Kingdom Of Cambodia

Nation Religion King

Training Workshop on Disaster Resilient Cities:
Advances in Meteorological Forecasting and Hazards Assessment

General status
Environmental Geology &hydrogeology in Cambodia
&
A Case Study of River Bank Erosion in Vietnam

Cambodian participants:

Mr. **KIM Seng**, Geologist, Office Research Geology, Department of Geology

KUALA LUMPUR, 2018

Department of Geology :

ក្រសួងរ៉ែ និងថាមពល
Ministry of Mines and Energy

- **Geological Survey and Geo-Environmental**

- To **Cooperation mineral sector** and **Research Geology**: contribute towards enhancing economic growth and betterment of the quality of life through sustainable mineral development, Geological Survey.

- Involve **Mineral Expolration** and optimal use of mineral resources and ensure a fair, efficient, environmental friendly and social responsible mineral investment.

- Promote the **protection**, and **conservation** and rehabilitation of **environment** **and natural resources** in mineral development activities.

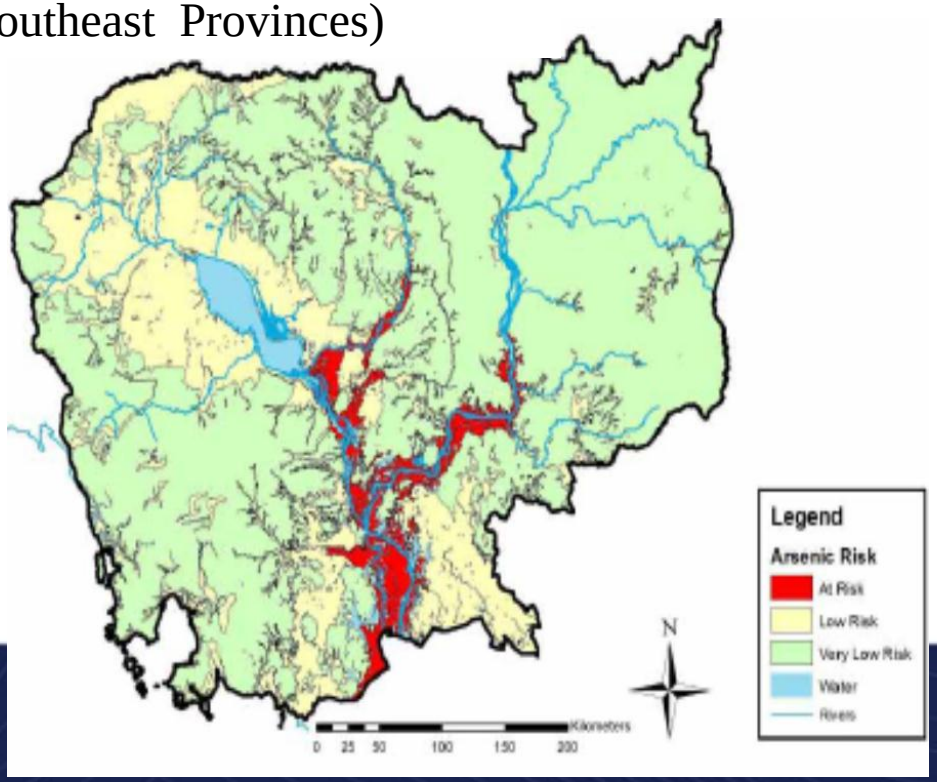
- **Geological** and **Mineral Deposit Mapping.**

Environmental Issue (Groundwater Contamination)

Table 1 Status of the total number of regional groundwater wells developed from 1983 to 2001 (Ministry of Planning, 2003)

No.	Province	UNICEF/MRD	NGOs	Total
1	BanteyMeanchey	615	628	1 243
2	Battambang	750	1 193	1 943
3	Kandal	641	340	981
4	Kampot	2 869	244	3 113
5	Keb	32	80	112
6	Kampong Cham	1 127	1 213	2 340
7	Kampong Chhnang	832	954	1 786
8	Kampong Speu	269	992	1 261
9	Kampong Thom	137	778	915
10	Koh Kong	24	17	41
11	Kratie	522	168	690
12	Mondol Kiri	1	0	1
13	OurdorMeanchey	0	0	0
14	Pailin	33	4	37
15	Phnom Penh	1 014	0	1 014
16	PreahVihear	51	286	337
17	Prey Veng	1 418	4 622	6 040
18	Pursat	274	154	428
19	Ratanak Kiri	20	64	84
20	Siem Reap	405	284	689
21	Sihanouk Ville	77	20	97
22	Stung Treng	31	220	251
23	SvayRieng	506	5 599	6 105
24	Takeo	1 596	405	2 001
	Total	13 244	18 265	31 509

Saltwater intrusion (Southeast Provinces)



Banteay Meanchey Provience
landslide_type Rockfall

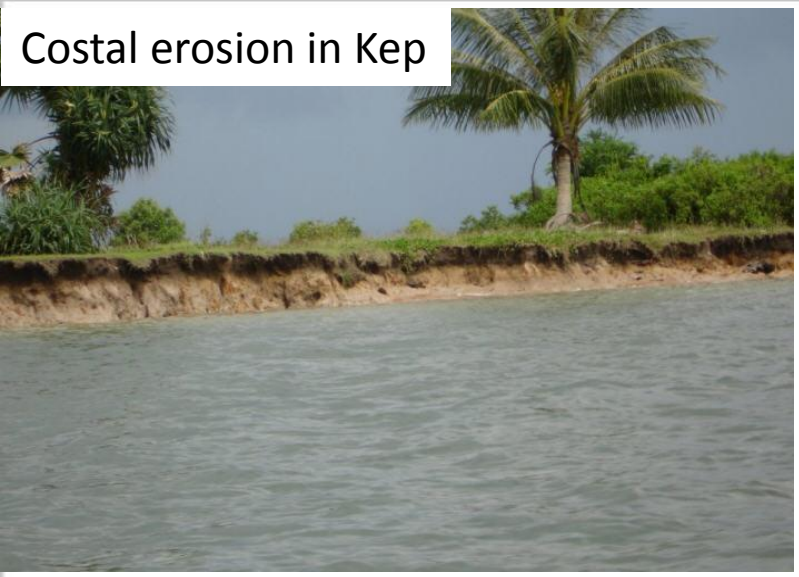
Preah Vihear Provience
landslide

Takeo Provience
Rockfall

drought in 2009

Flooding, 2013

Costal erosion in Kep



A 50-meter bank of the Tonle Sap River slid into the water, collapsed and sank

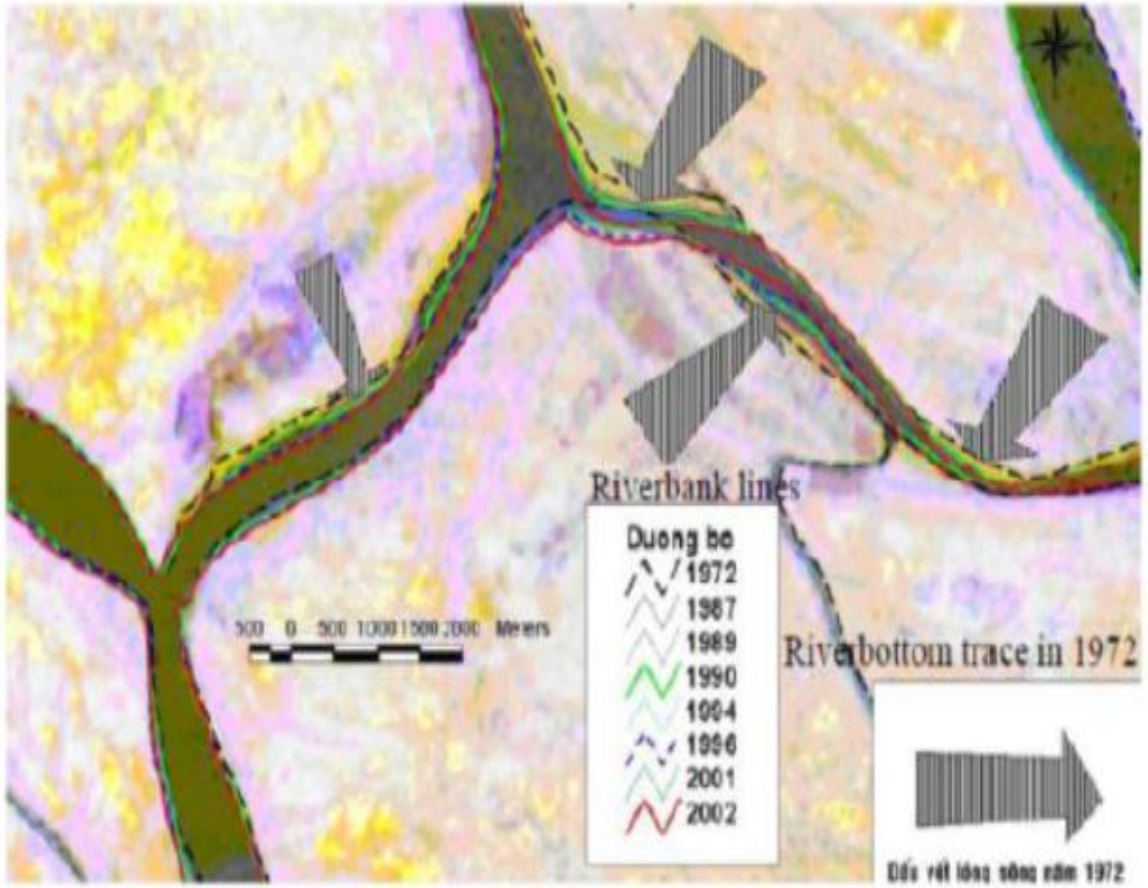
Land erosion in Kampong Cham province

Land erosion in Kandal province

A Case Study of River Bank Erosion in Vietnam

Original title of project/case study:
Prediction of River Bank Erosion in The Lower Mekong River Delta,
Authors: Le Manh Hung, Hitoshi Tnaka, Nguyen Trong Tu, and Nguyen Trung Viet.
Affiliation: Southern Institute of Water Resources Research, Vietnam , Tohoku University, Japan
Email: manhhung@saigonnet.vn

- The location of the research area: Vietnam, National project KC08-15
- The justifications for conducting the research
- Measures which has been taken, including the data and software
- Before the study: no empirical research, after: policy made to protect people and properties
- Results of the research: beneficial to the nation and people
- Limitations and recommendations: human activities, sand mining, and others should be factored into



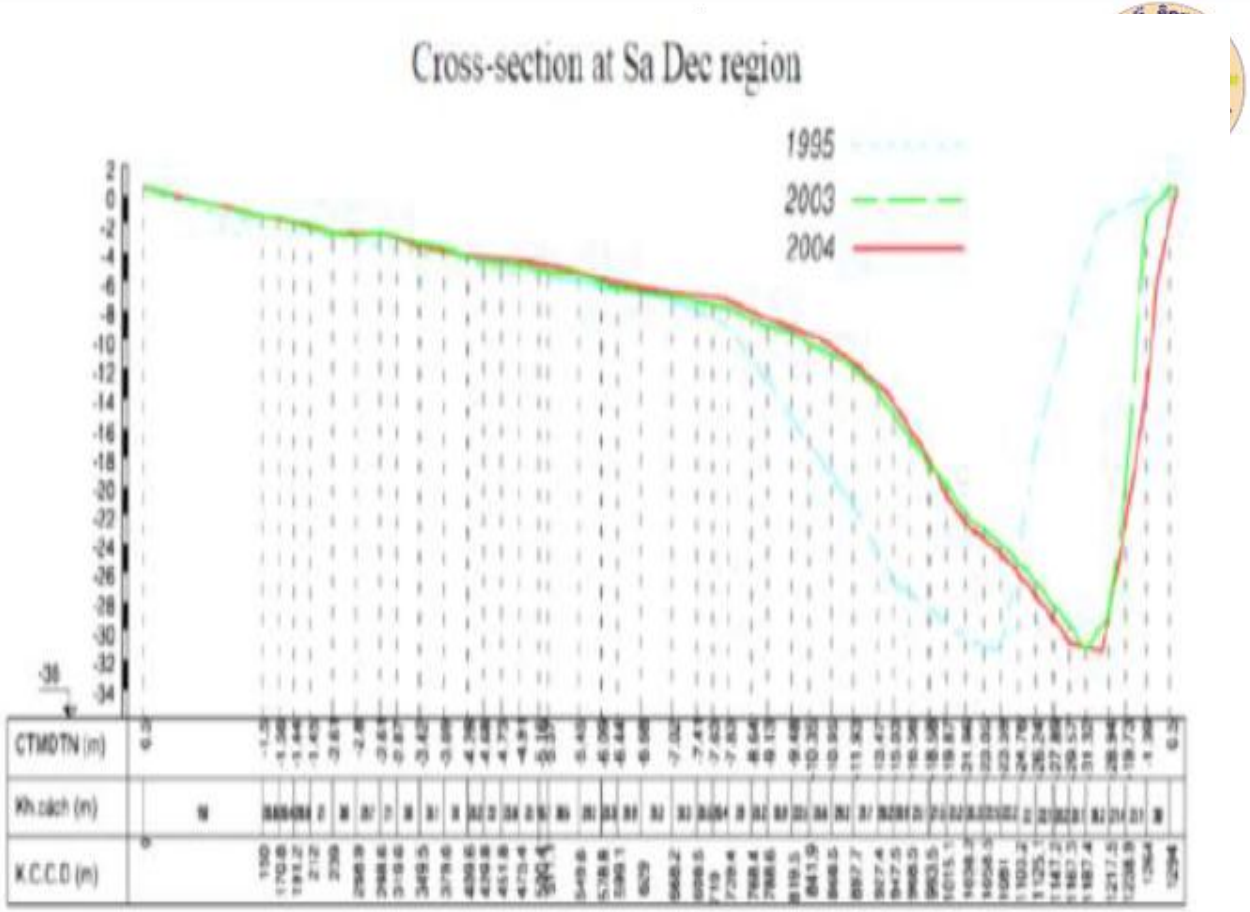


Figure1a. The satellite image about the evolution of the riverbank of the Van Mao river from 1972 to 2002. 1b. The cross section of Sa Dec river.

Table 1 Evolution trends of the bank erosion at some specific position in the Lower Mekong Delta

River bank's name	Erosion position	Erosion length (km)	Maximum bank erosion width (m)	Mean erosion speed (m/year)	Movement speed of erosion center (m/year)
Left bank of Tien River	Thuong Phuoc – Thuong Thoi Tien	6	1250	34,7	33,3
	Hong Ngu	8	110	3,1	3,5
	Cho Lach – Ben Tre	4,5	400	11,1	3,2
Right bank of Tien River	My Luong – Long Dien	4	120	3,3	6,8
	Chau Thanh – Sa Dec – My thuan	10	1200	33,3	38,1
Vam Nao River	My Hoi Dong	6,5	350	9,7	23,3
Right bank of Hau River	Khanh An – Khanh Binh	3	300	8,3	2,8
	An Chau – Long Xuyen	2,6	100	2,8	3,1
	Binh Thuy – Can Tho	2,8	300	8,3	2,2

$$B_{xi} = \alpha \left[(\Delta V_i . \Delta T_i)^n \left(\frac{H_{\max i} - H_0}{H_{\max} - H_0} \right) \right]^{\beta}$$

in which $\Delta V_i = V_i - [V]_{kd}$ indicates the flow capacity caused erodible riverbed,

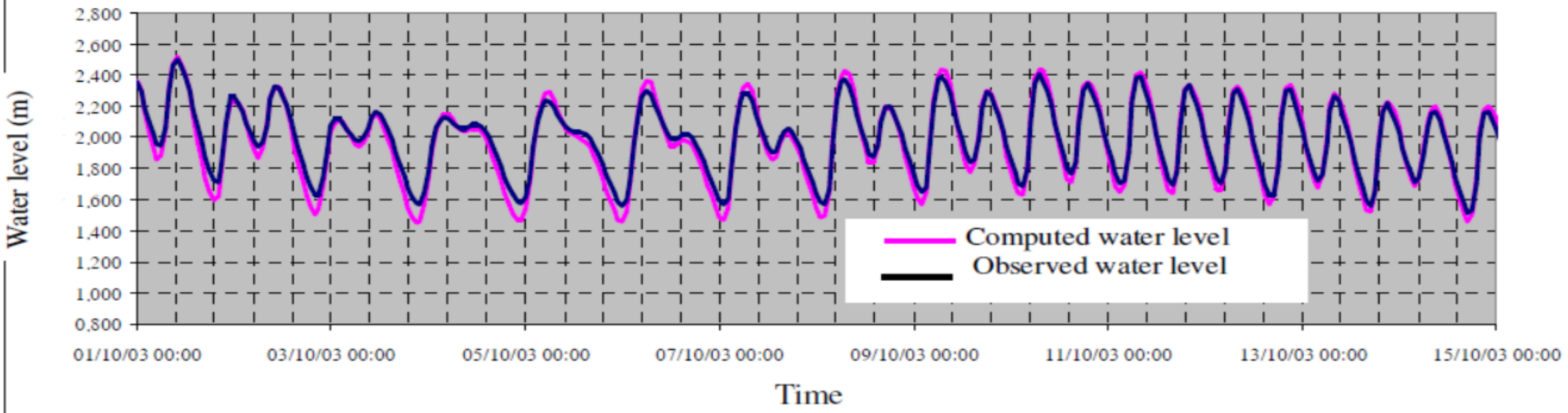
V_i - the mean flow velocity at the edge of the erosional bank,

$[V]_{kd}$ - the inception movement velocity of the bed material,

ΔT_i -the maintainable duration of the flow velocity, which is greater than inception movement velocity of the bed material at the section *i*, respectively;

α, β, n - the experimental coefficients.

(a)



Measured time	Section name	Measured discharge (m3/s)	Computed discharge (m3/s)	Difference (%)
9:30 -10th Aug 2003	Sec. 1	9109	9799,89	6,91
9:10 -10th Aug 2003	Sec. 2	2409	2170,71	2,38
9:00 -10th Aug 2003	Sec. 3	738	914,18	1,76
8:50 -10th Aug 2003	Sec. 4	5813	6385,56	5,73
14:40 -10th Aug 2003	Sec. 5	8207	8157,17	0,50
15:00 -10th Aug 2003	Sec. 6	1771	1627,52	1,43
14:50 -10th Aug 2003	Sec. 7	6641	6394,86	2,46

I. Dong Thap Province

No.	River's Name	Districts	Erosion position	Length of erosion bank (m)	Erosion distance in the bank (m)
1	Tien	Hong Ngu	Left bank in Thuong Phuoc 1,2	4900	20 ÷ 30
2			Head of Long Khanh island, Long Khanh A	2200	15 ÷ 20
3			Head of Cai Vung island, left bank in Long Thuan	3600	10 ÷ 15
4			Right bank of Cai Vung island, Phu Thuan A	4000	5 ÷ 7
5			Left bank in Thuong Lac	2400	5 ÷ 8
6			Left bank in Hong Ngu town	1500	5 ÷ 8
7			Head of Tay island, Phu Thuan B	4000	20 ÷ 30
8		Tam Nong	Left bank in Phu Ninh	3500	5 ÷ 8
9		Thanh Binh	Left bank of Tay island, Tan Quoi	4000	5 ÷ 8
10			Left bank in Tan Thanh	2700	5 ÷ 6
11			Left bank in Tan Binh	600	5 ÷ 6
12		Cao Lanh	Left bank in commune No. 6	2000	5 ÷ 8
13		Lap Vo	Left bank in My An Hung A, B	7000	5 ÷ 7
14		Cao Lanh	Left bank in My Xuong	1500	8 ÷ 10
15			Left bank in Binh Hang Tay, Binh Hang Trung	3700	8 ÷ 10
16		Sa Dec	Right bank in commune 3,4	3600	5 ÷ 8
17		Chau Thanh	Right bank An Hiep	6000	20

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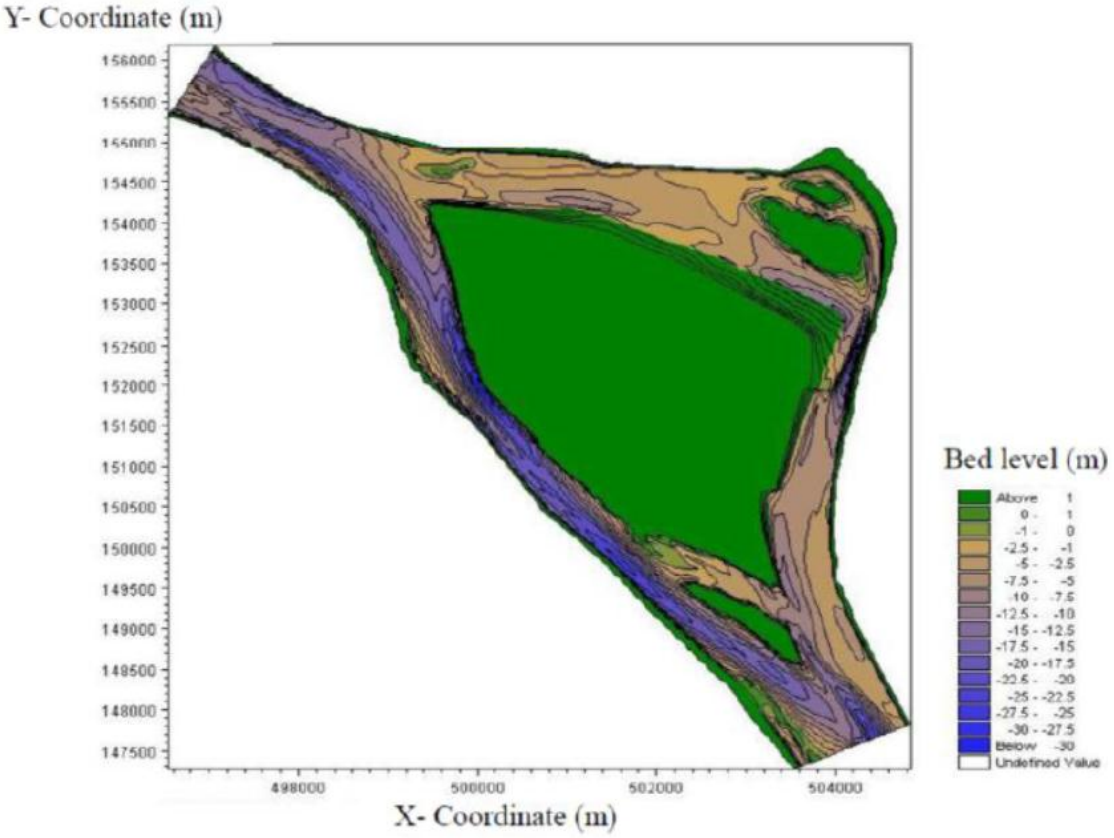

Le Manh Hung, Hitoshi Tnaka, Nguyen Trong Tu, and Nguyen Trung Viet, 2006. *Prediction of River Bank Erosion in The Lower Mekong River Delta.*
Retrieved on April 18, 2018 from http://www.geologypage.com/2014/05/mekong-river.html

Thanks for your attention!

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