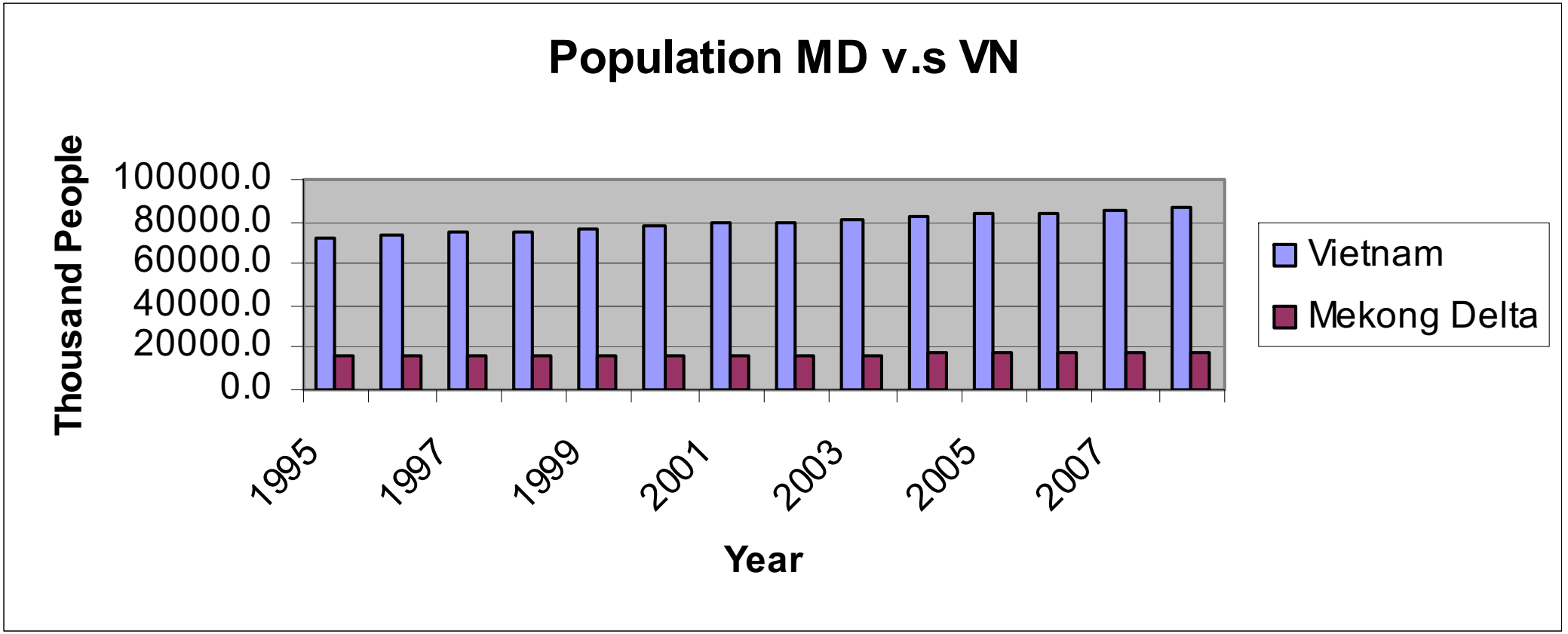
Targets

- Rapid economic growth and structural change of the economy towards industrialization and modernization
- GDP share of agriculture is aimed at 10%, agriculture labor is targeted at 25-30%.
- Industry is comparable to the region and competitive internationally.
- Modernized agriculture and infrastructure, diversified industry and services in rural area.
- Diversified service sector, esp. banking and communication to meet international standards.
- GDP per capita is targeted at USD 3200/annum.

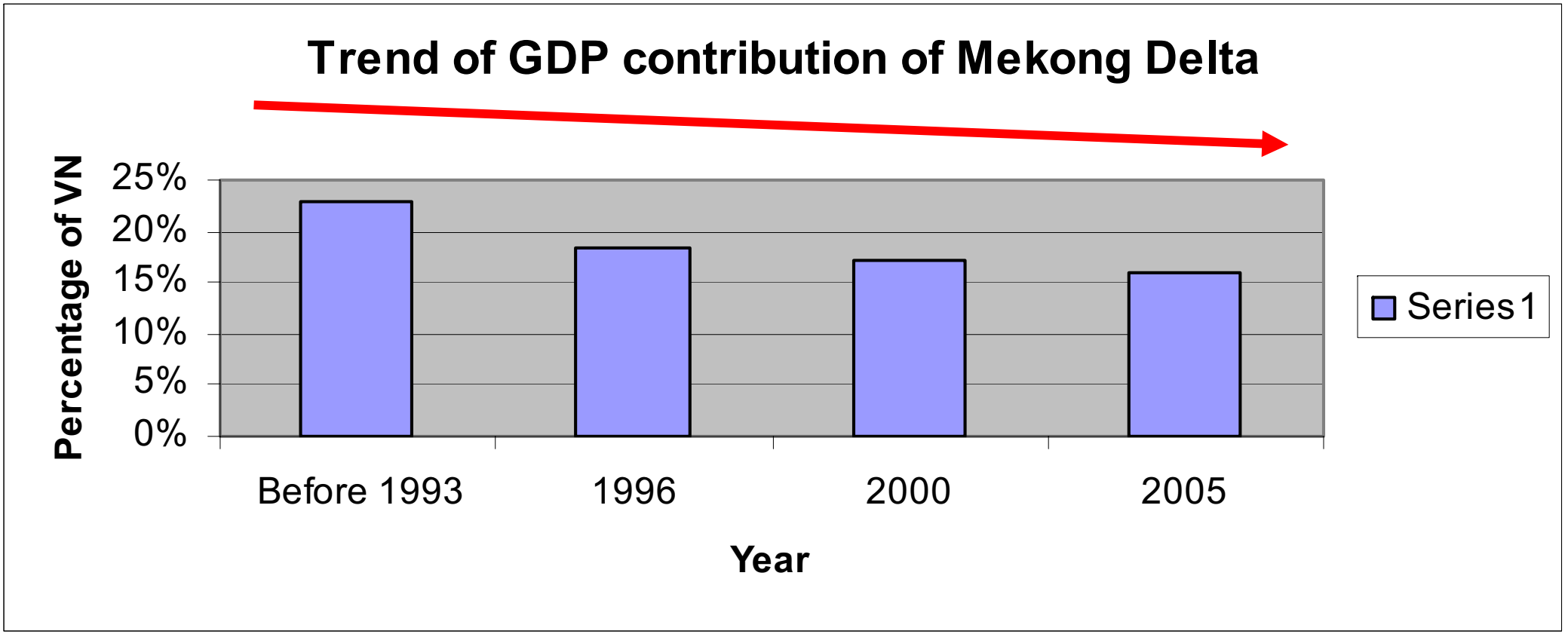
(According to Nguyen Xuan Hien (website of SWRPI, undated)

Mekong Delta

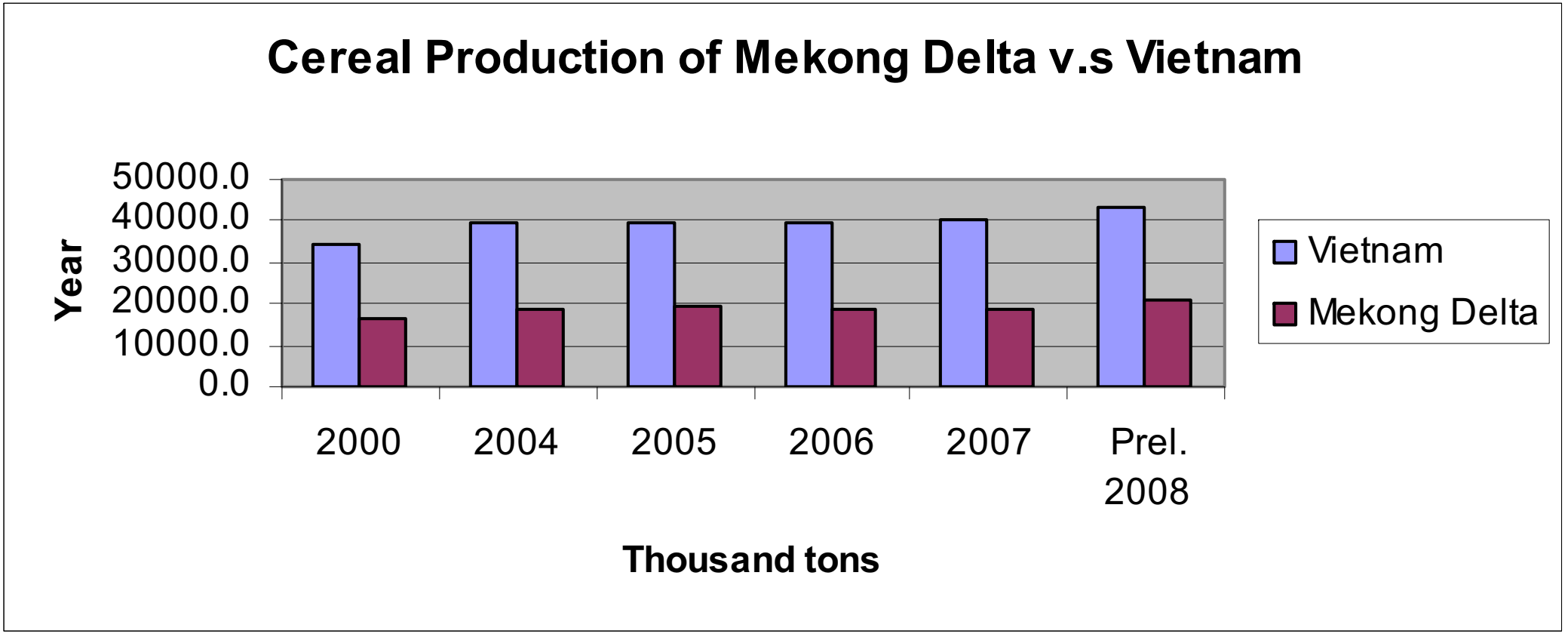
20% of VN population



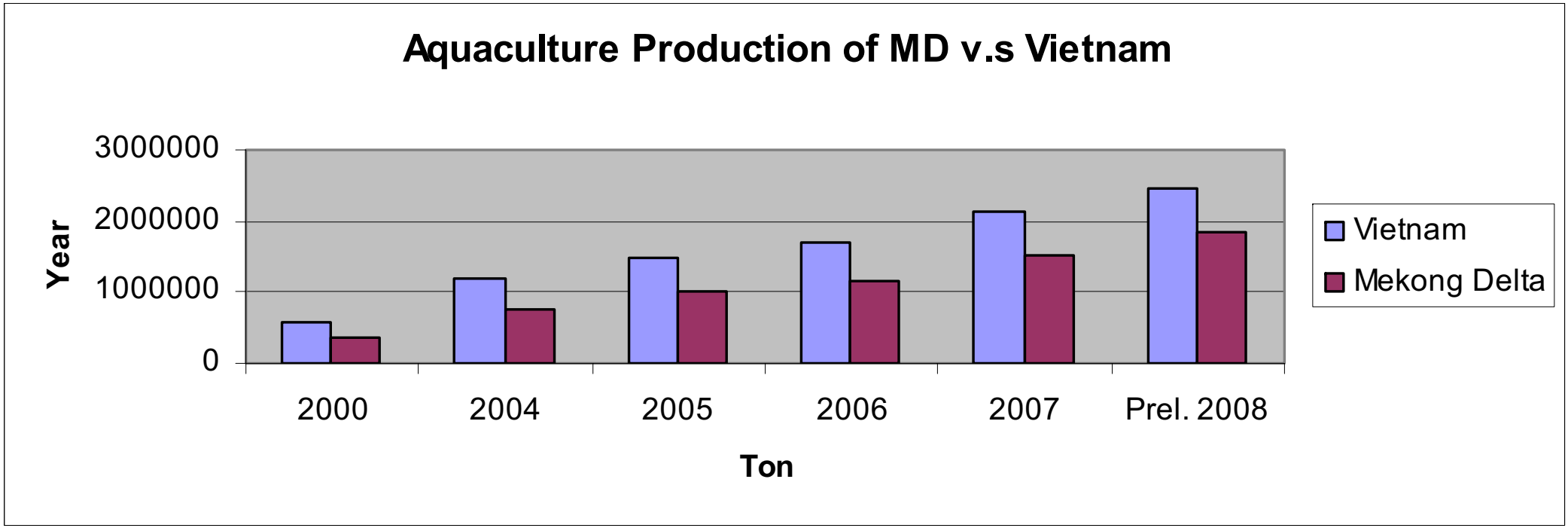
20% of VN's GDP


Trend of GDP contribution of Mekong Delta
Percentage of VN
25%
20%
15%
10%
5%
0%
Before 1993
1996
2000
2005
Year
Series1

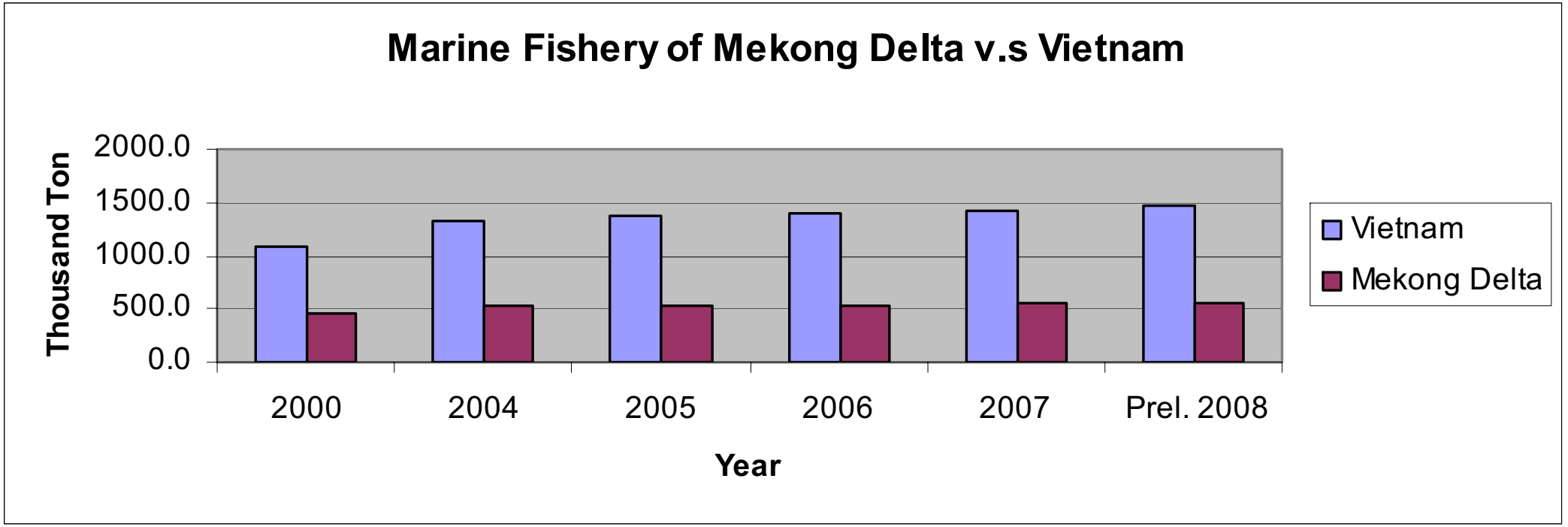
48% of cereal production



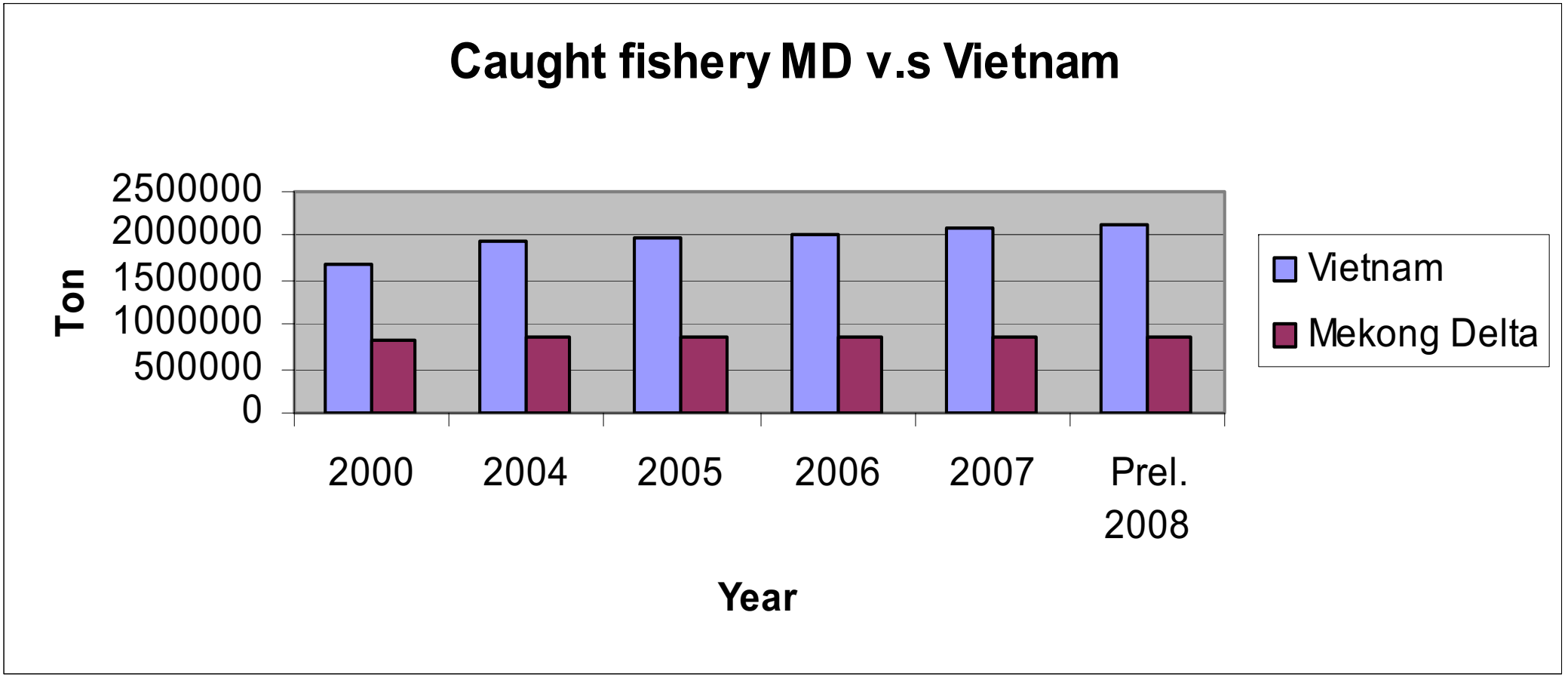
75% of Aquaculture production



38% of Marine Fishery

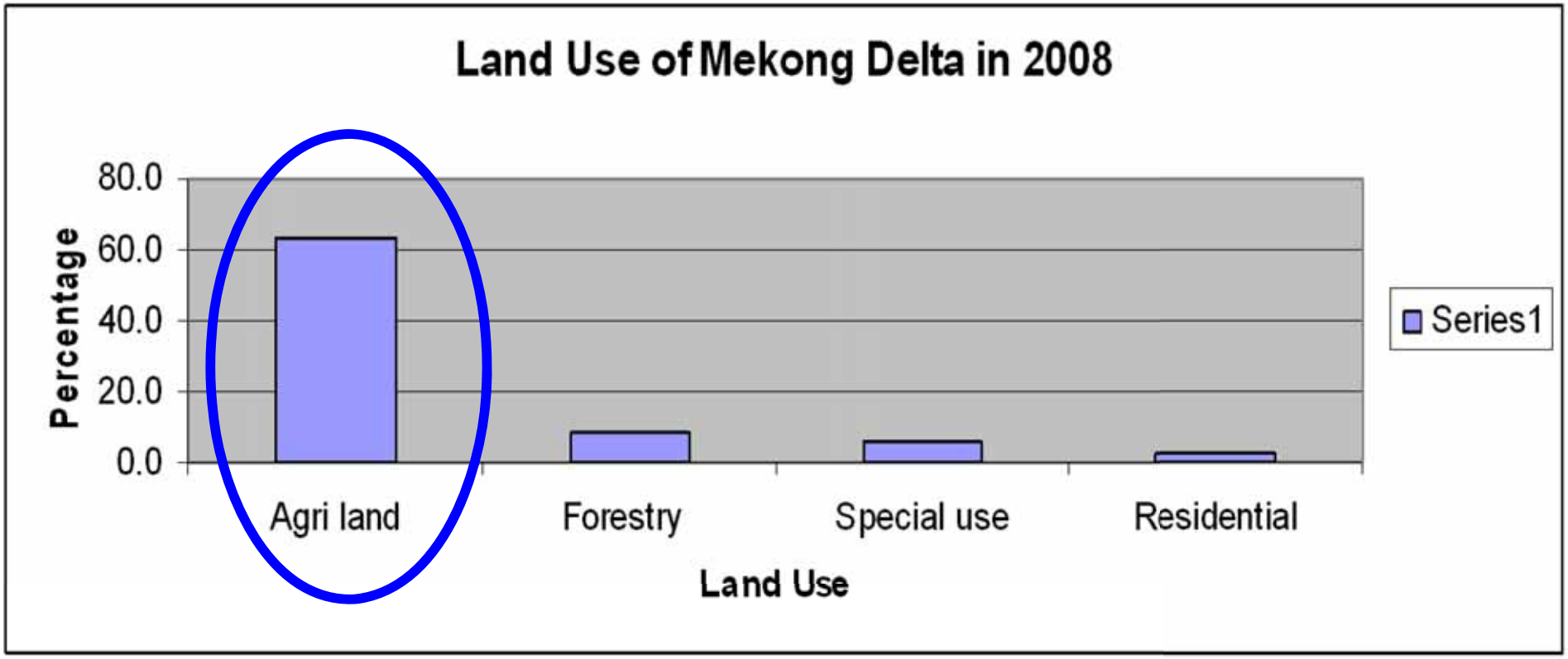


40% of caught fisheries

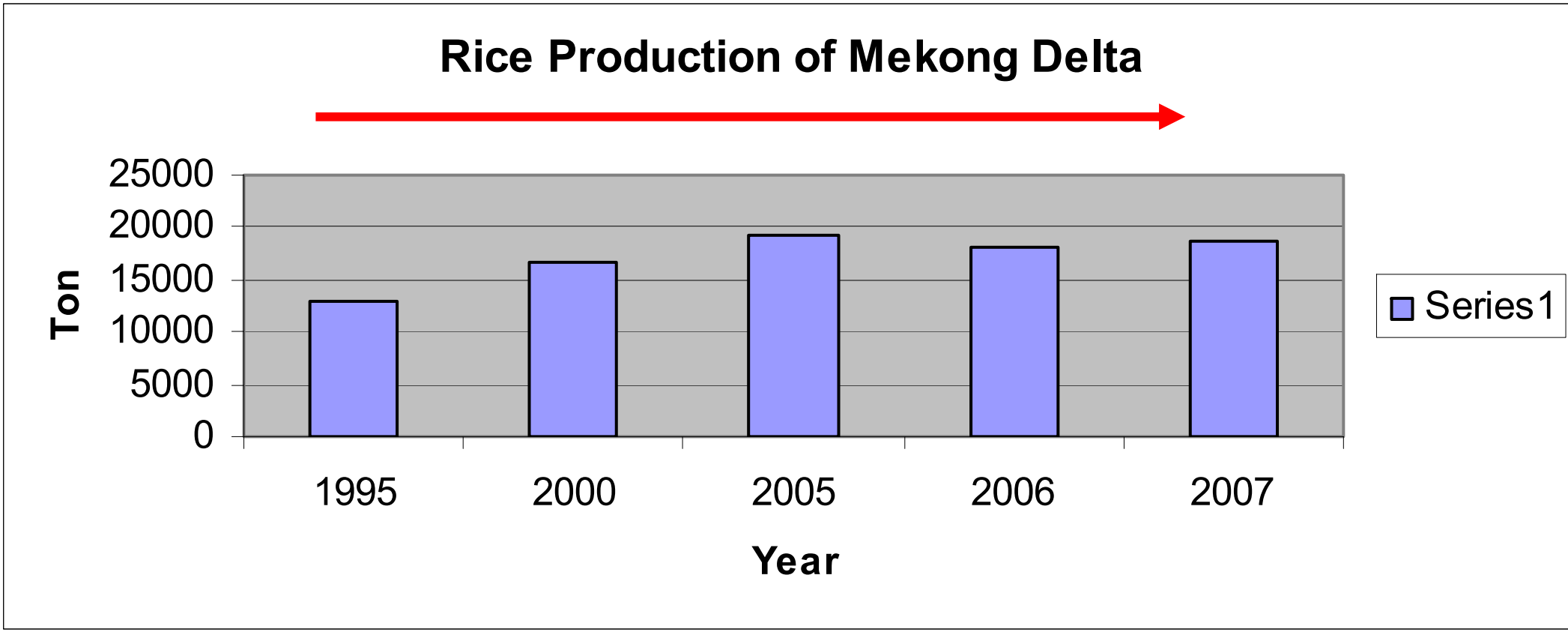


Land Use

- Agri and Forestry (71.4%)
- 63.1 is Agriculture
- 8.3 is forestry

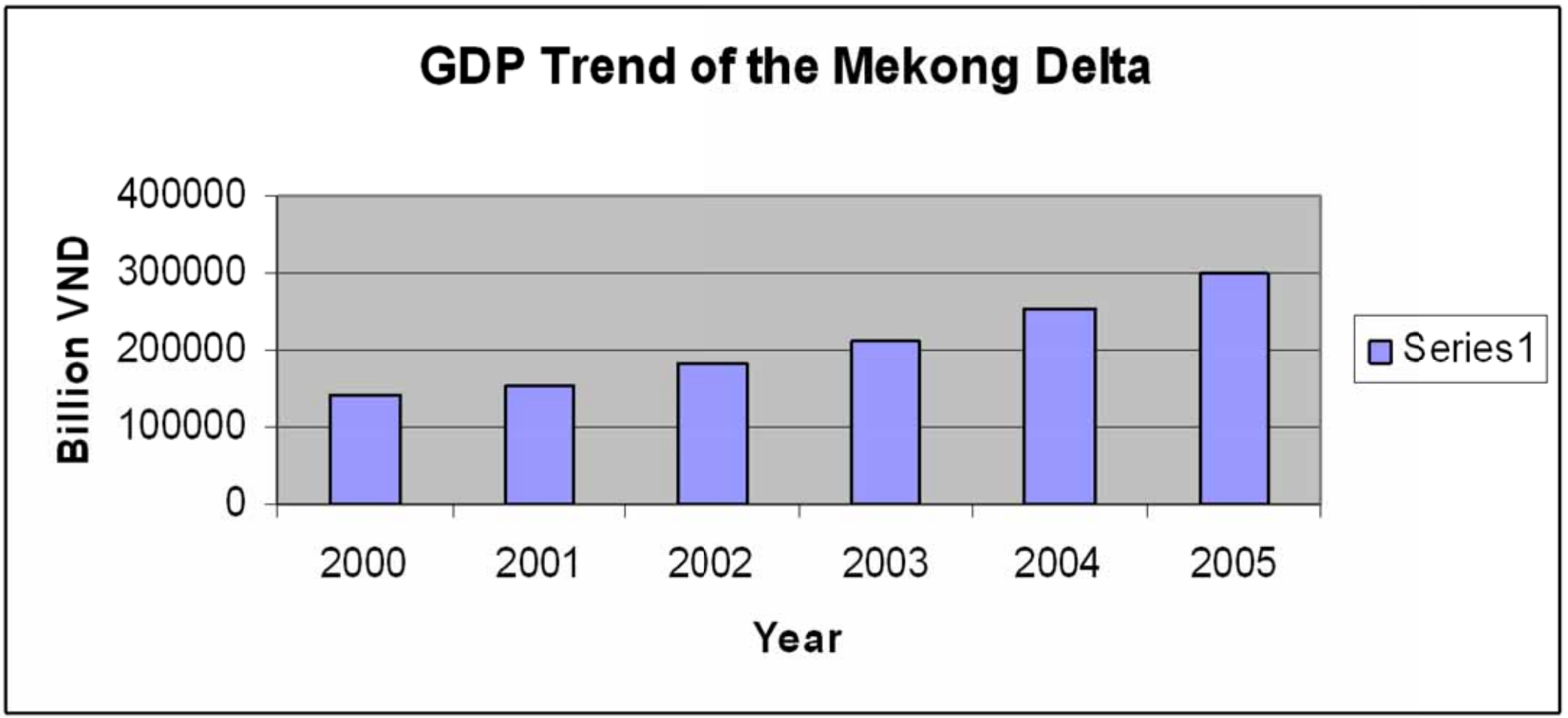


Rice Production

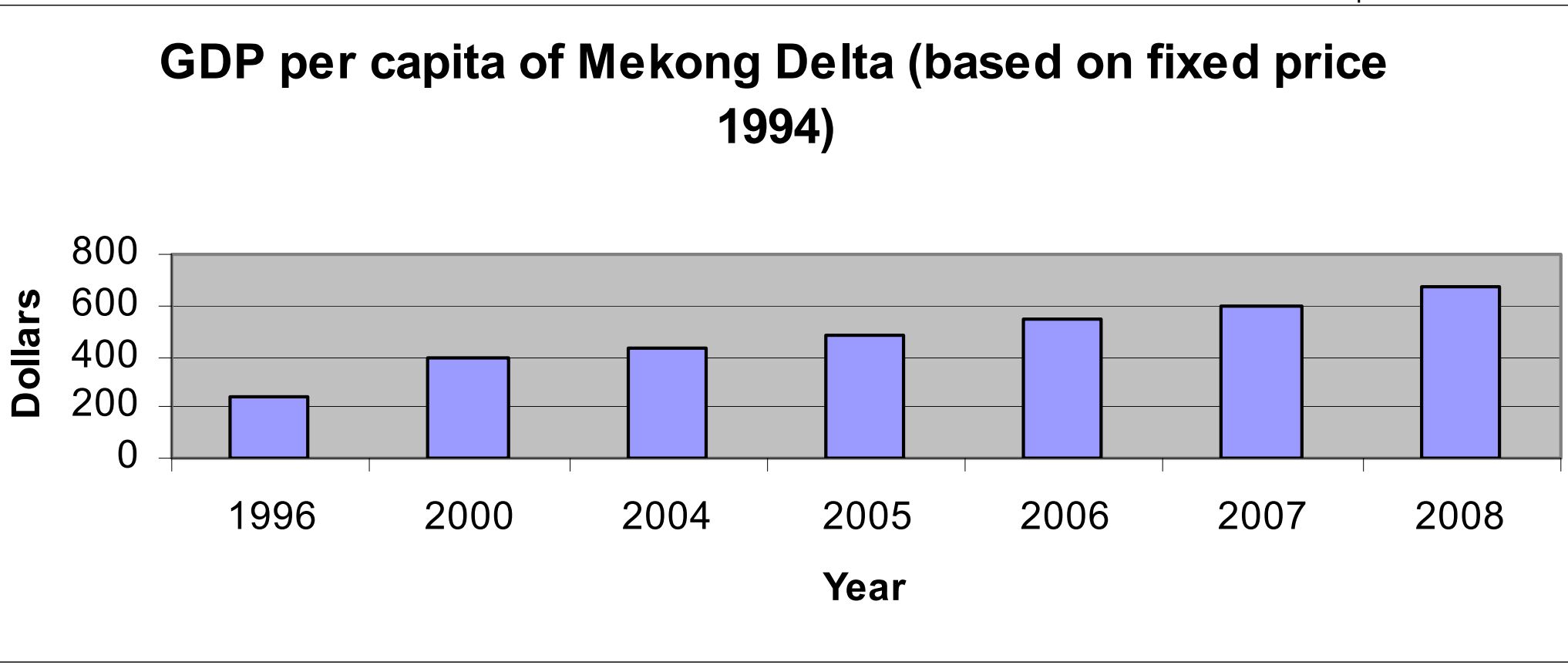


http://www.mekongdelta.com.vn/mekongdelta/Solieu/Sanluong.htm#Bảng_7.2_

Total GDP trend



GDP per capita trend



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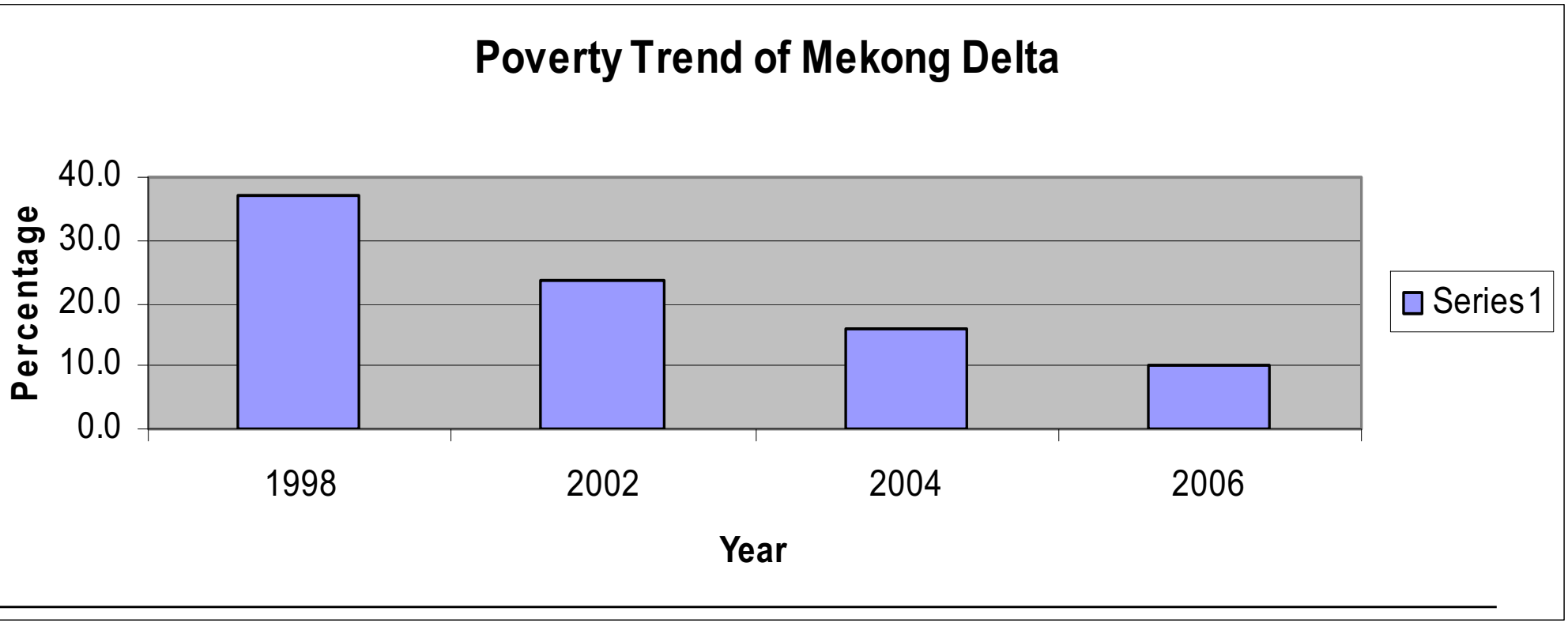
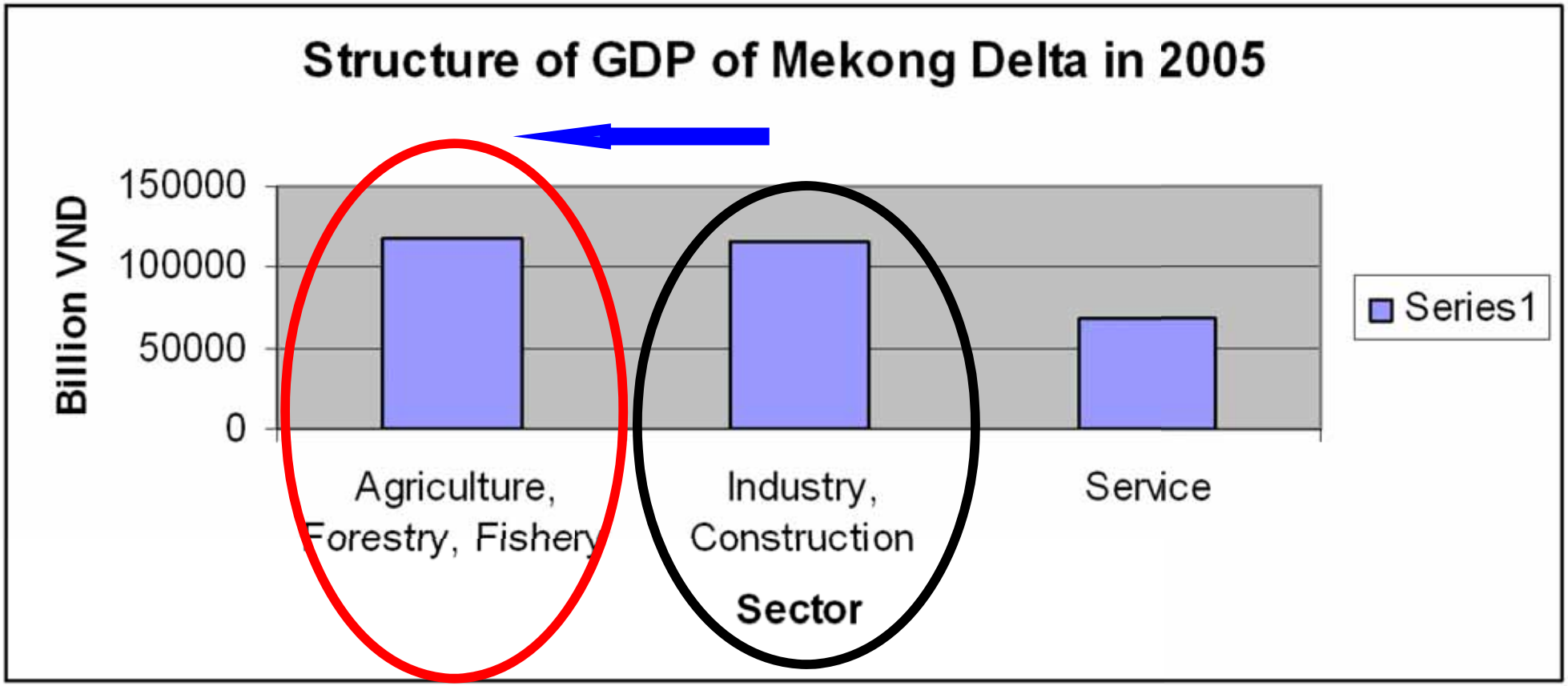
Poverty Reduction Trend



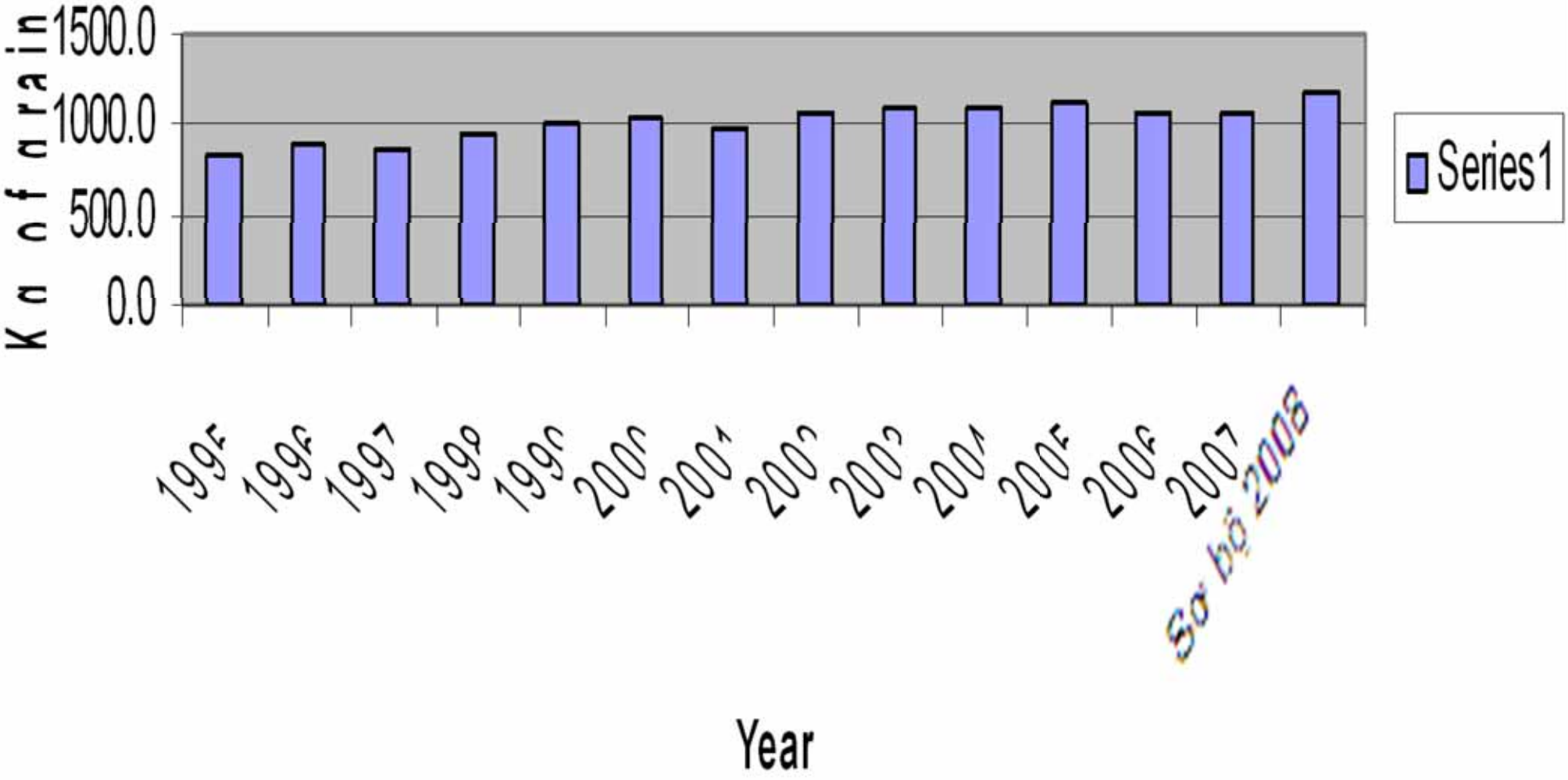
(*) Poverty line is based on monthly expenditure per person. it is VND149,000 in 1998, 2002: VND160,000; 2004: VND173,000; 2006: VND 213,000.

Economy of Mekong Delta relies on Agriculture
Industry in MD is Agri-related

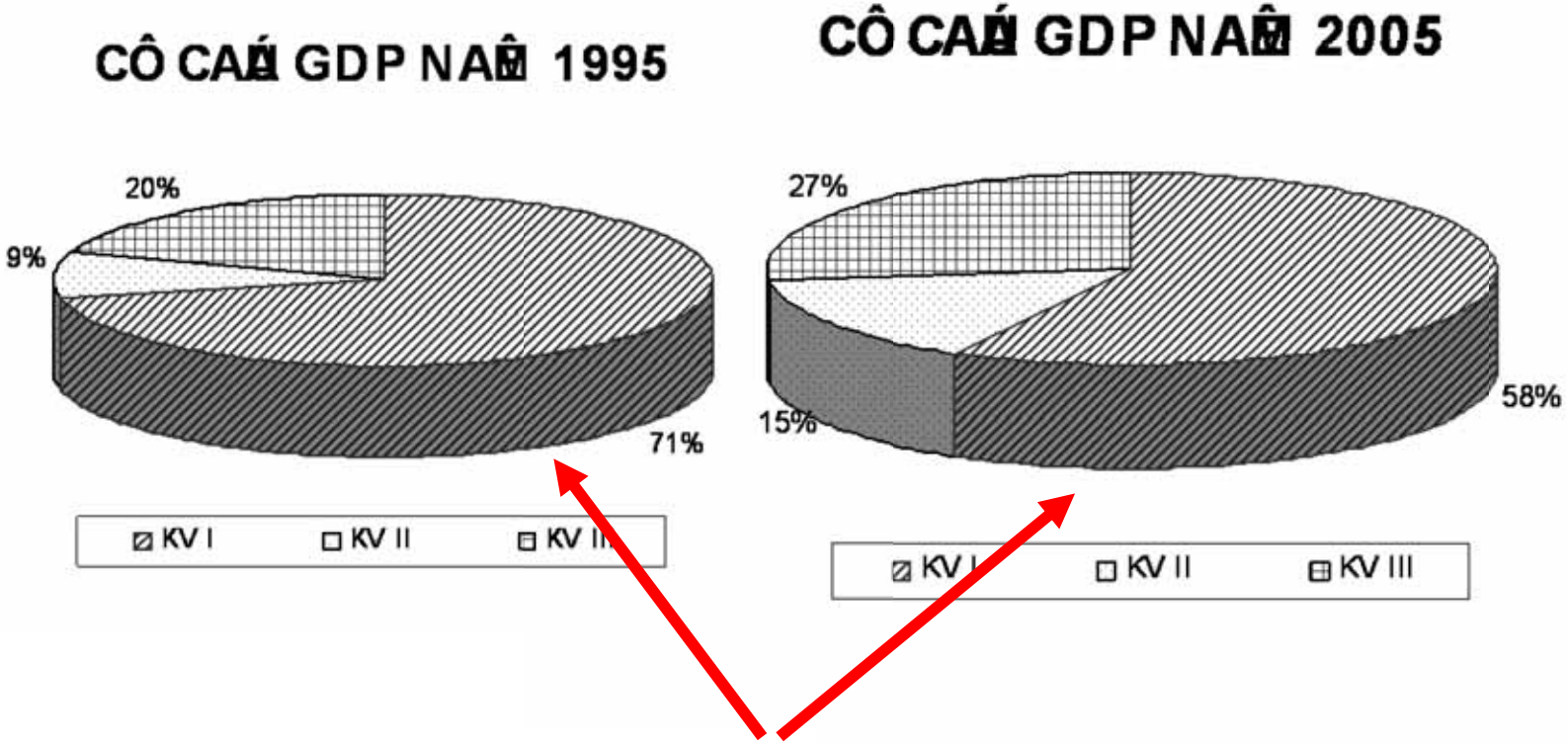
(http://www.tuoitre.com.vn/tianyon/Index.aspx?ArticleID=104390&ChannelID=11)



Food per capita of Mekong Delta

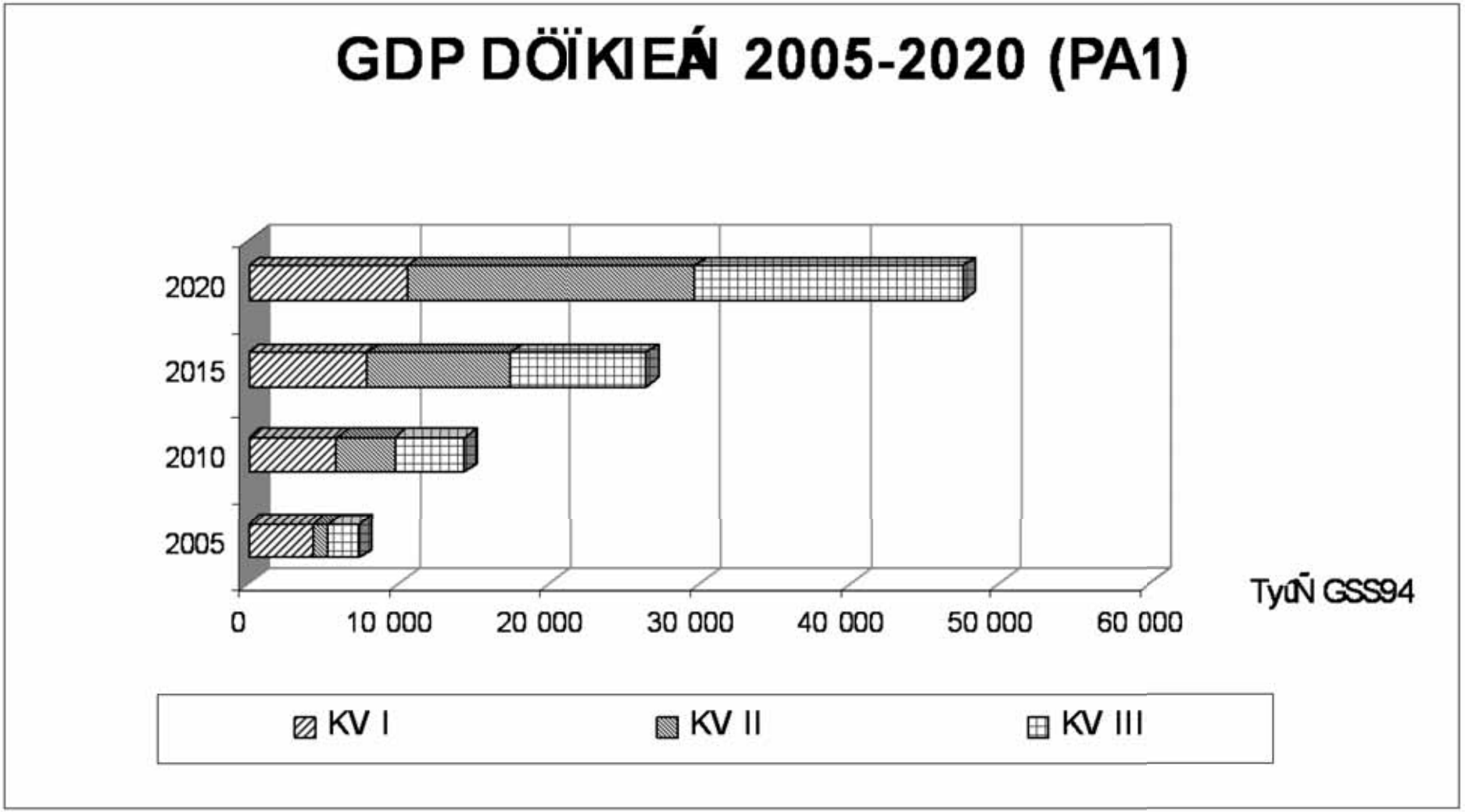


Sampled Province: Dong Thap province



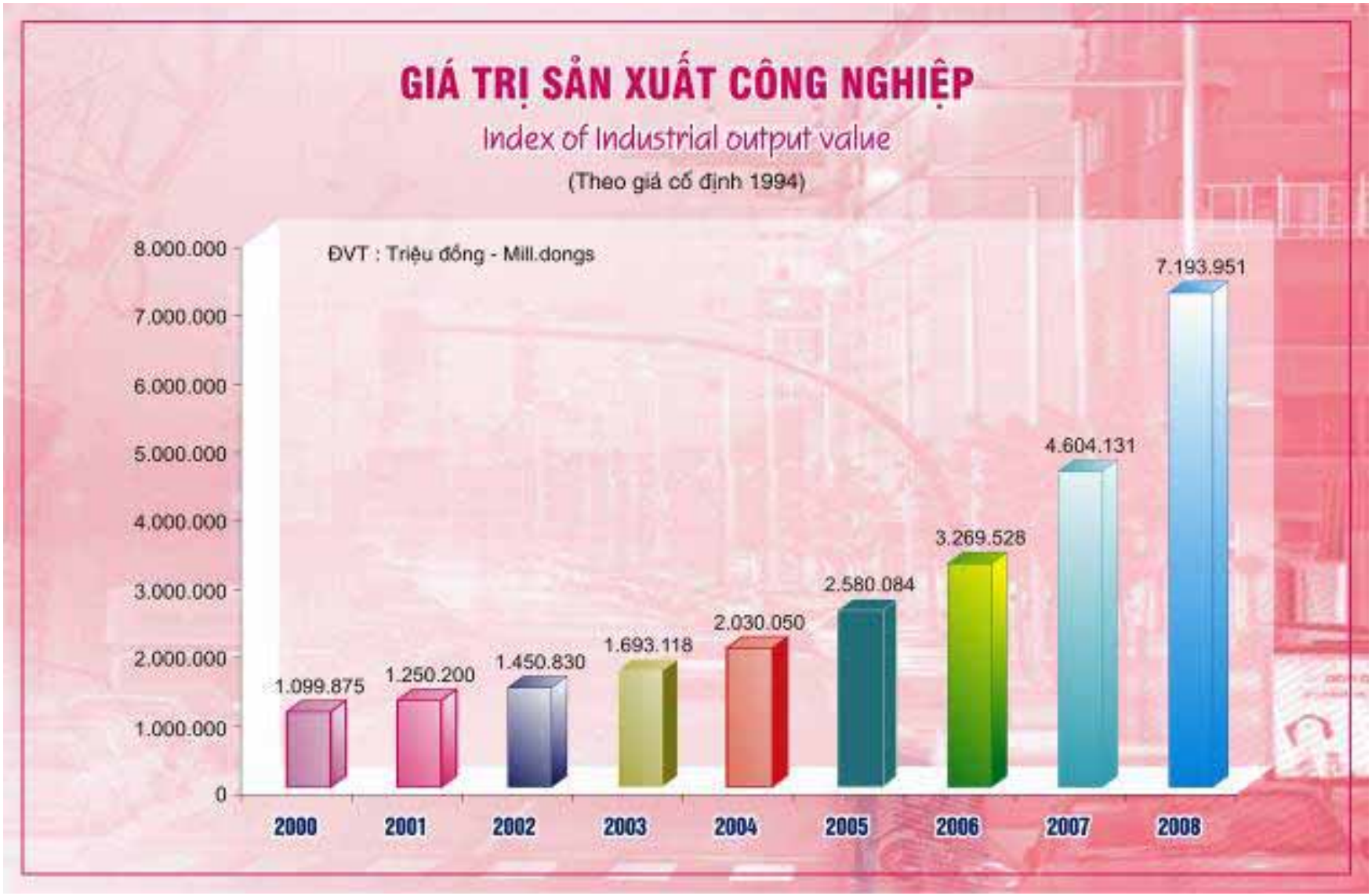
Agriculture is a major part of GDP's structure

Expected GDP in 2020 of Dong Thap province

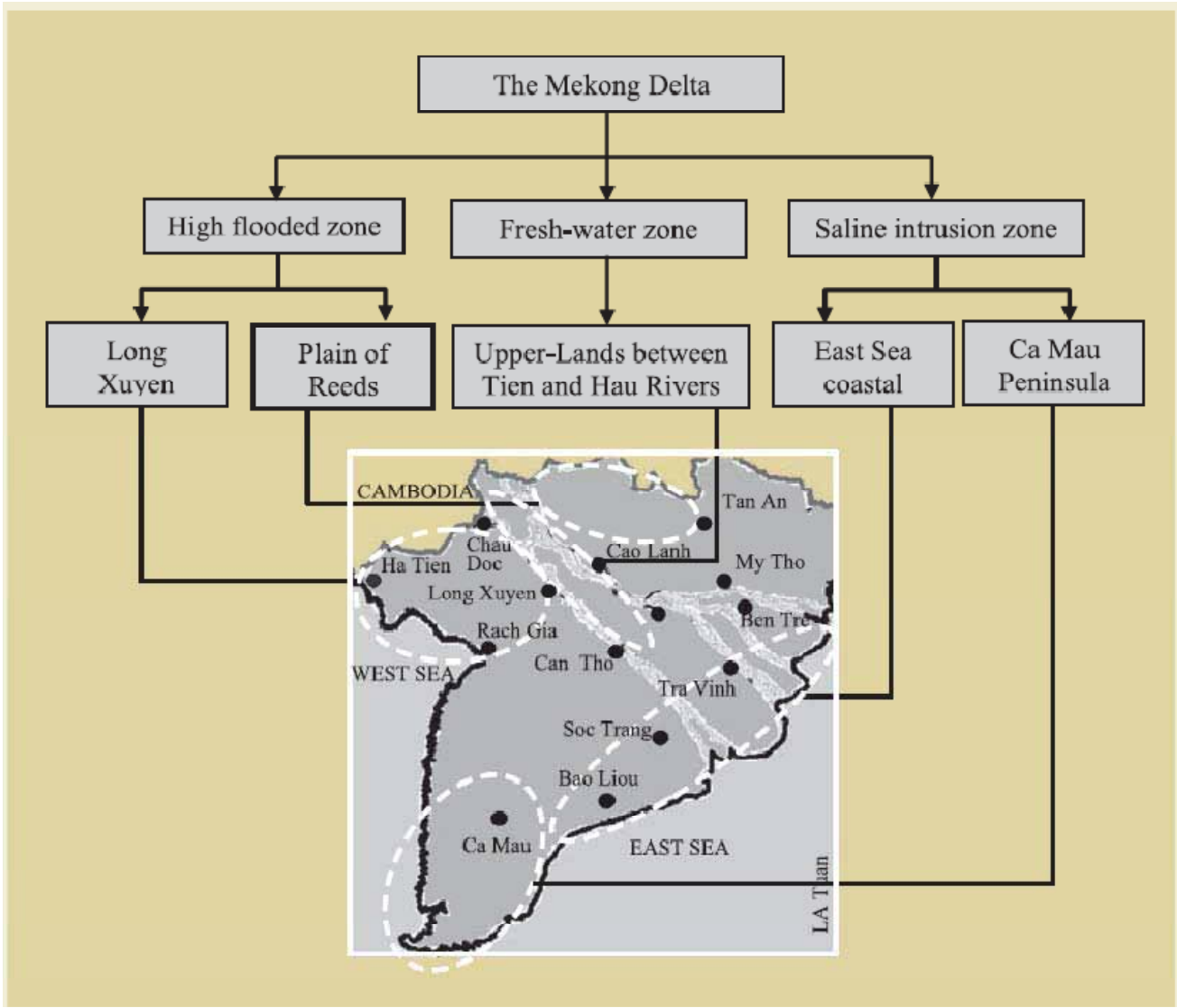


Rice production Trend of Dong Thap province

Trend of industry value of Dong Thap (Agri-related)



Hydrology and bio-chemo-physical environment of the Delta



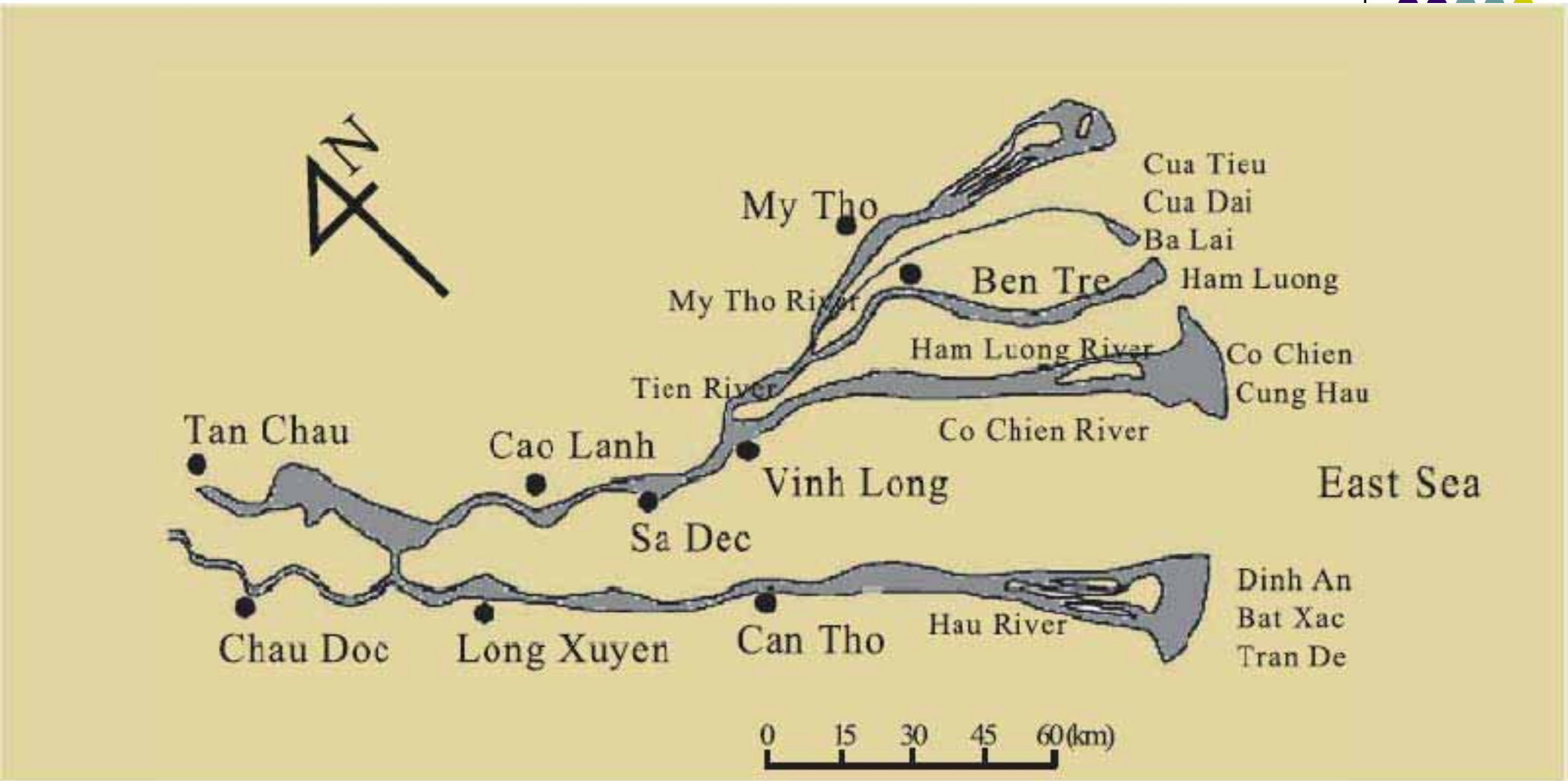
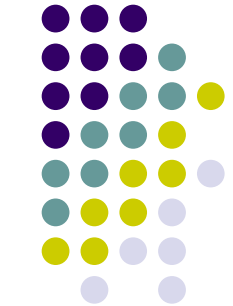


Figure 4: The Mekong River in Vietnam and its nine branches
(Source: Modified from http://cantho.cool.ne.jp)

The Mekong Delta



- Flat flood plain (0-4 meters a.m.s.l)
- Formed of eroded sediments from upstream.
- 7,000 km of main canals, 4,000 km of secondary canal, 20,000 km of protection dykes (preventing early flood) (MARD, 2003)

Annual pattern of water discharge of the Mekong

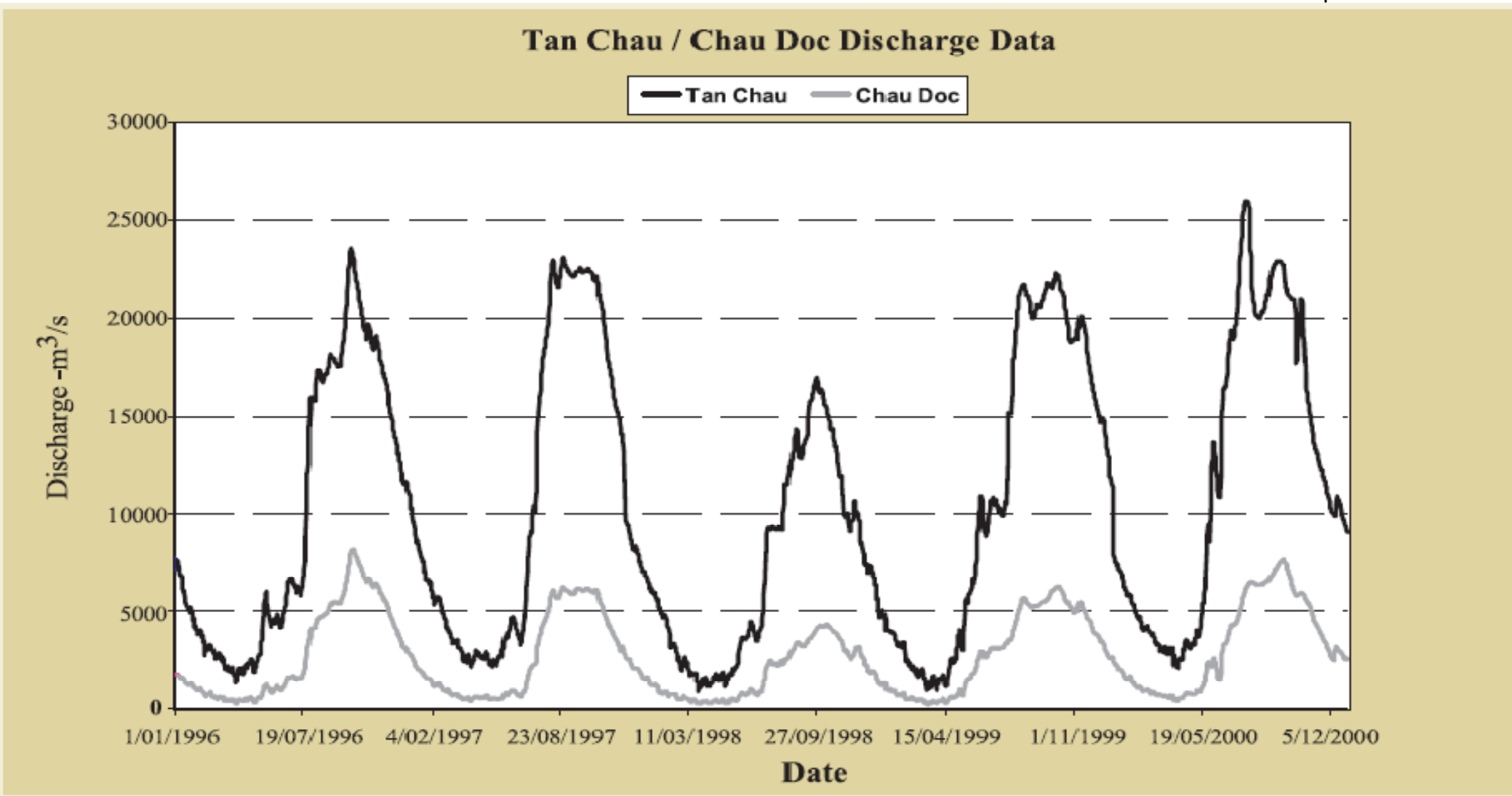
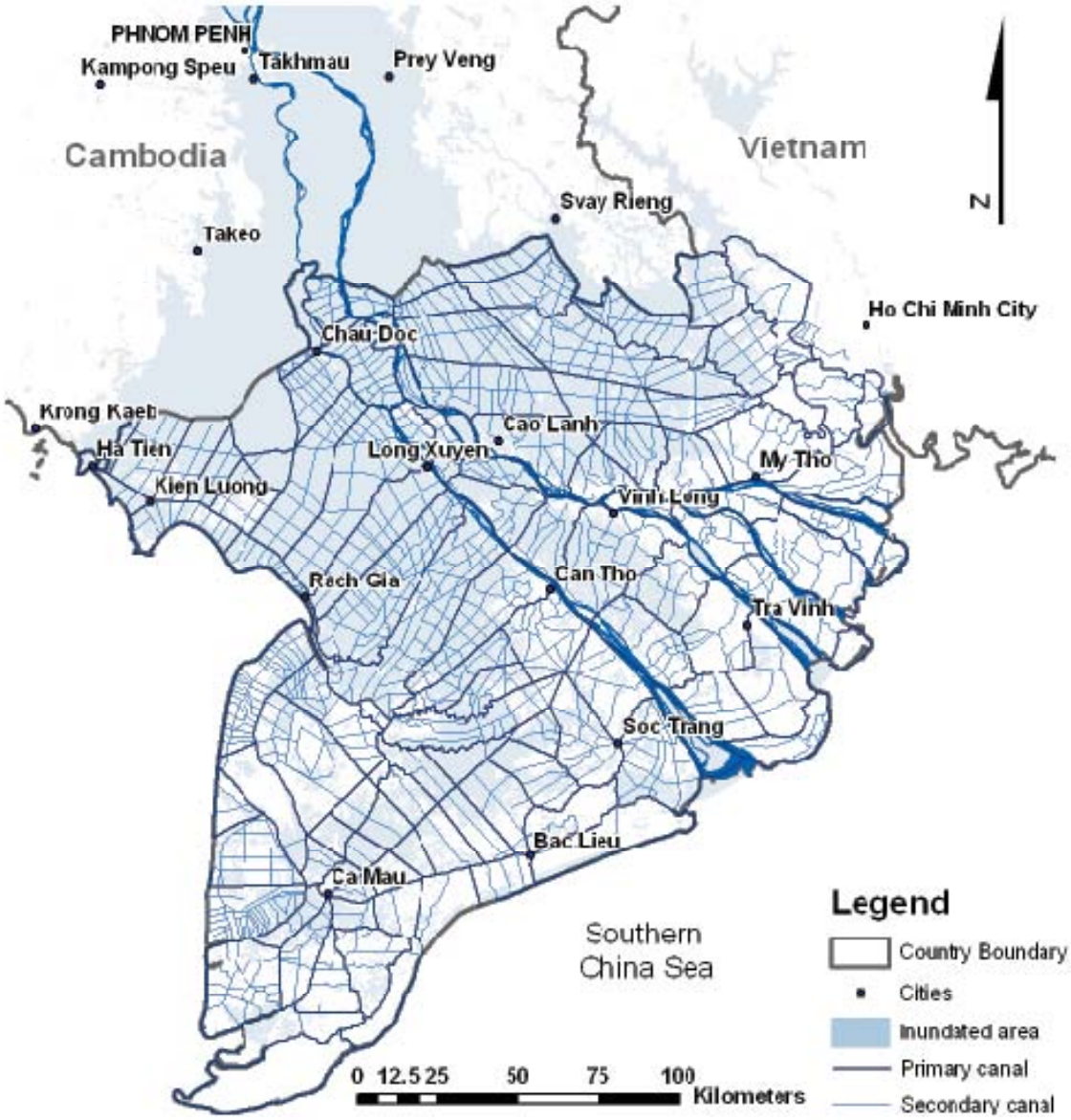


Figure 5: Flow discharges in Tan Chau and Chau Doc from 1/1996 to 12/2000

Dense network of canal enabling delivery of freshwater to most part of the delta

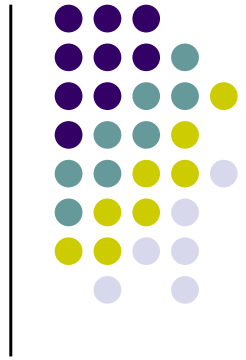


Water issues

- *Salinity intrusion: 2.1 mil hectares (50% of delta-May-Dec)*
- *Floods: 1.2 - 1.9 million hectares of the south-western part of the Delta is under annual flood*
- *Acid sulphate soils (ASS): 1.6 million hectares (40%) of the Mekong Delta. Floods can transport toxic water from ASS areas to other non-ASS areas*
- *Polluted water: pollution from agricultural and industrial chemicals and domestic untreated wastewater.*
- *Fresh water shortage: discharge in dry season 1,700-2,500m3/s Water scarcity for irrigation affects nearly 1.5 million hectares of cultivable land in the dry season.*

Table 3: High flood peaks (WL > 420 cm) at Tan Chau Station

No.	Flooding year	Cycle (years)	Peaks (cm)	Diff. (+/-) (cm)
1	1929		485	
2	1934	5	500	11
3	1937	3	515	15
4	1939	2	505	-10
5	1943	4	498	-7
6	1947	4	500	2
7	1952	5	486	-14
8	1956	4	447	-39
9	1961	5	527	80
10	1964	3	462	-65
11	1966	2	519	57
12	1970	4	468	-51
13	1975	5	437	-31
14	1978	3	494	57
15	1981	3	468	-26
16	1984	3	497	29
17	1991	7	479	-18
18	1994	3	467	-12
19	1996	2	487	20
20	2000	4	506	19
21	2001	1	478	-28
22	2002	1	482	4
23	2004	2	441	-41
24	2005	1	436	-5



Flooding is a normal phenomenon

Salinity

A particular dry year

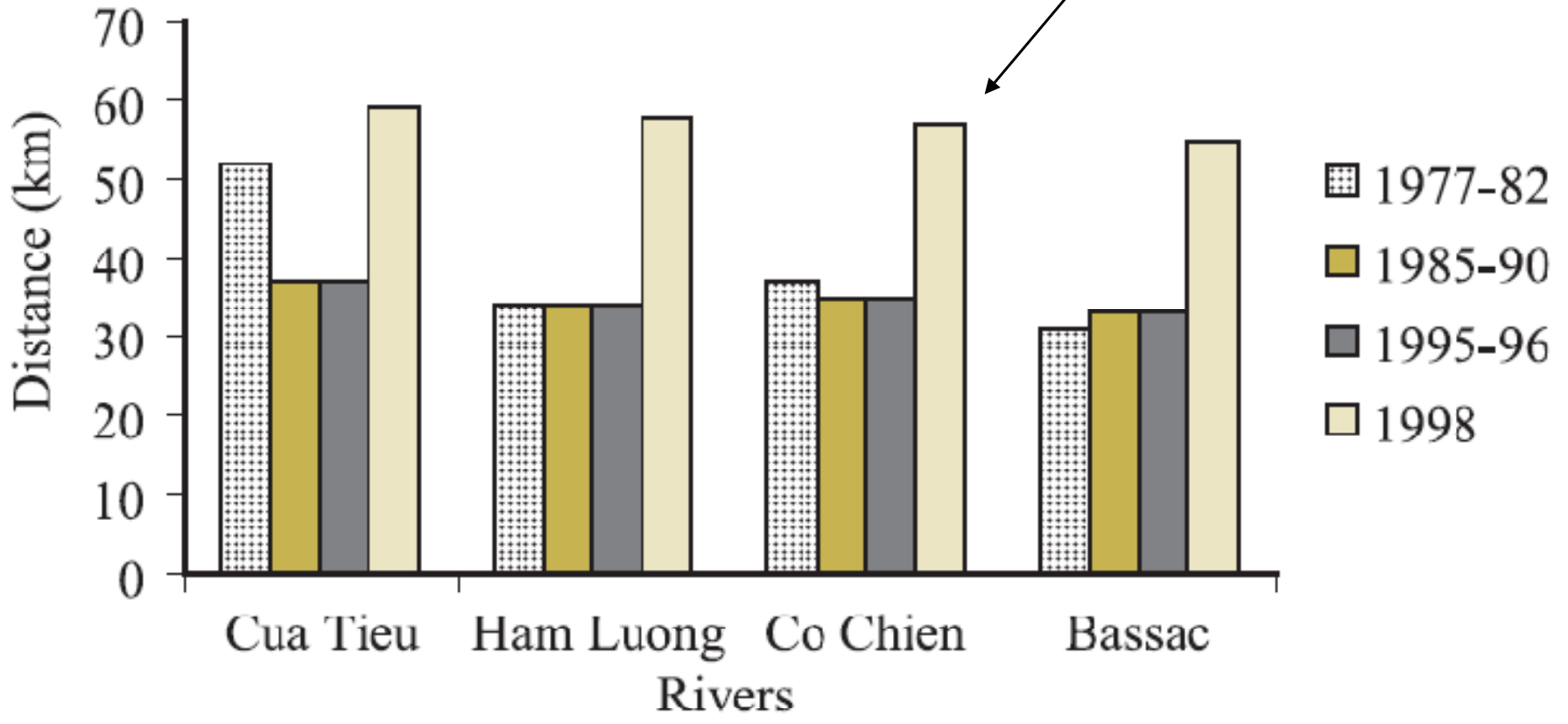


Figure 3: Average maximum distance (km) of salinity intrusion (4 ppm) up Mekong and Bassac branches in April (Source: Reproduced from Miller, 2003).

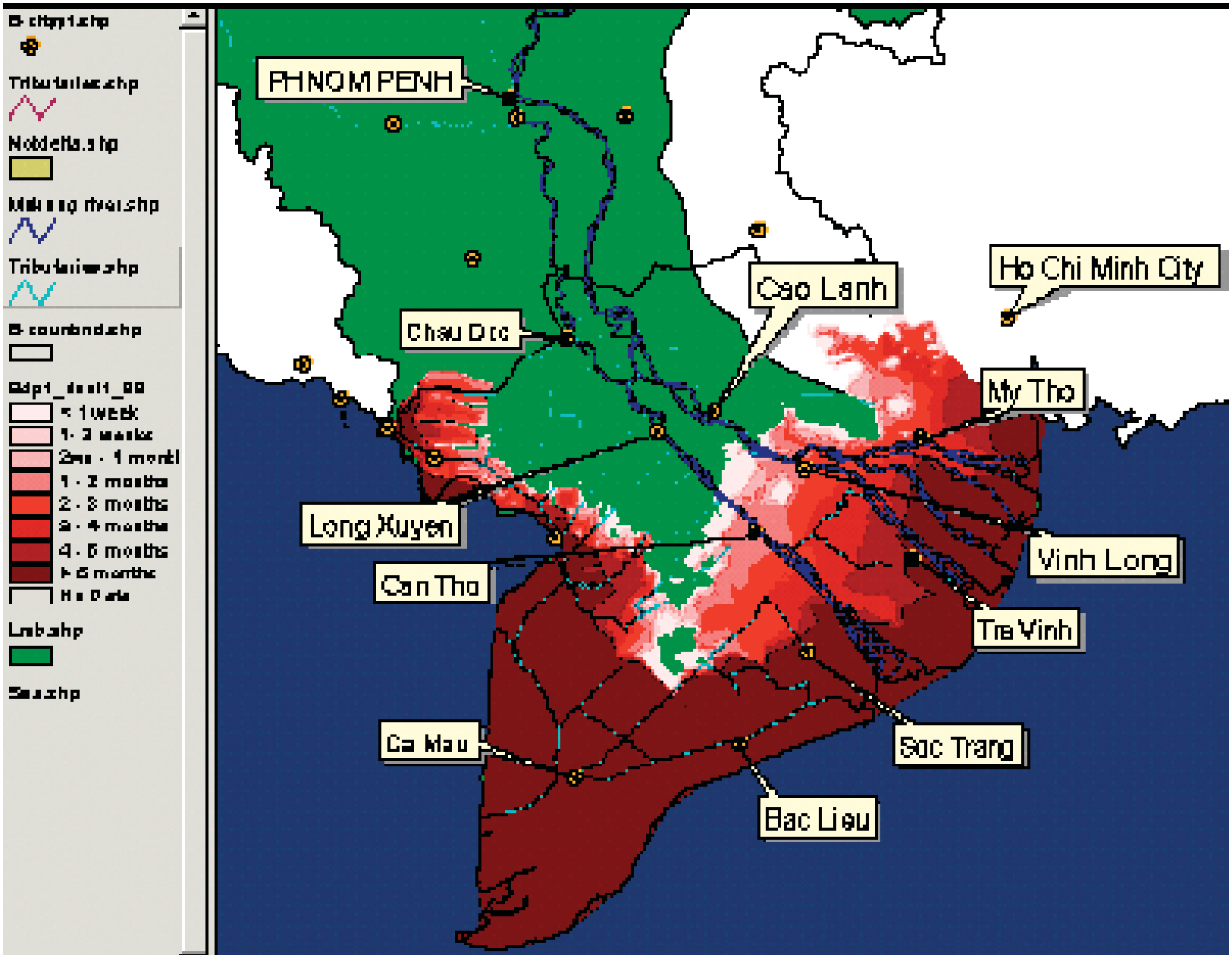


Figure: *Mekong Delta: Simulation of saline intrusion during the dry season drought conditions of 1998. The map shows the duration of salinity levels greater than 1 gram per litre. The area affected exceeds half of the total 55,000 km2 that defines the main delta* (Source: MRC 2003, State of the Basin Report)

- Salinity intrusion influenced by:
  - processes within Vietnam
  - wider **global climate changes**
  - **and Basin water resources developments** (Dang Kieu Nhan (in Summernet, 2007).
- How upstream dams are operated can have significant impacts on extent and timing of saline intrusion.

Acid Sulphate Soils

- Acid sulphate soils cover 40 per cent of the delta.
- Acid sulphate soils are sensitive to fluctuations in river discharge.
- In the rainy season, a large discharge from the rivers is necessary to leach and flush toxicity released from the soils before any crops can be cultivated. (Minh et al., 1997a).
- During the dry season, in order to maintain a certain groundwater level to prevent oxidization of pyritic substances, a **certain minimum river discharge** is needed.

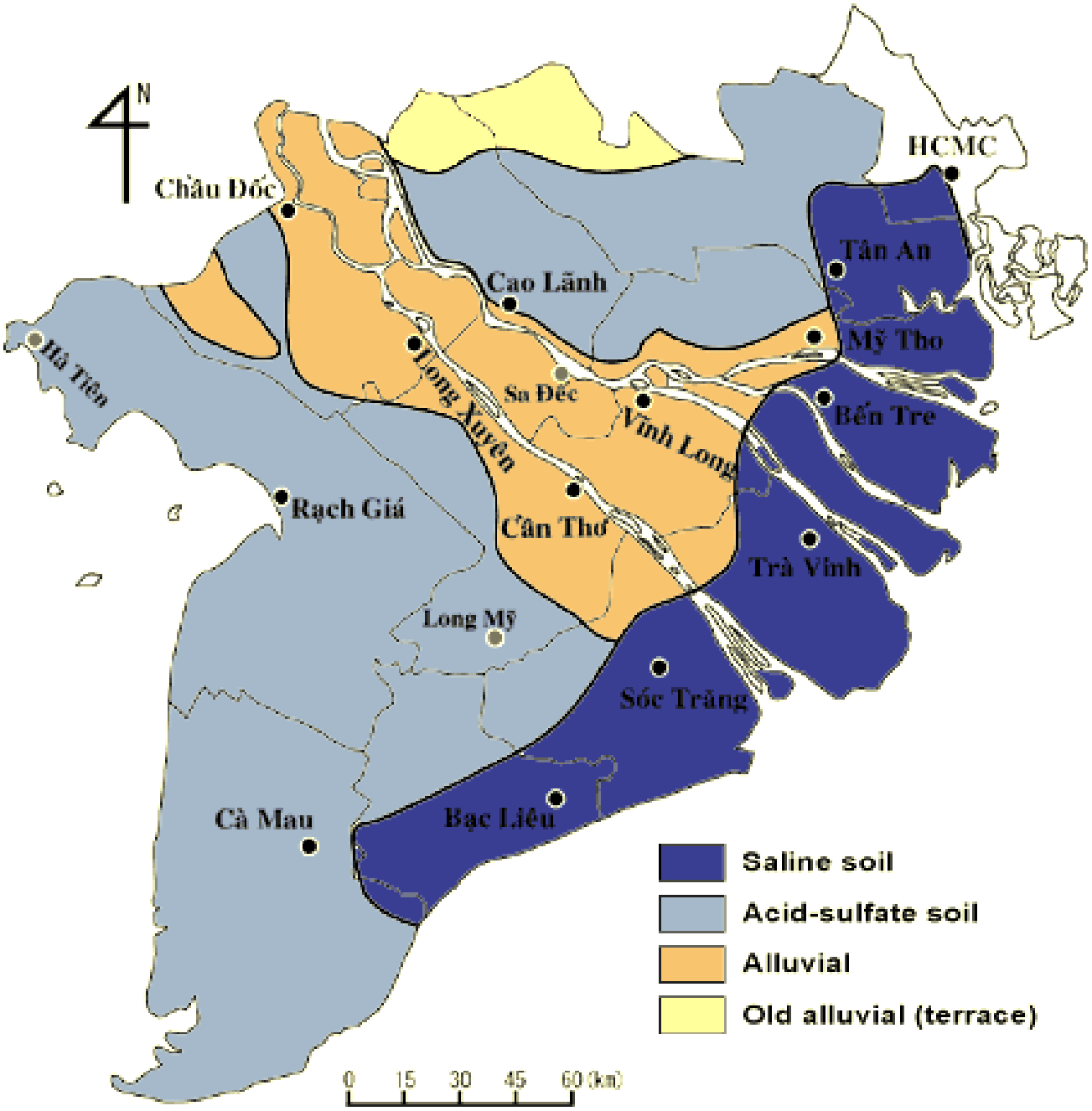


Fig. Distrubution of soil status in Mekong Delta

http://cantho.cool.ne.jp/mekong/geo/geol_e.html

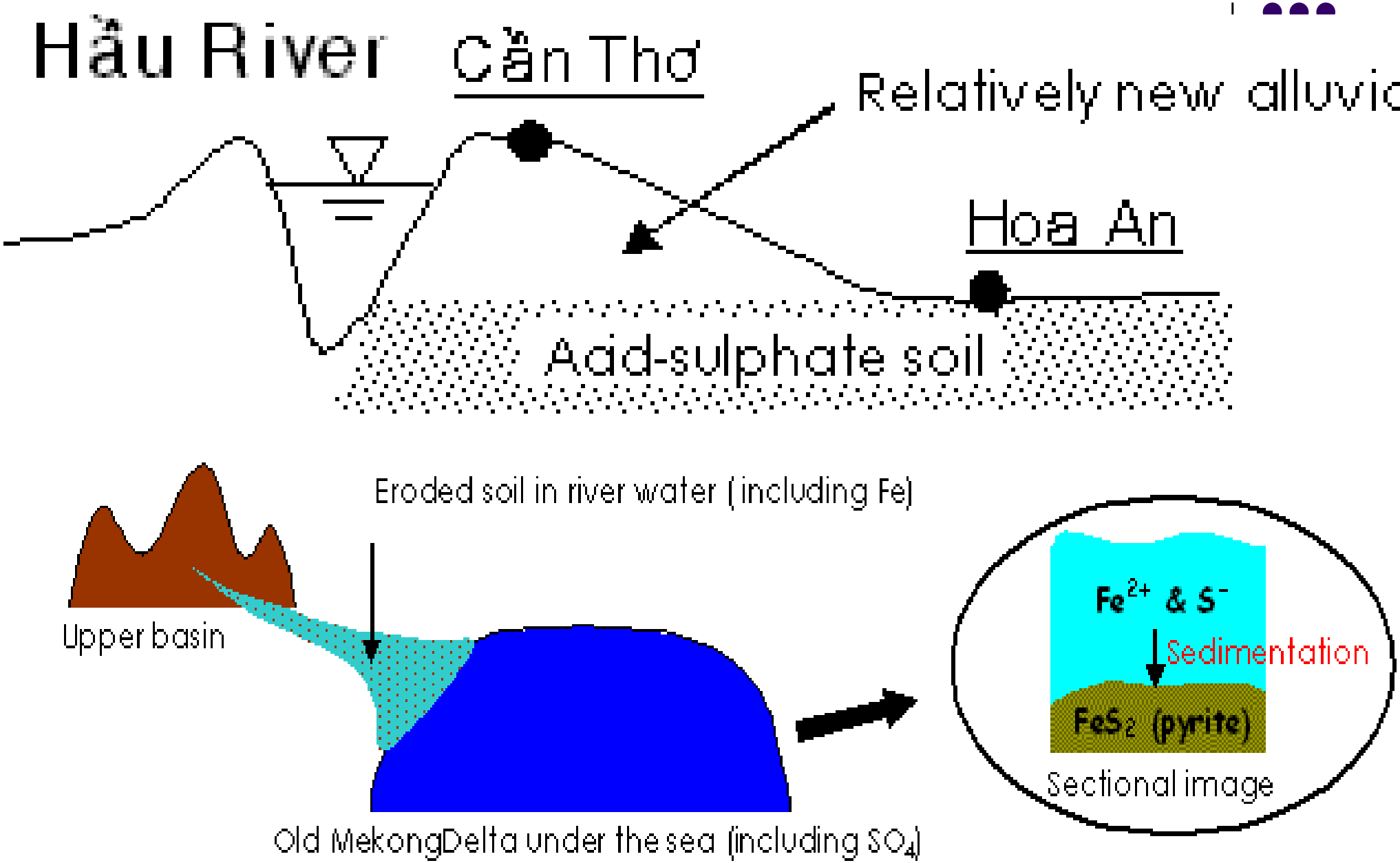


Fig. The image of making process of pyrite at the seabottom

http://cantho.cool.ne.jp/mekong/geo/geol_e.html

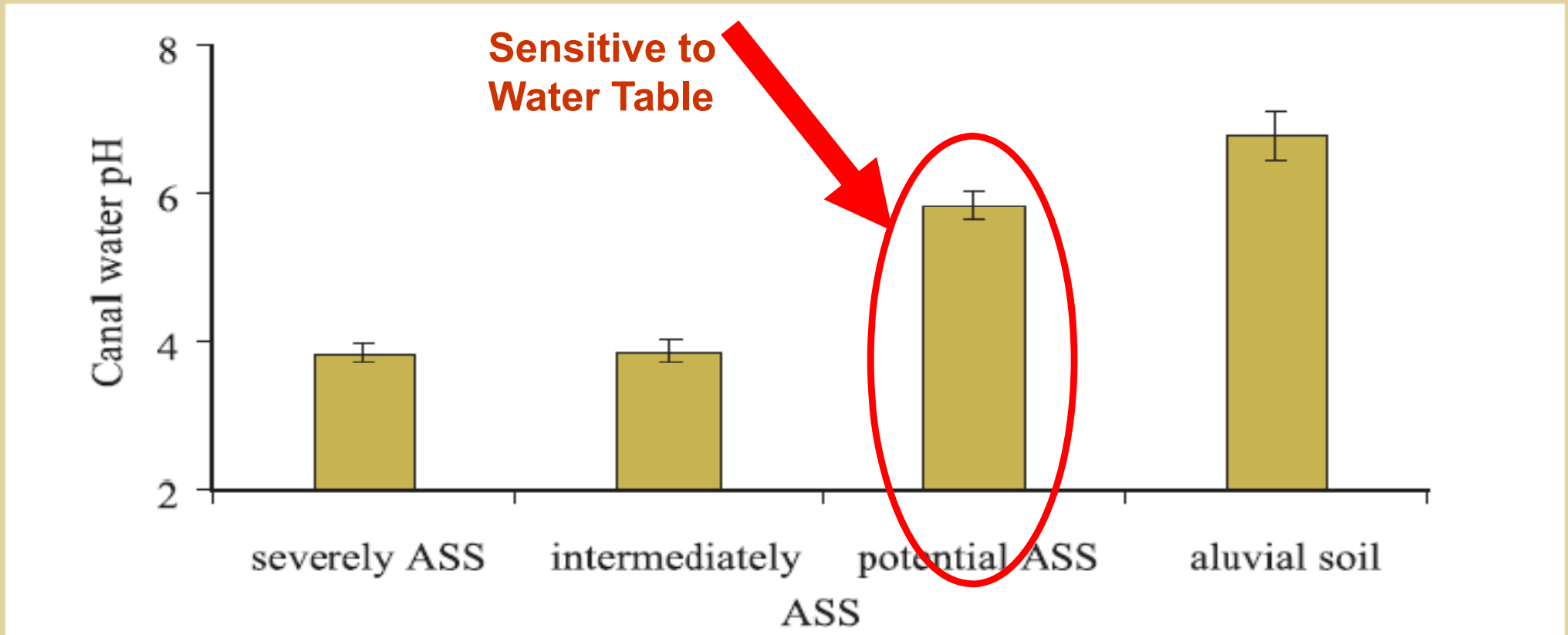


Figure 6: pH values in canal water sampled during May-Jul in different acid sulphate soils in the Long Xuyen Quadrangle and the alluvial soil. Mean with standard error. Key: ASS (acid sulphate soils)
(Source: Reproduced from Nhe, 2006).

Water need for agriculture

Table 1: Estimated water productivity (kg rice m-3 water input) of rice production in the Mekong delta. Based on average rainfall and cropping seasons given in Figure 2 and calculated as kg rice per m^3 water input from irrigation

Parameters	Rice crops		
	Winter-spring	Summer-autumn	Autumn-winter
Total water requirement (m^3 ha^{-1})[1]	8080	7520	6500
Rain water available (m^3 ha^{-1})[2]	160	4000	7000
Irrigation requirement (m^3 ha^{-1})	7920	3520	-500
Average yields of rice (tons ha^{-1})	6.0	4.3	4.0
Water productivity (kg m^{-3} water)[3]	0.8	1.2	-

(Source: Reproduced from Sam, 1997)

3.86 million ha of Agri land (2008)

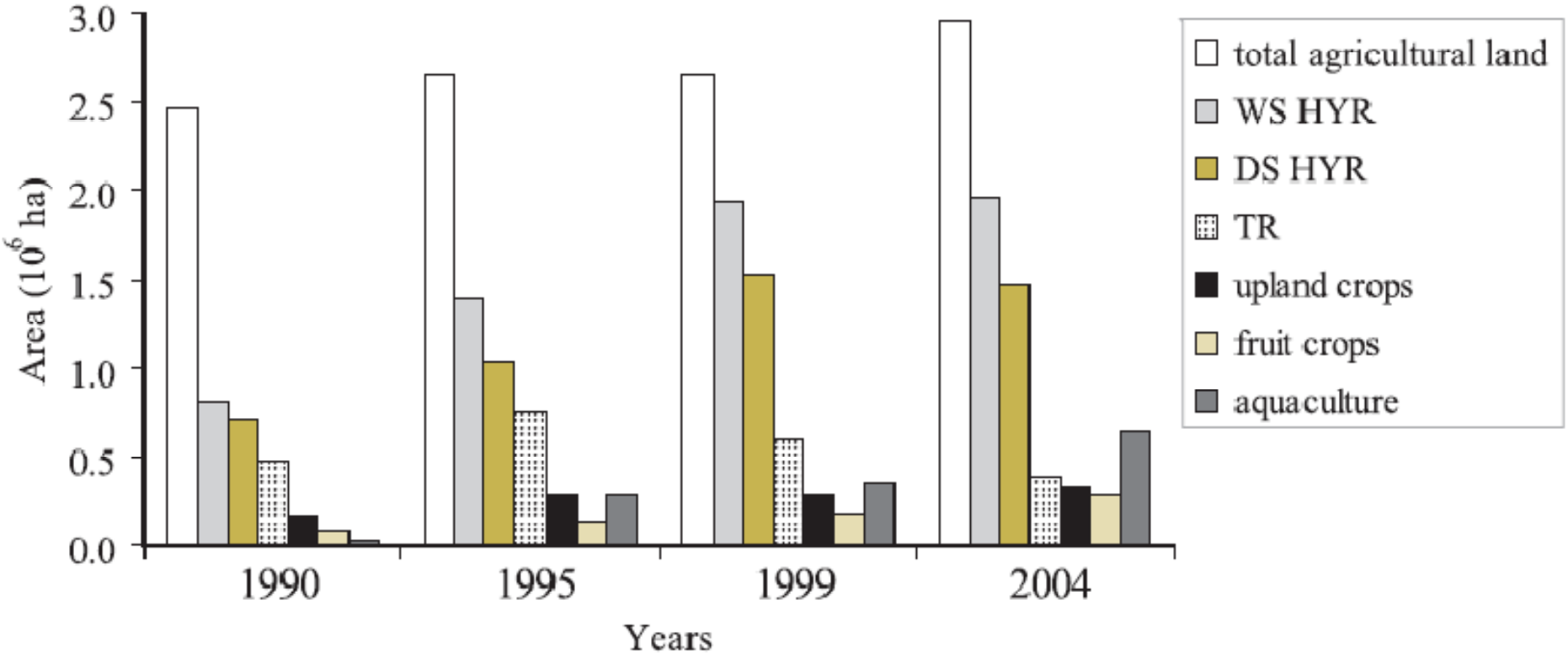
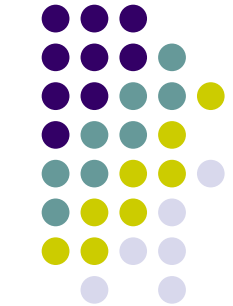


Figure 1: Changes in land use between 1990 and 2004 in the Mekong delta. Total agricultural land was expressed as the surface area, while areas devoted to rice, upland crops, fruit and aquaculture were based on growing areas. For HYR rice growing, 2 or 3 crops of rice are practiced per year Key: DS (dry season), WS (wet season), HYR (high yielding rice), TR (traditional rice).
(Source: Adapted from Nhan *et al*, 2007a).



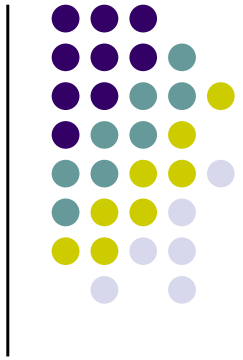
- It is estimated that rice cultivation in the upper provinces can abstract a water volume between 900 and 1,200 m3 s-1 from December to May.

- This water consumption by rice farming equals about one-half of flow rates of the Mekong during the dry season within Vietnam (Tin and Ghassemi, 1999).

- Sam (1997) calculated irrigation water requirement for the whole Mekong delta to be about 400-900 m3 s-1 in 1990-1991 period, and predicted an increase demand of 900-1,100 m3 s-1 by 2010

Summary of key issues

- Mekong Delta plays an important role in the national economy and food security (to some extent for the region)
  - 50% of staple foods for the country.
  - 40% of country's fishery production.
- Economy of MD has been growing.
- Economy of MD relies on Agriculture
- Industry in MD is Agri-dependant.
- Agriculture and Fishery depend on the physico-chemico-biological environment.
- The physico-chemo-biological environment of the MD depends on the flows of the Mekong and tidal water of the sea.
- Flows mean quantity, quality, timing, and sediment
- Salinity, acidification, water availability, erosion, reduction of soil fertility (agriculture and marine fishery), flood and drought are examples of issues associated with changes of flows.



Thank you