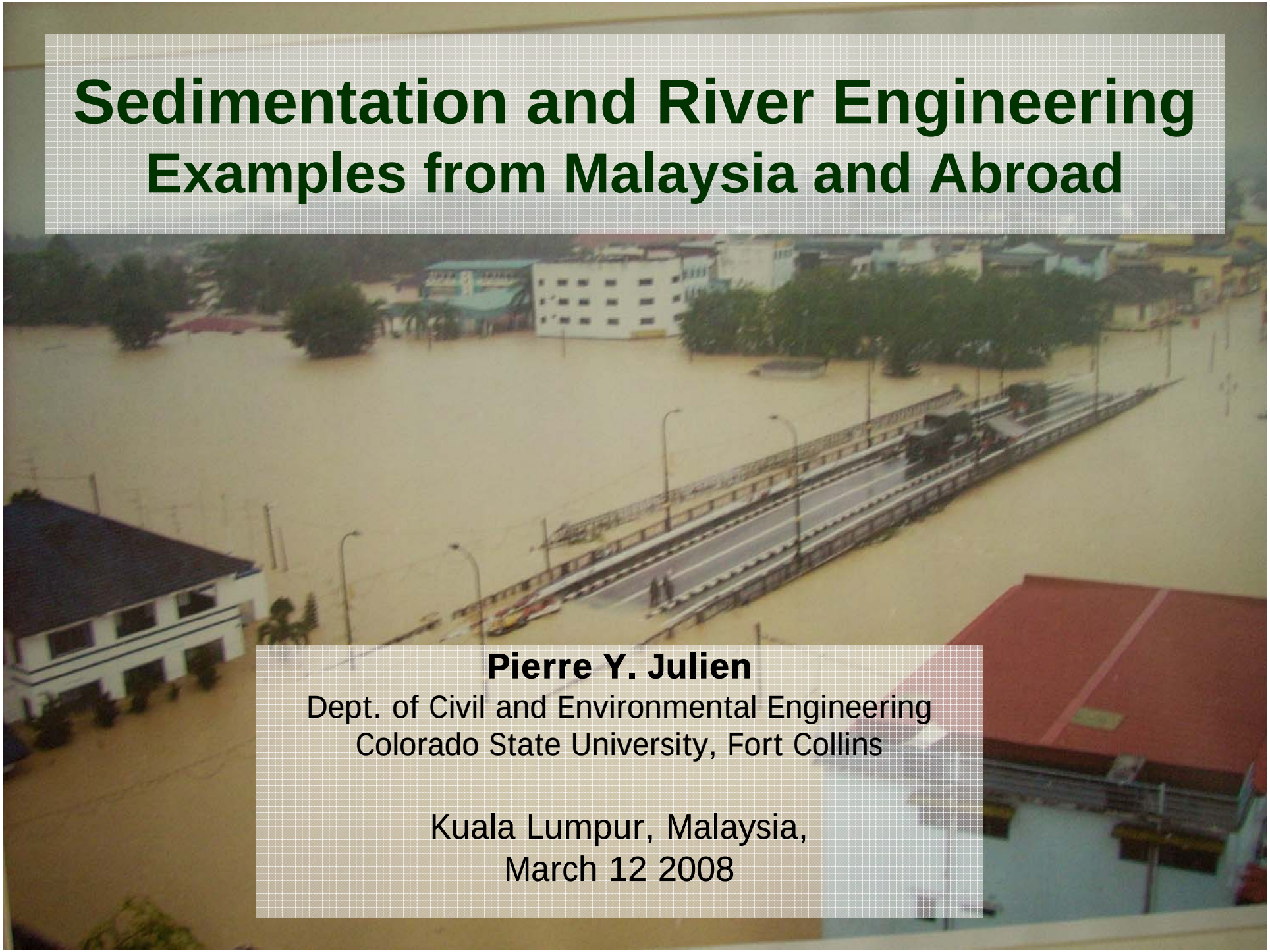
Sedimentation and River Engineering
Examples from Malaysia and Abroad



Pierre Y. Julien
Dept. of Civil and Environmental Engineering
Colorado State University, Fort Collins

Kuala Lumpur, Malaysia,
March 12 2008

Example: Vargas Mountains, Venezuela

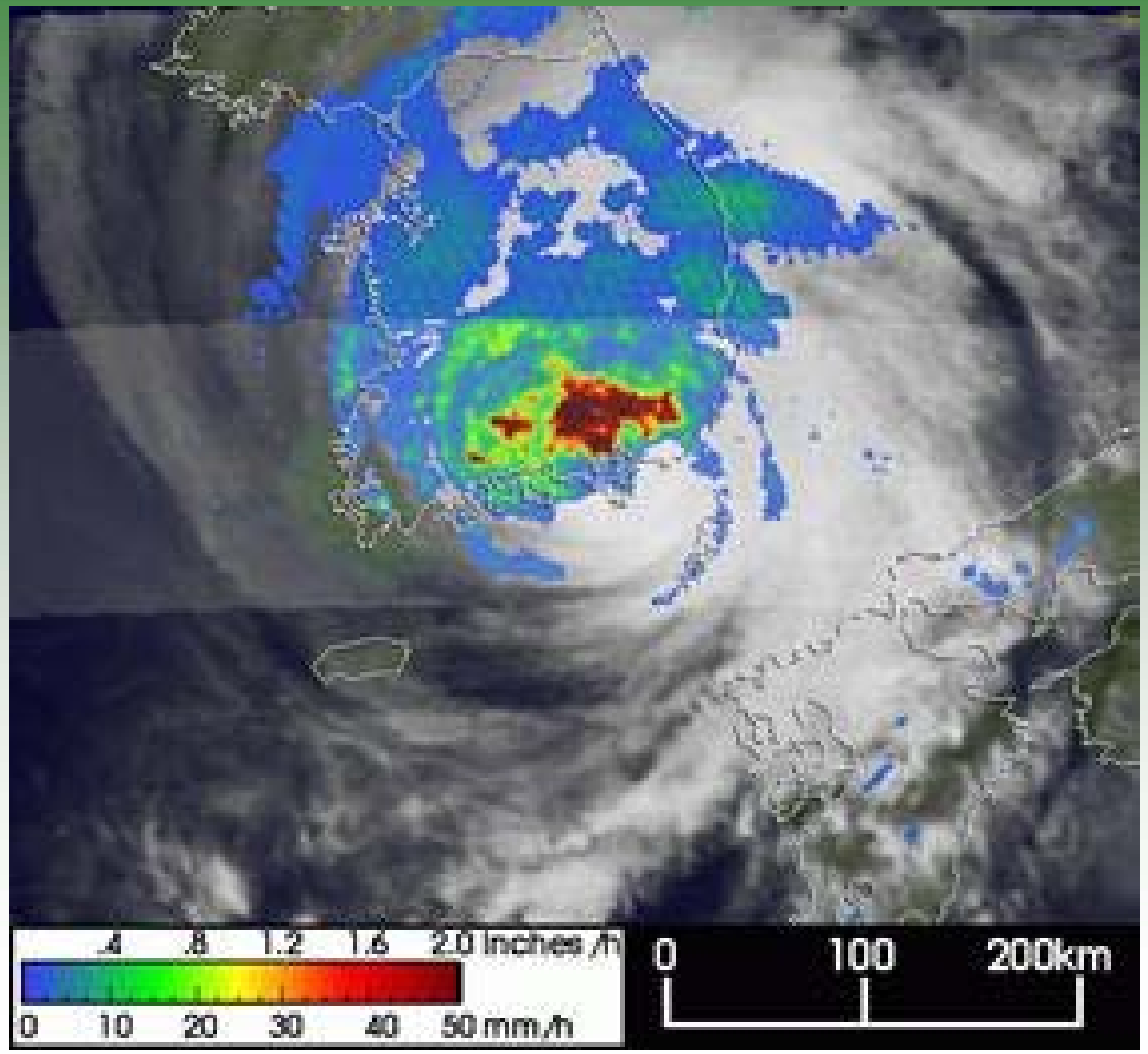
Los Corales

Los Corales

Los Corales

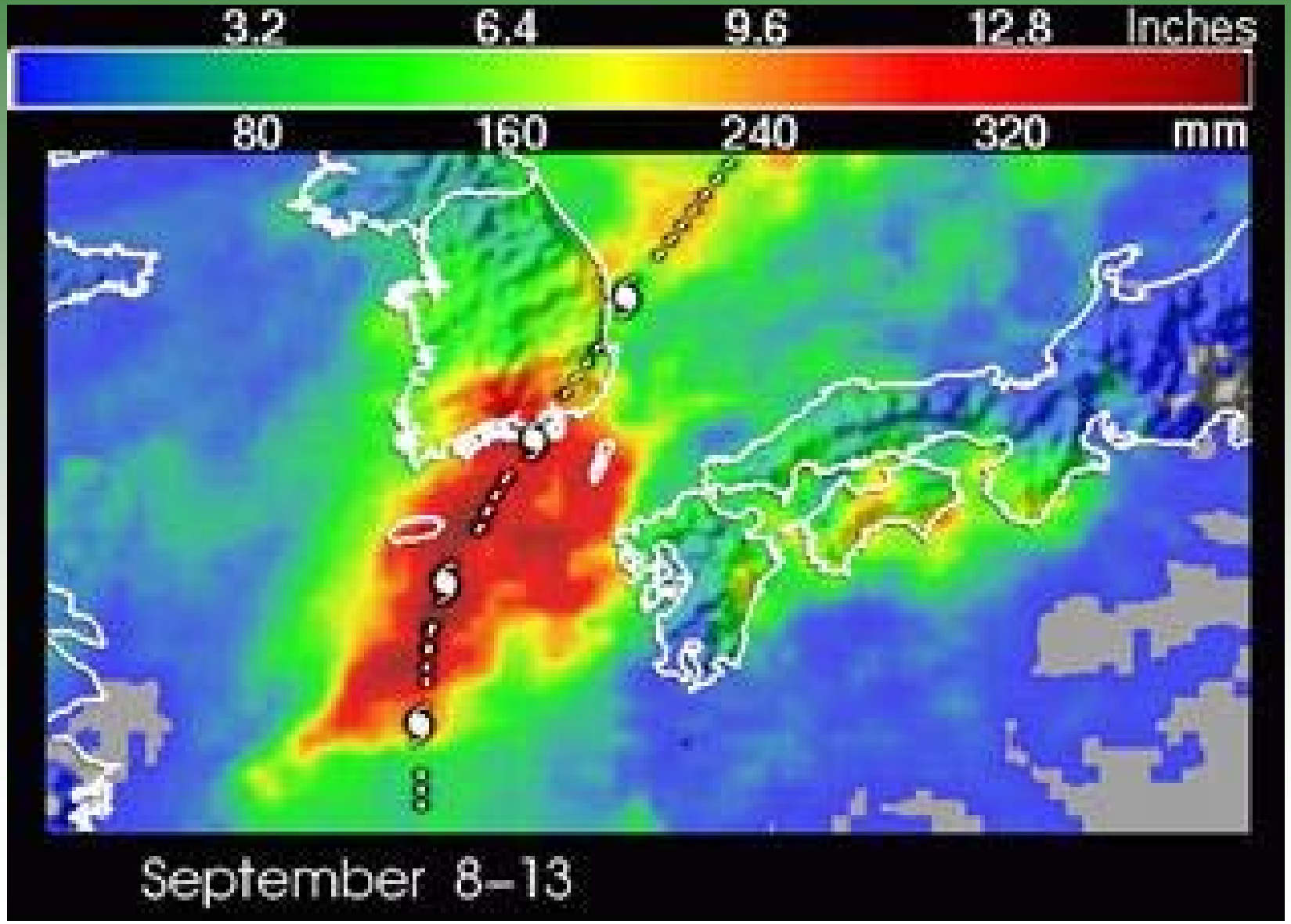
Los Corales

Rainfall distribution of Typhoon Maemi in Korea



South Korea

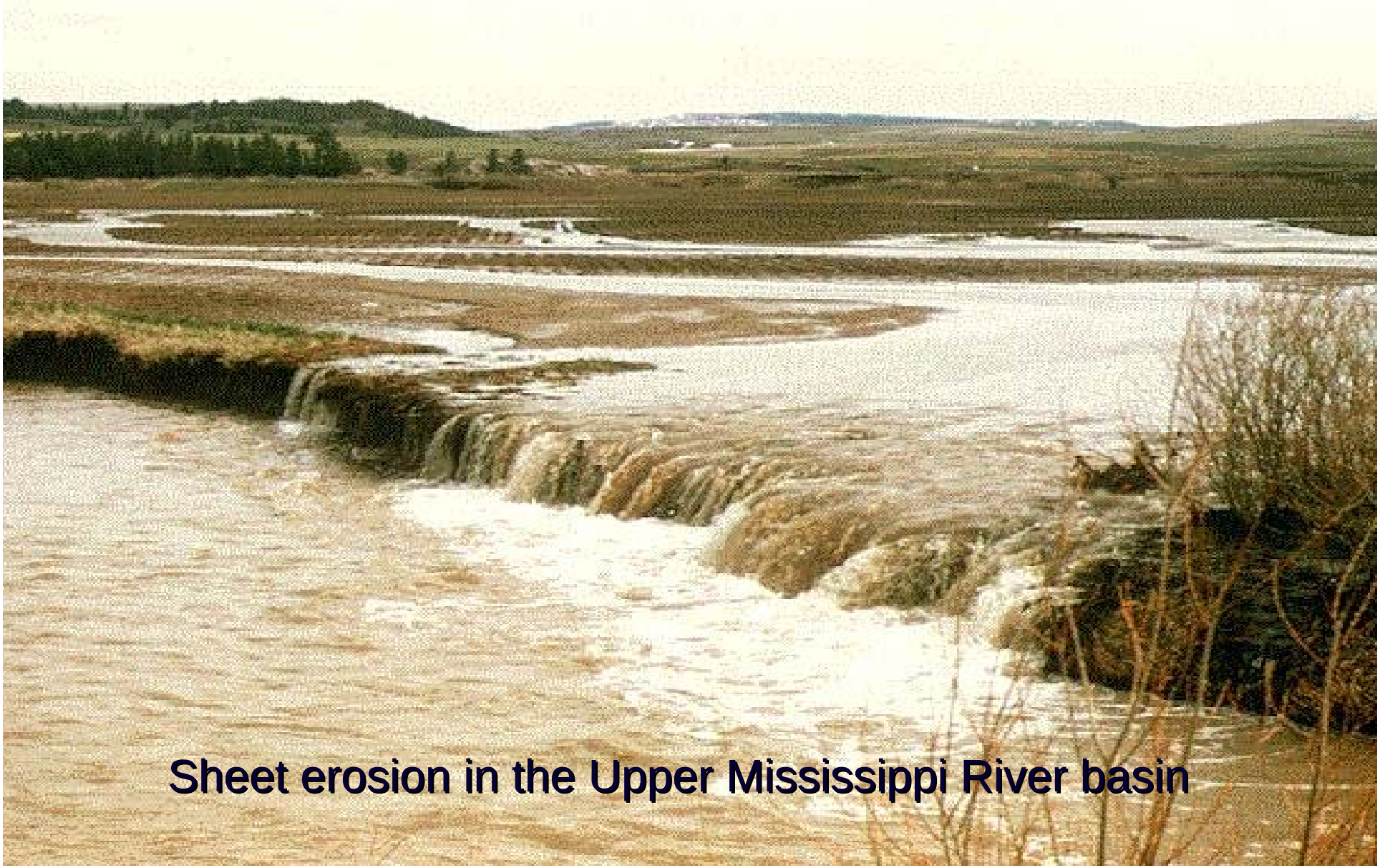
Total rainfall of Typhoon Maemi from 9/8/2003 to 9/13/2003)



Crop field area of the Imha watershed, S.K.

Mangun mountain, South Korea

Upland Erosion



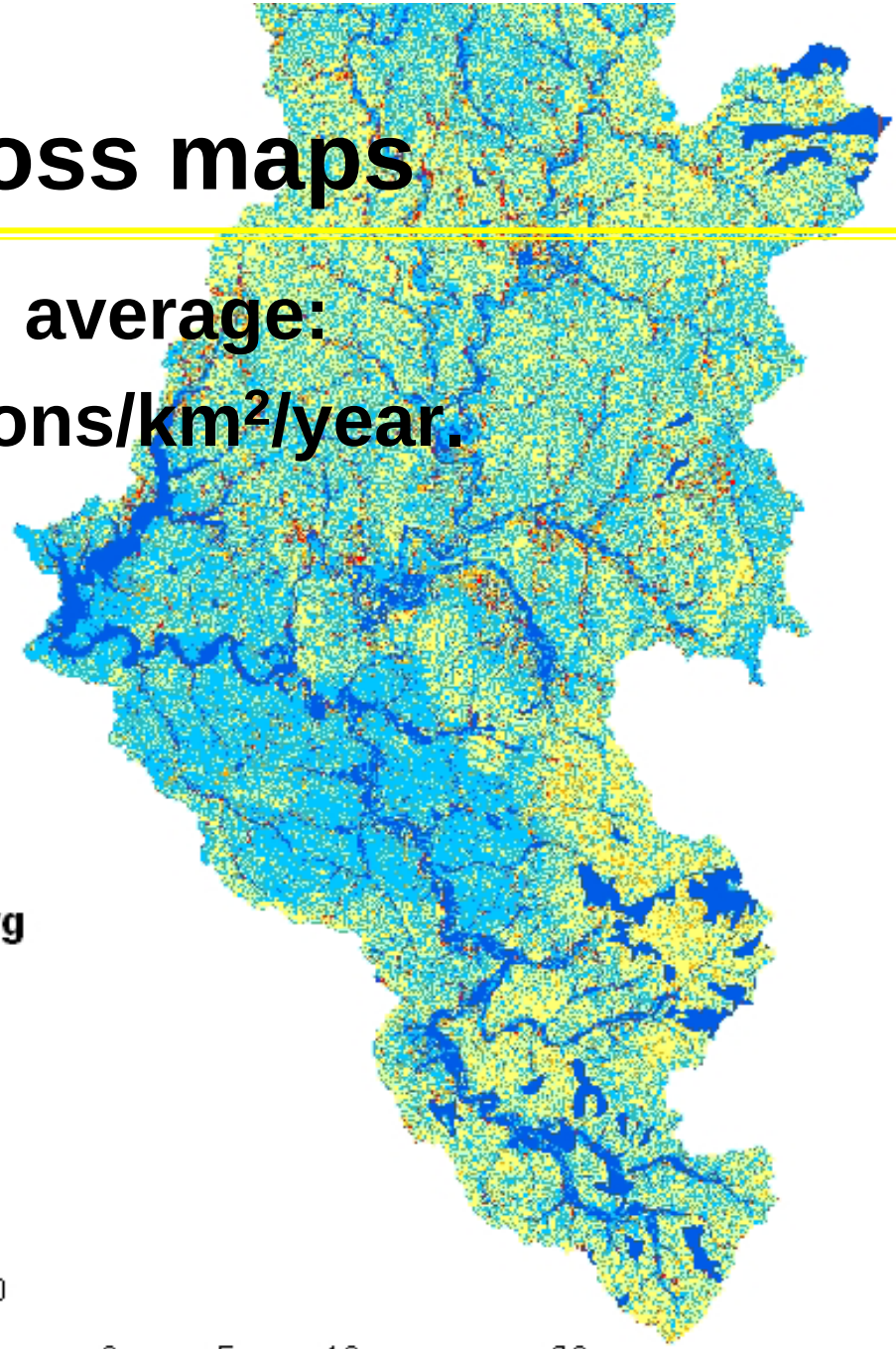
Watershed Deforestation

Imha Reservoir, South Korea

Soil loss maps

Annual average:

3,450 tons/km²/year.



Legend

Soilloss_avg

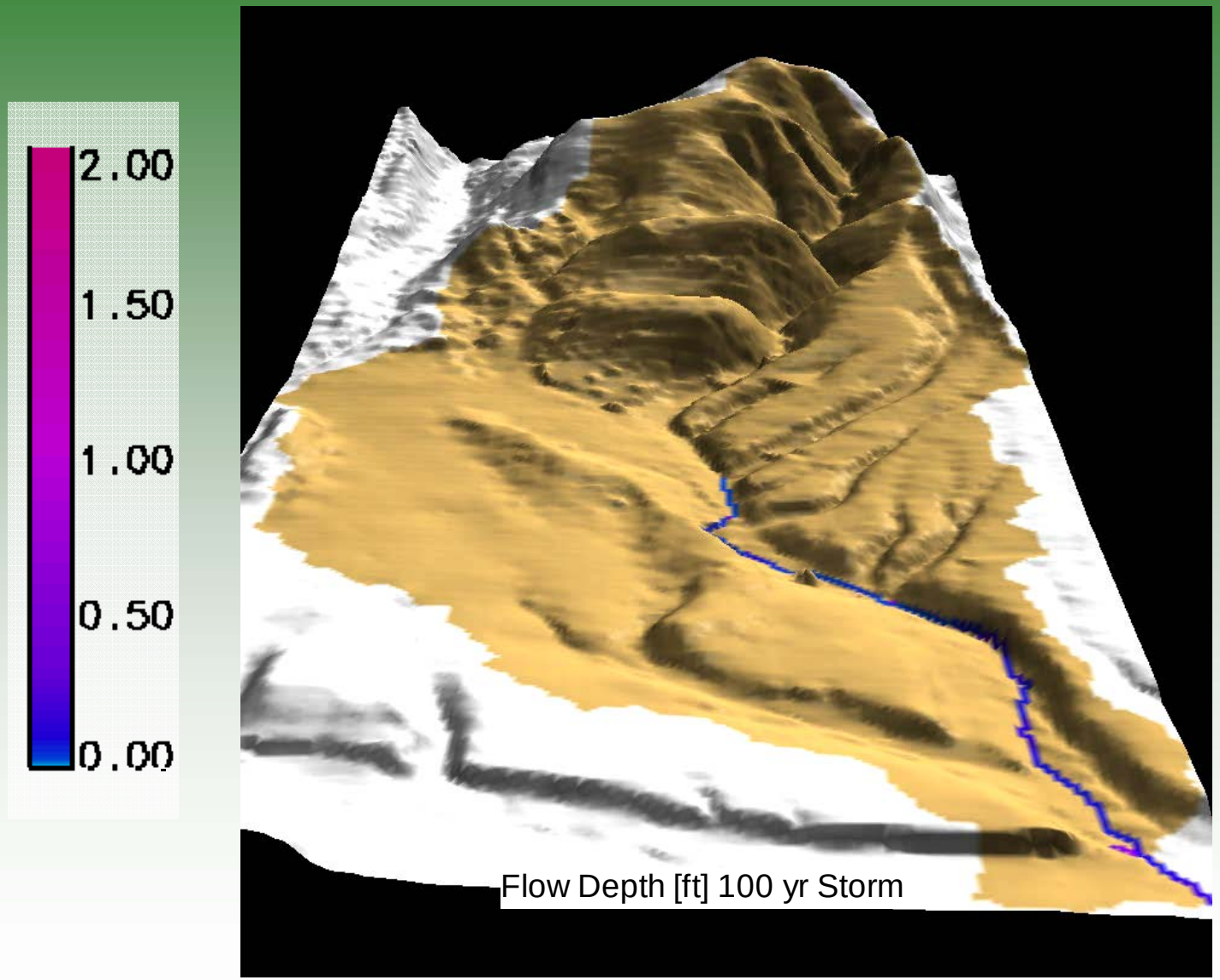
tons/acre/yr

- 0 - 1
- 1 - 10
- 10 - 30
- 30 - 100
- 100 - 760

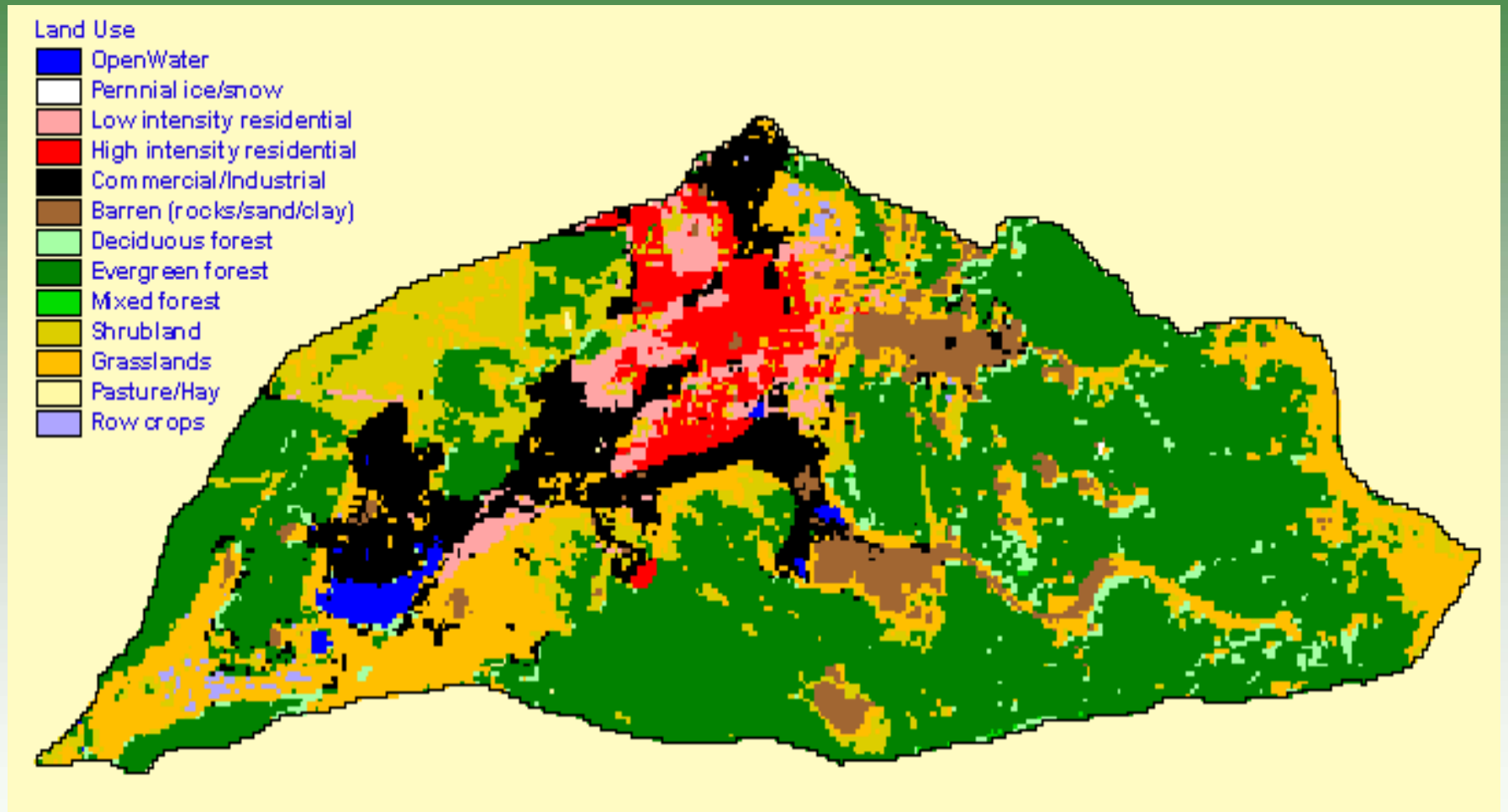
0 5 10 20 Kilometers

24

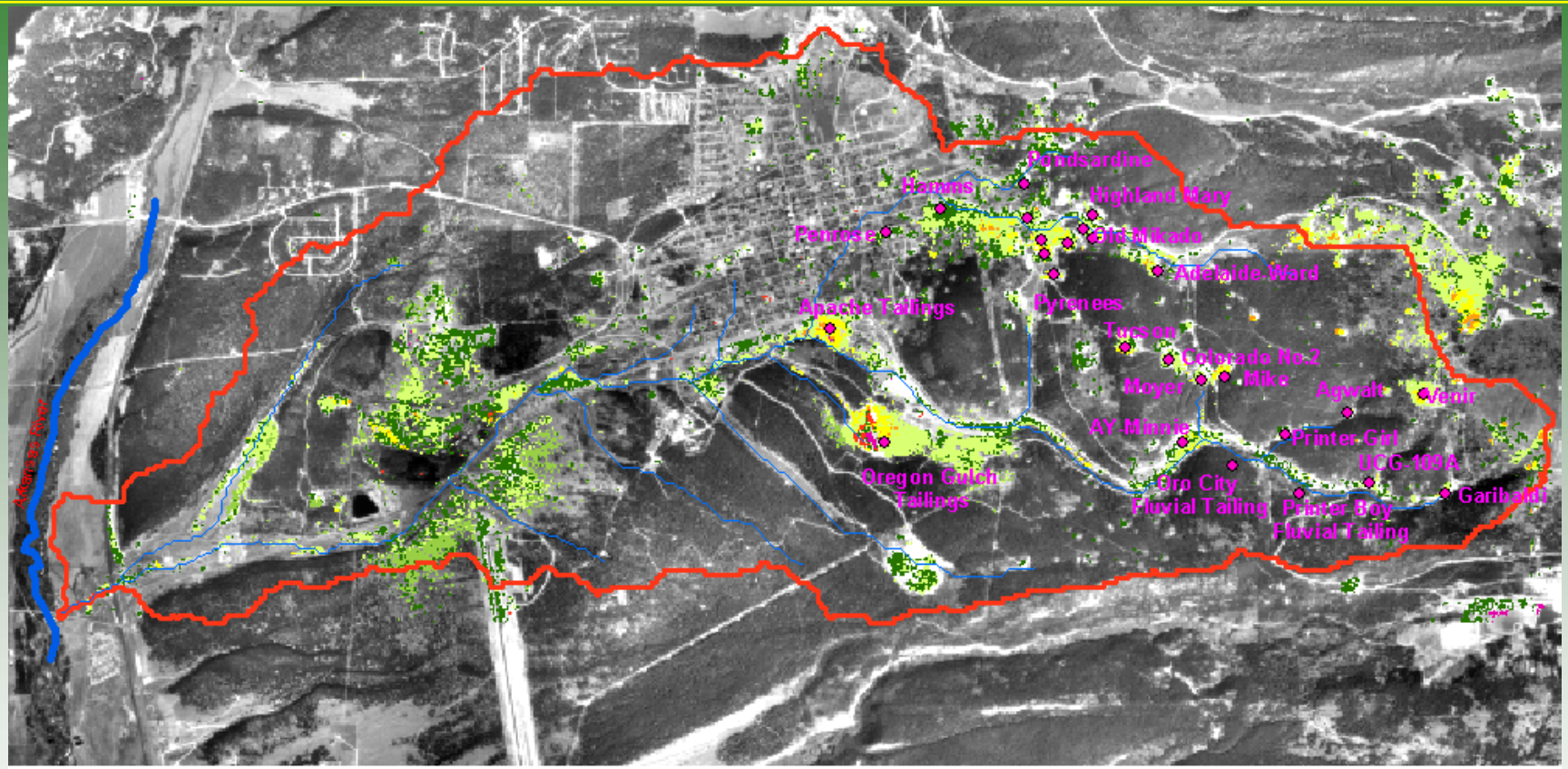
CSU Watershed Model TREX



Land Use Data



California Gulch Watershed



0 0.5 1 2 3 4 5 Kilometers

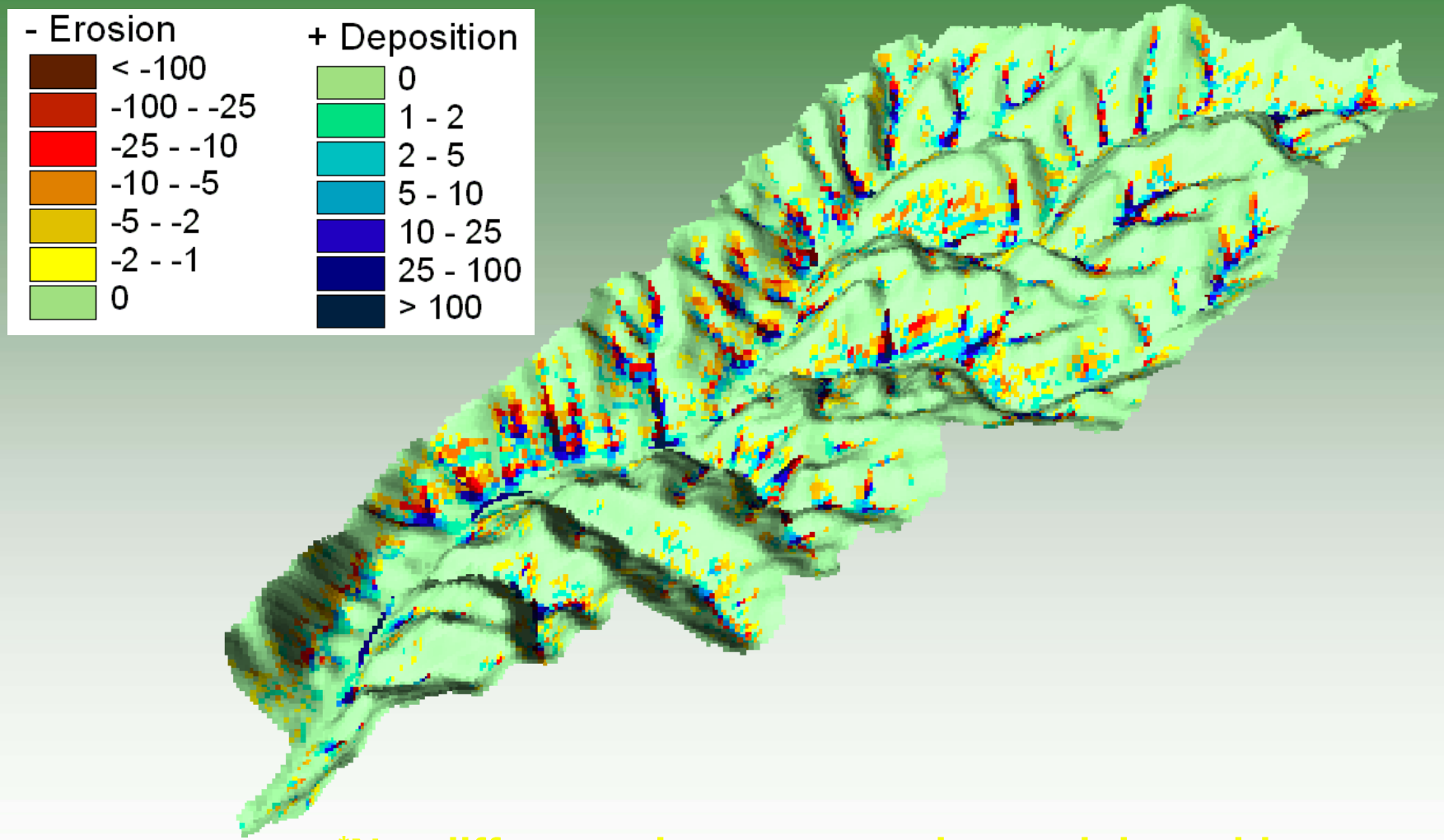
N

ACIDIC
High Leachability

NEUTRAL
Low Leachability

- Pyrite
- Low pH water
- Jarosite
- Jarosite + Goethite Area
- Goethite
- Hematite 1
- Hematite 2

Net Erosion and Deposition*



*Net difference between erosion and deposition.

Undisclosed logging area

Palm Oil Plantation

Photo courtesy of PID Sg. Mati

Palm Oil Plantation

Photo courtesy of PID Sg. Mati

Insufficient silt trap provided by developer at Sepang, Selangor

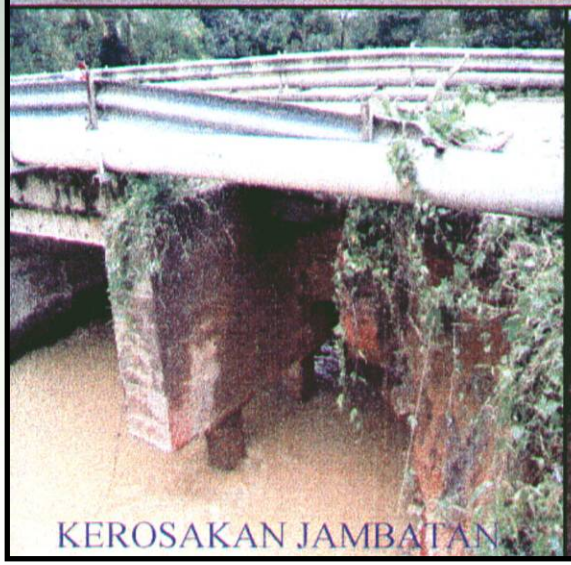
Photo courtesy of Shahida

Highly toxicities pesticide waste dumped in to the river

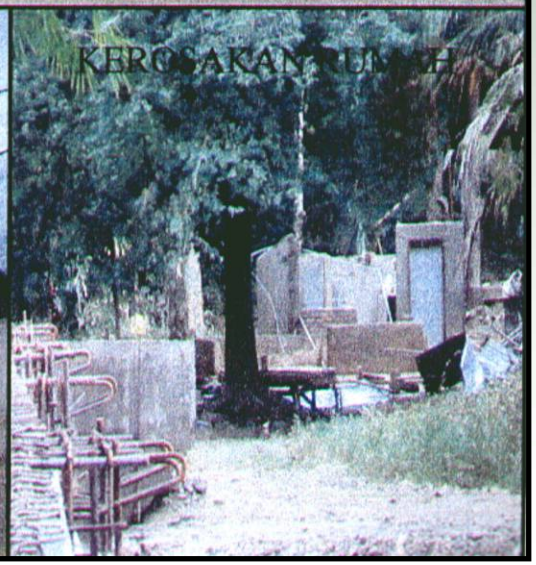
Photo courtesy of DID Kelantan

BANJIR DAERAH BALING OKTOBER 2003

TAMAN KUALA KETIL, BALING

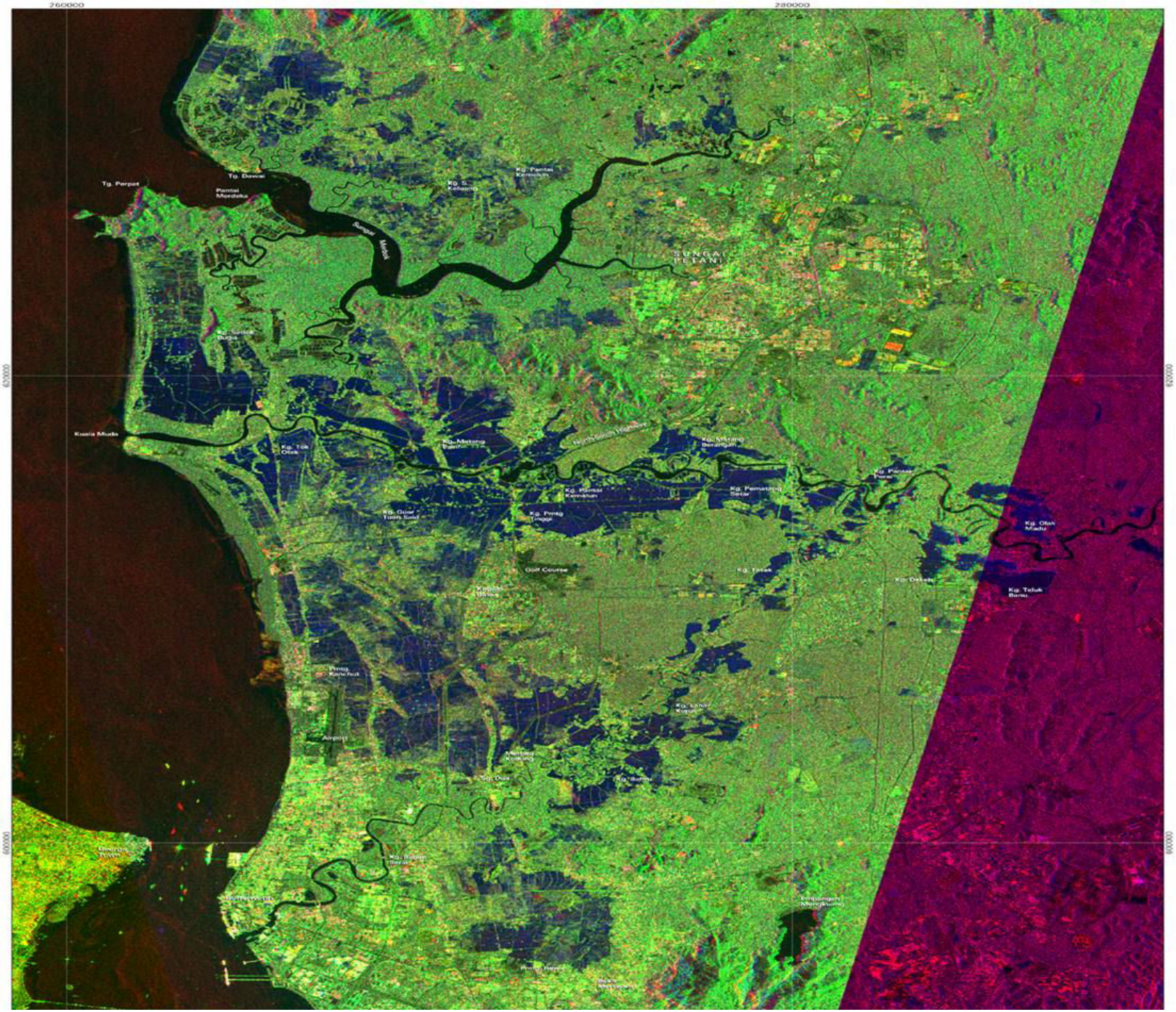


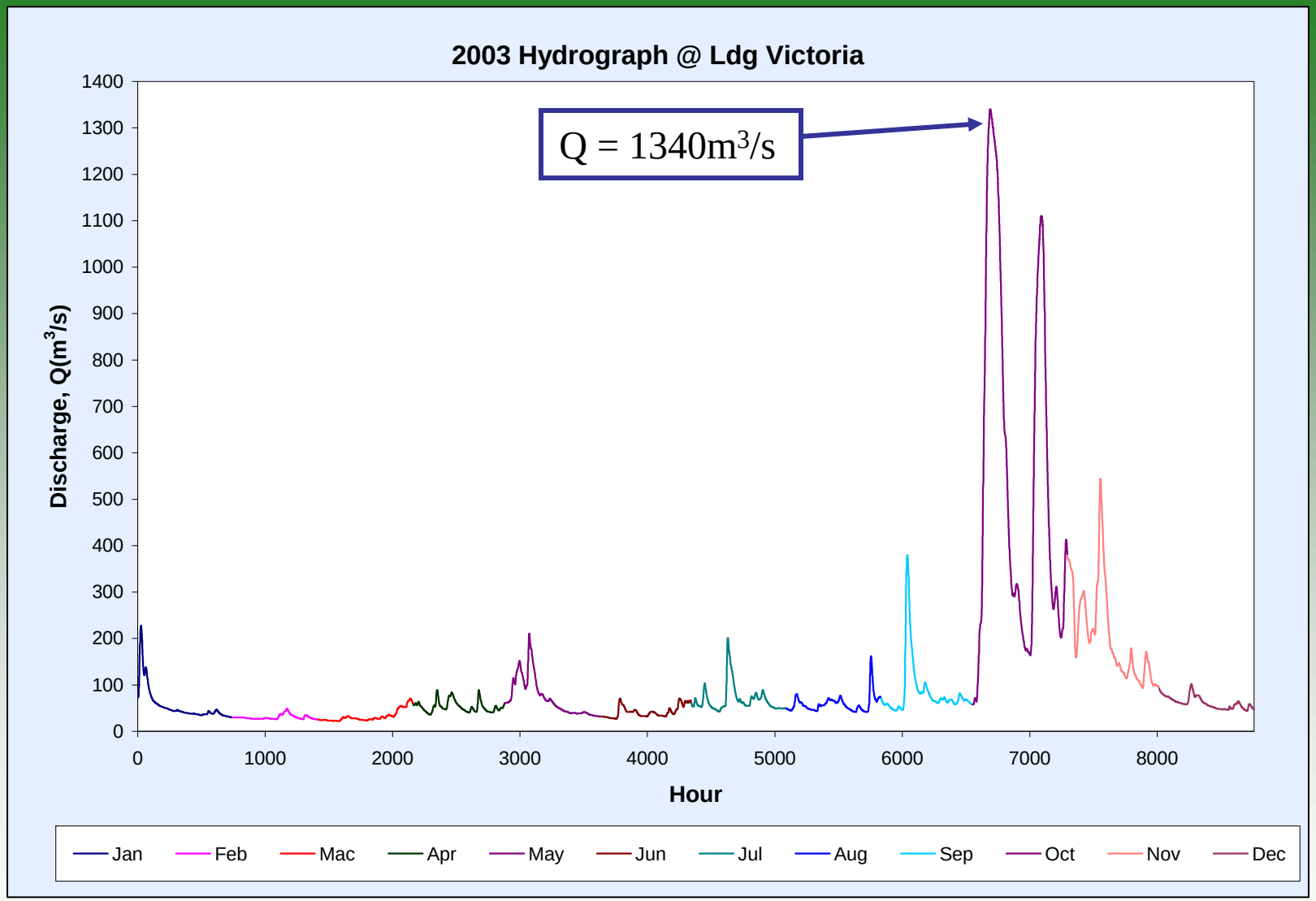
KEROSAKAN JAMBATAN

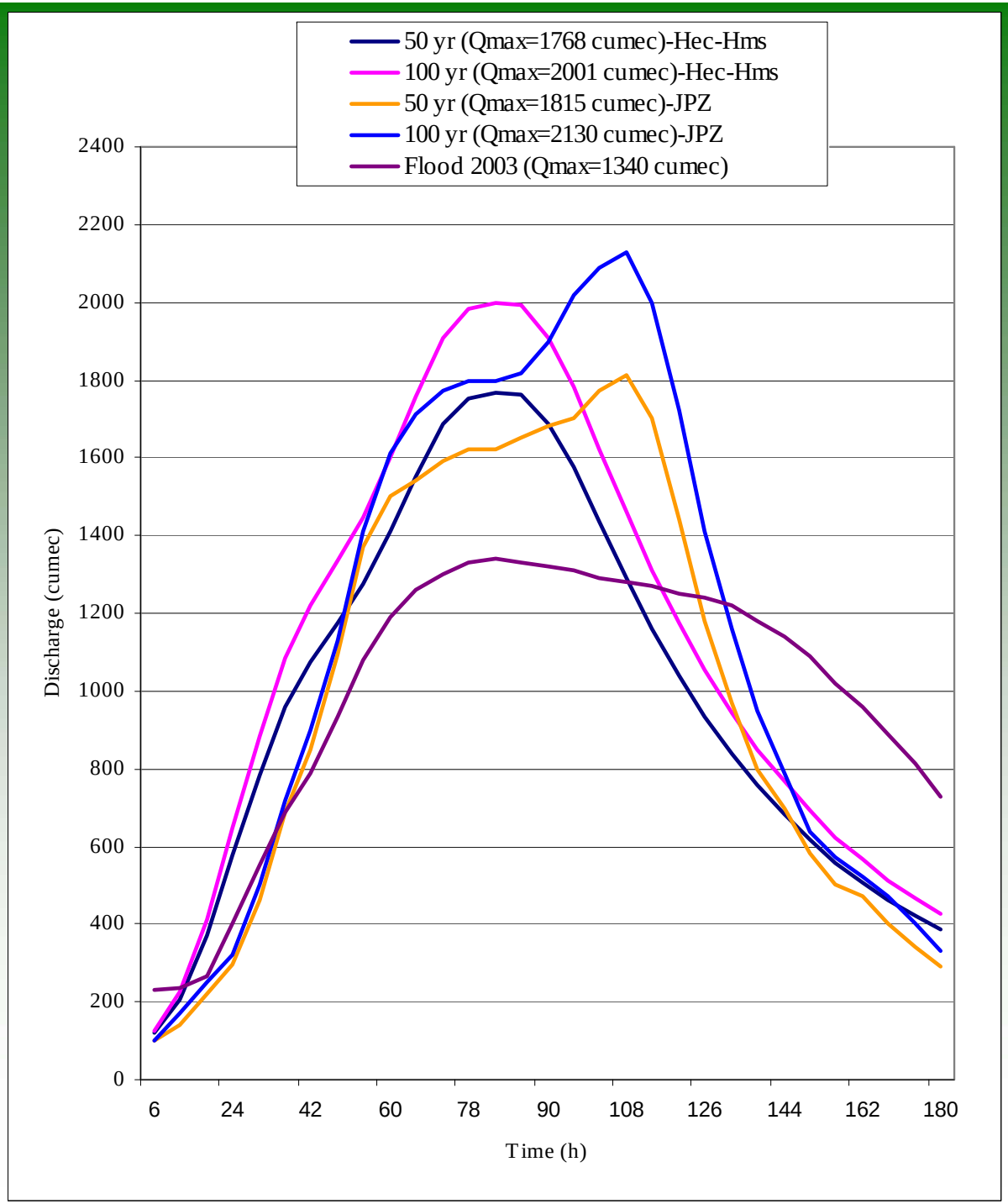


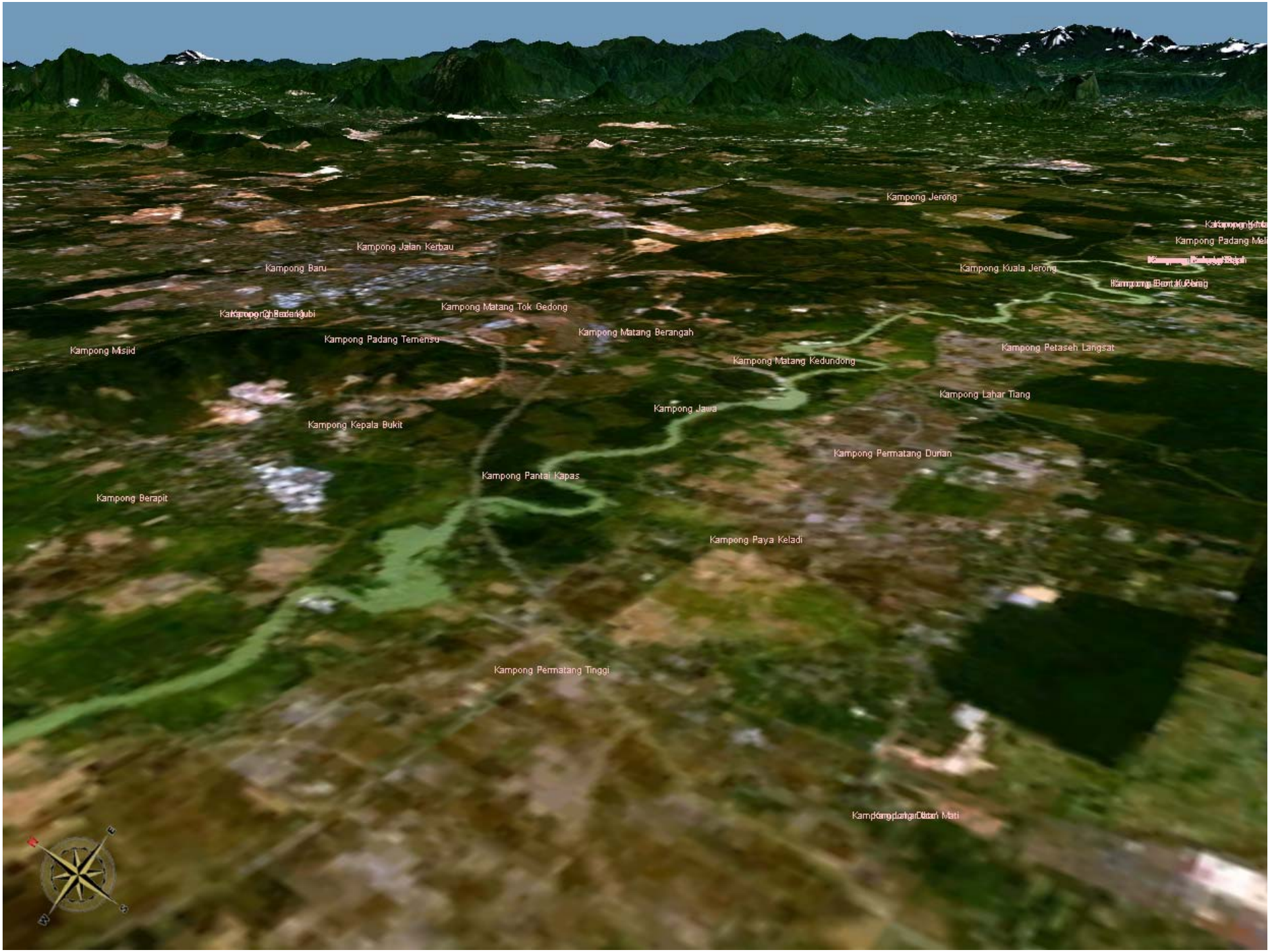
KEROSAKAN RUMAH

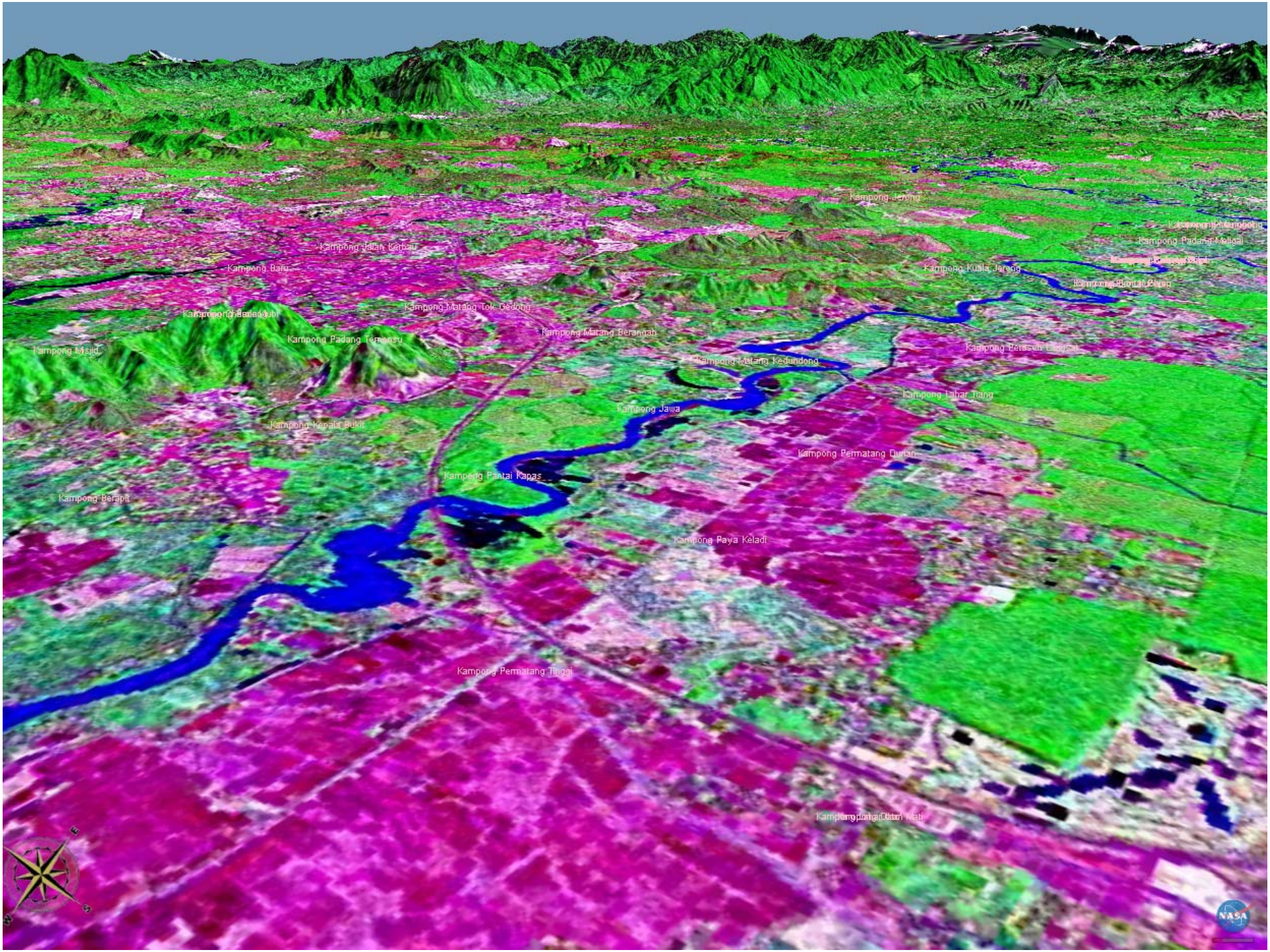
FLOOD IN P. PINANG AND KEDAH : 9 - 10 OCTOBER 2003




2003 Hydrograph @ Ldg Victoria
Q = 1340m3/s
Discharge, Q(m3/s)
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0
1000
2000
3000
4000
5000
6000
7000
8000
Hour
Jan
Feb
Mac
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

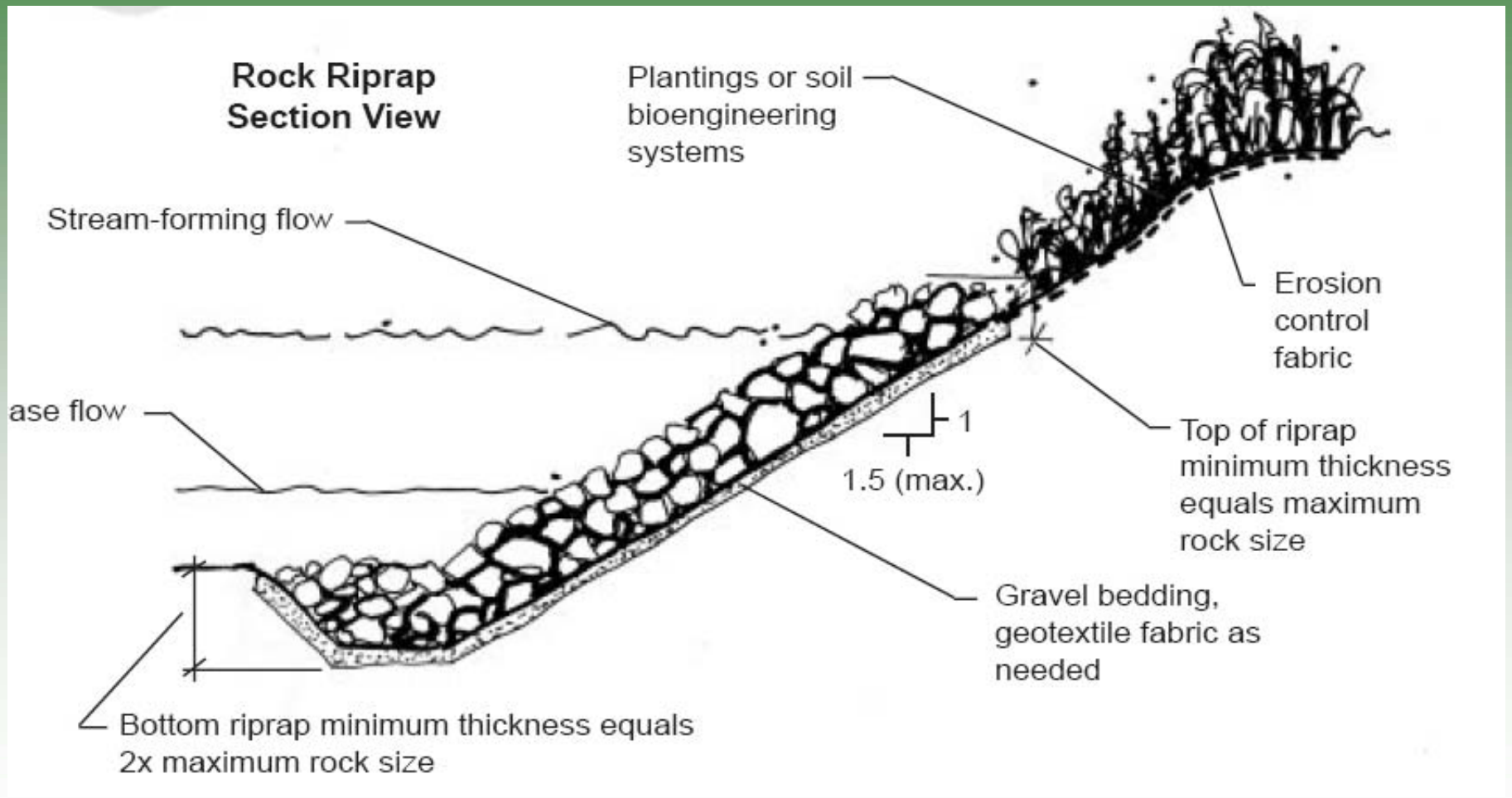

50 yr (Qmax=1768 cumec)-Hec-Hms
100 yr (Qmax=2001 cumec)-Hec-Hms
50 yr (Qmax=1815 cumec)-JPZ
100 yr (Qmax=2130 cumec)-JPZ
Flood 2003 (Qmax=1340 cumec)
Discharge (cumec)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
6
24
42
60
78
90
108
126
144
162
180
Time (h)


Kampong Jerong
Kampong Padang Mel
Kampong Jalan Kerbau
Kampong Baru
Kampong Kuala Jerong
Kampong Matang Tok Gedong
Kampong Matang Berangah
Kampong Padang Temenggu
Kampong Misjid
Kampong Petaseh Langsat
Kampong Matang Kedundong
Kampong Lahar Tiang
Kampong Jawa
Kampong Kepala Bukit
Kampong Permatang Durian
Kampong Pantai Kapas
Kampong Berapit
Kampong Paya Keladi
Kampong Permatang Tinggi
Kampong Mati


Kampong Jerong
Kampong Padang Meligai
Kampong Jalan Kerbau
Kampong Baru
Kampong Kuala Jerong
Kampong Matang Tok Gedong
Kampong Matang Berangah
Kampong Padang Temasu
Kampong Matang Kedundong
Kampong Lahar Trang
Kampong Jawa
Kampong Kepala Bukit
Kampong Permatang Durian
Kampong Pantai Kapas
Kampong Berapit
Kampong Paya Keladi
Kampong Permatang Tinggi

Channel realignment

Riprap Design



Membina Benteng Banjir

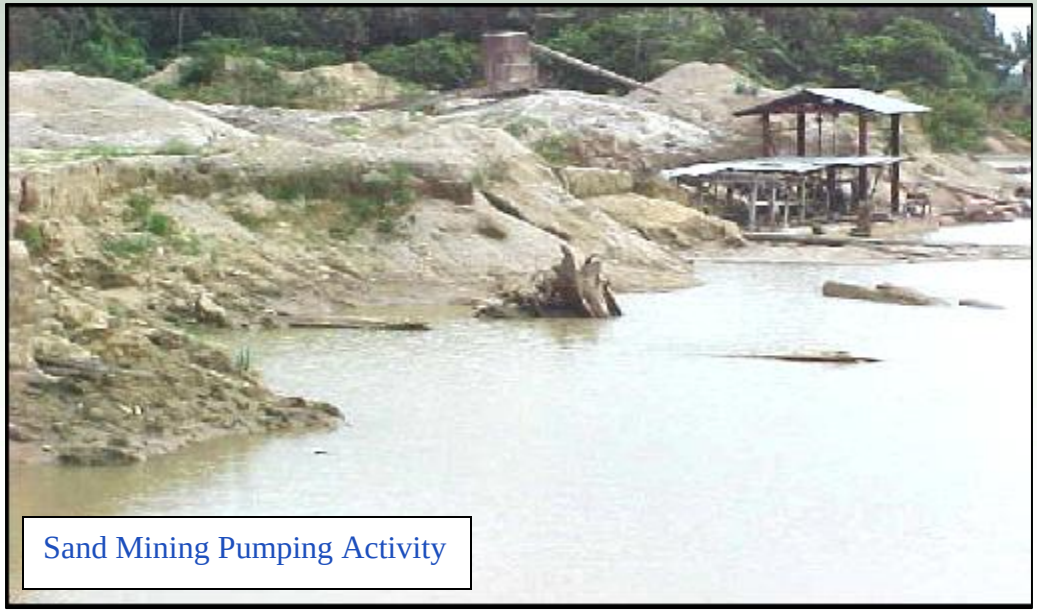
Meluruskan sungai

Intake Gate, SMART Tunnel

Sand and Gravel Mining

Kampong Kubang Bedengong

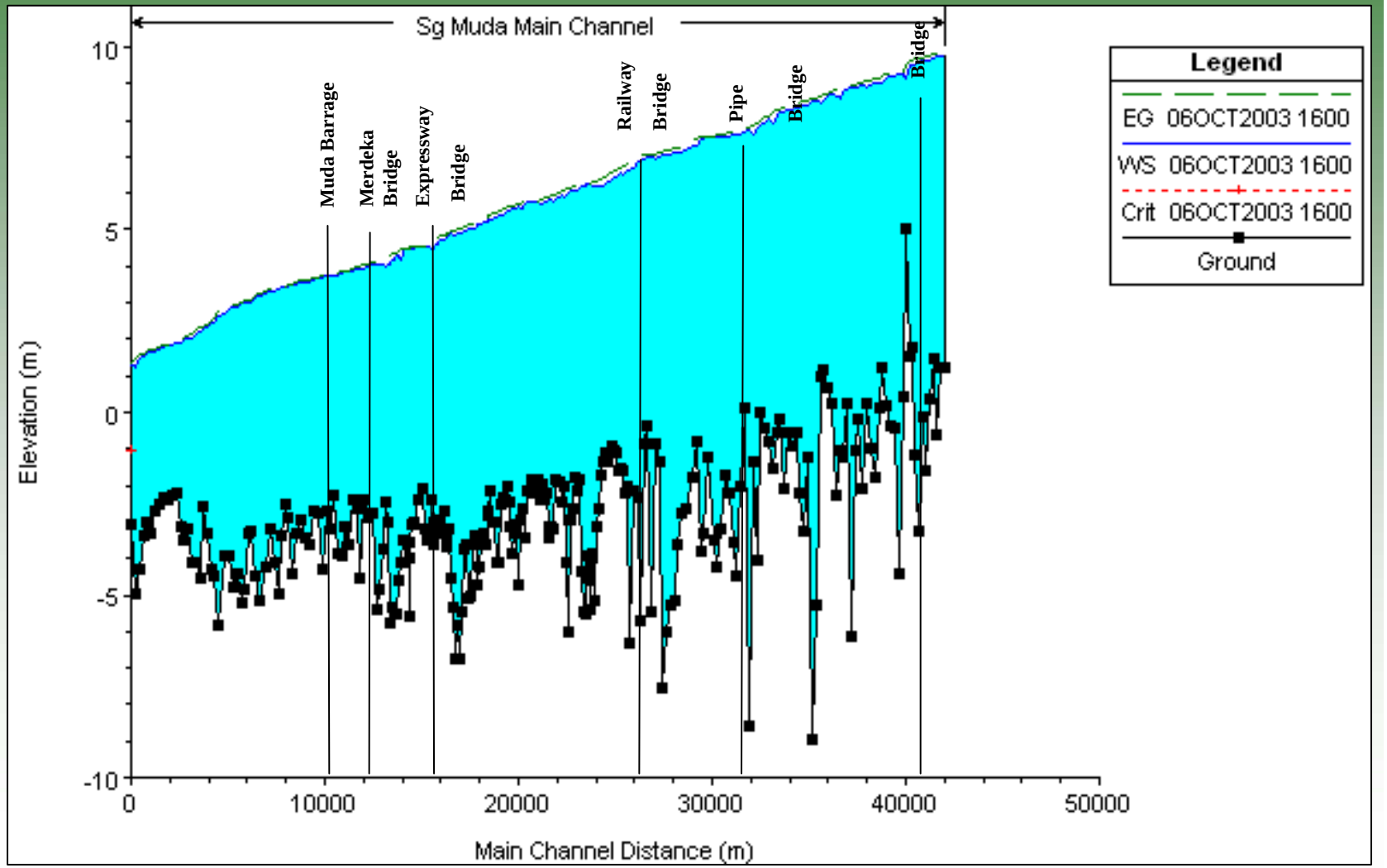
Kampong Lubok Segintah



Sand Mining Pumping Activity

River Sand Mining

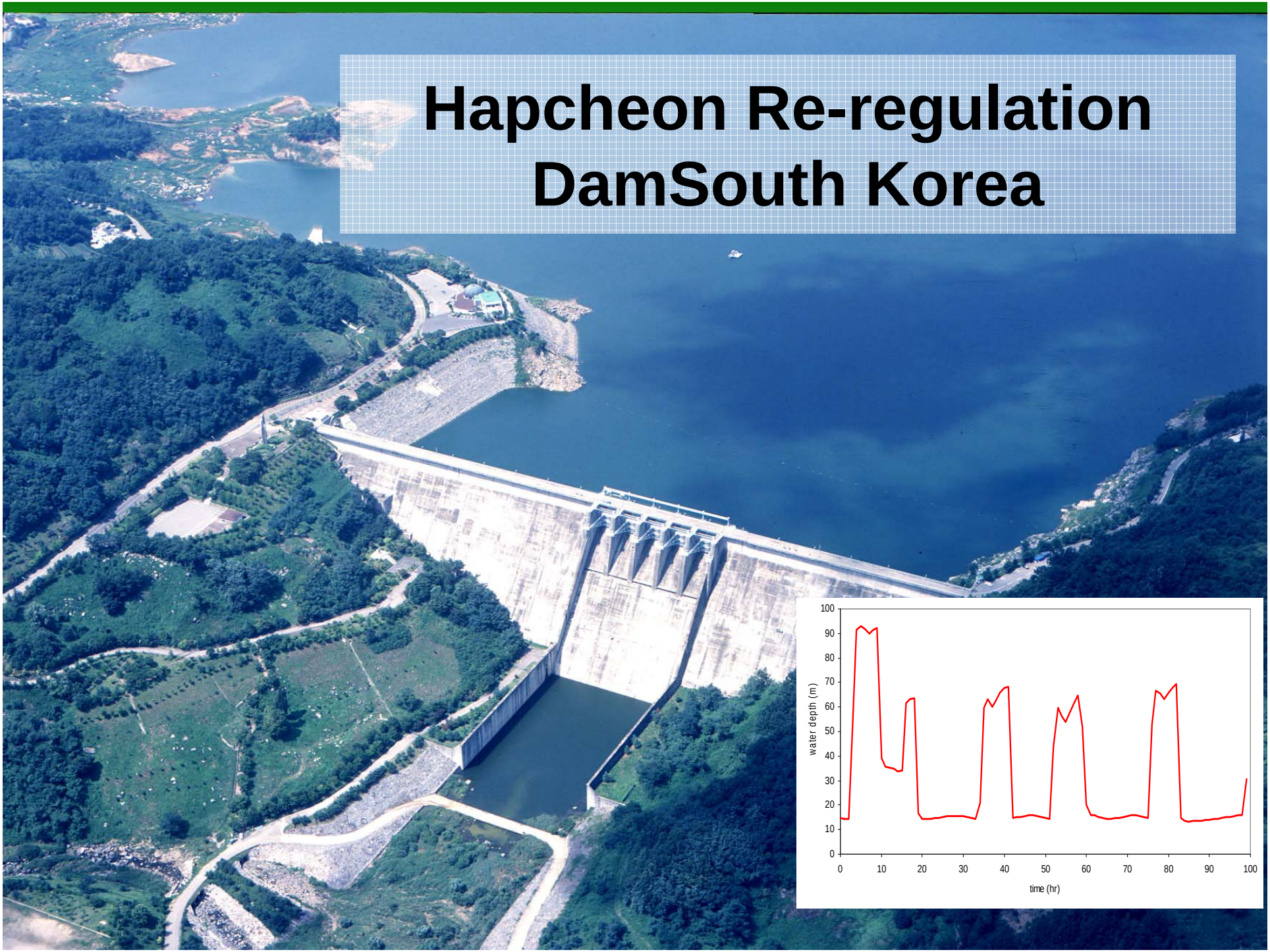
Longitudinal Flood Profile for Sg Muda (Q=1340m^3/s)



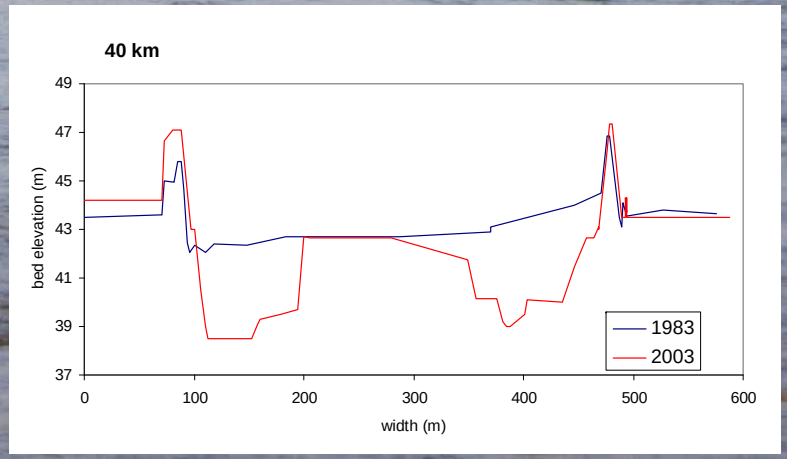
Off-stream Sand and Gravel Mining

Arbee Ln
Waterstone Ct
E Horsetooth Rd
SE Frontage Rd
Ashmount Dr
Michelle Ln
Charlie Ln
Carrick Rd
Mariah Ln
Lee Trl
Chinook Ln
25
87

Hapcheon Re-regulation DamSouth Korea



Degradation and armouring



River changes below Hapcheon dam

PGC2

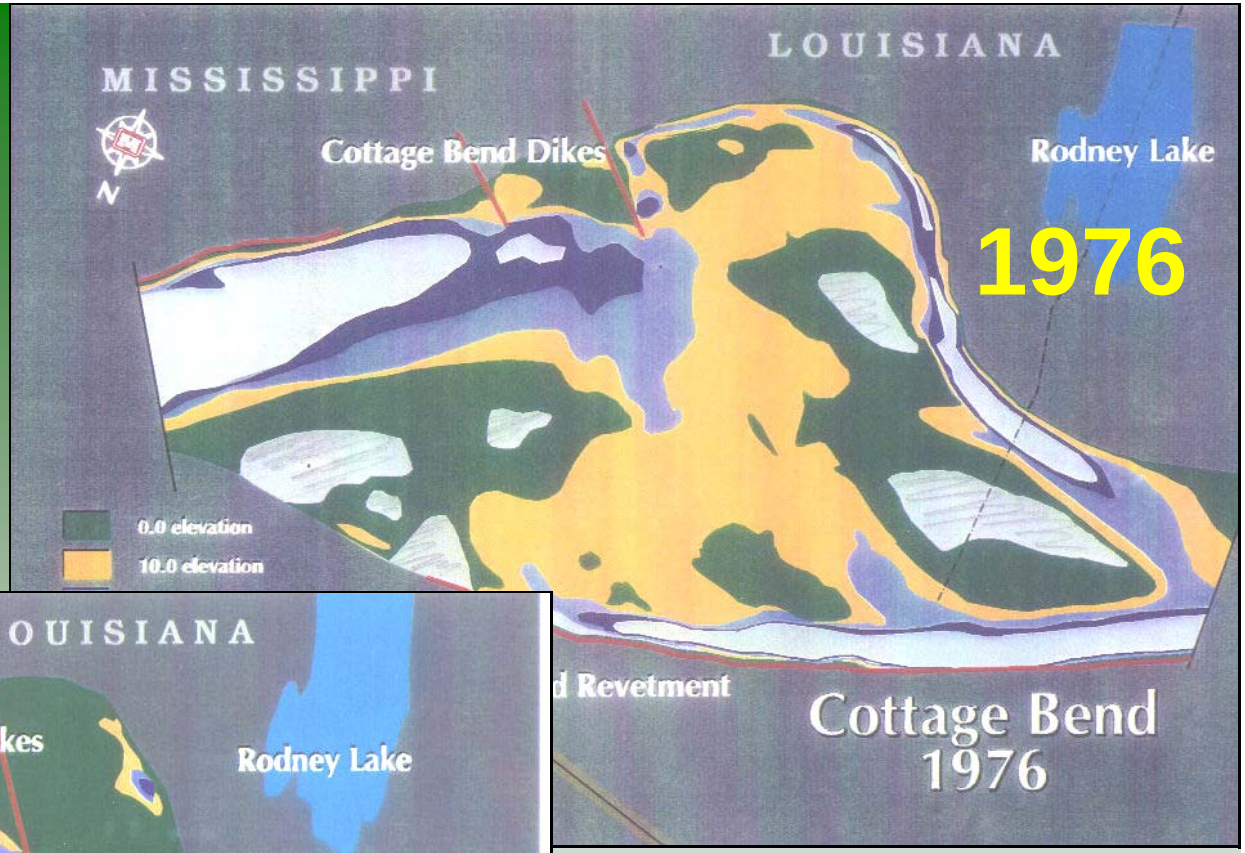
Dykes

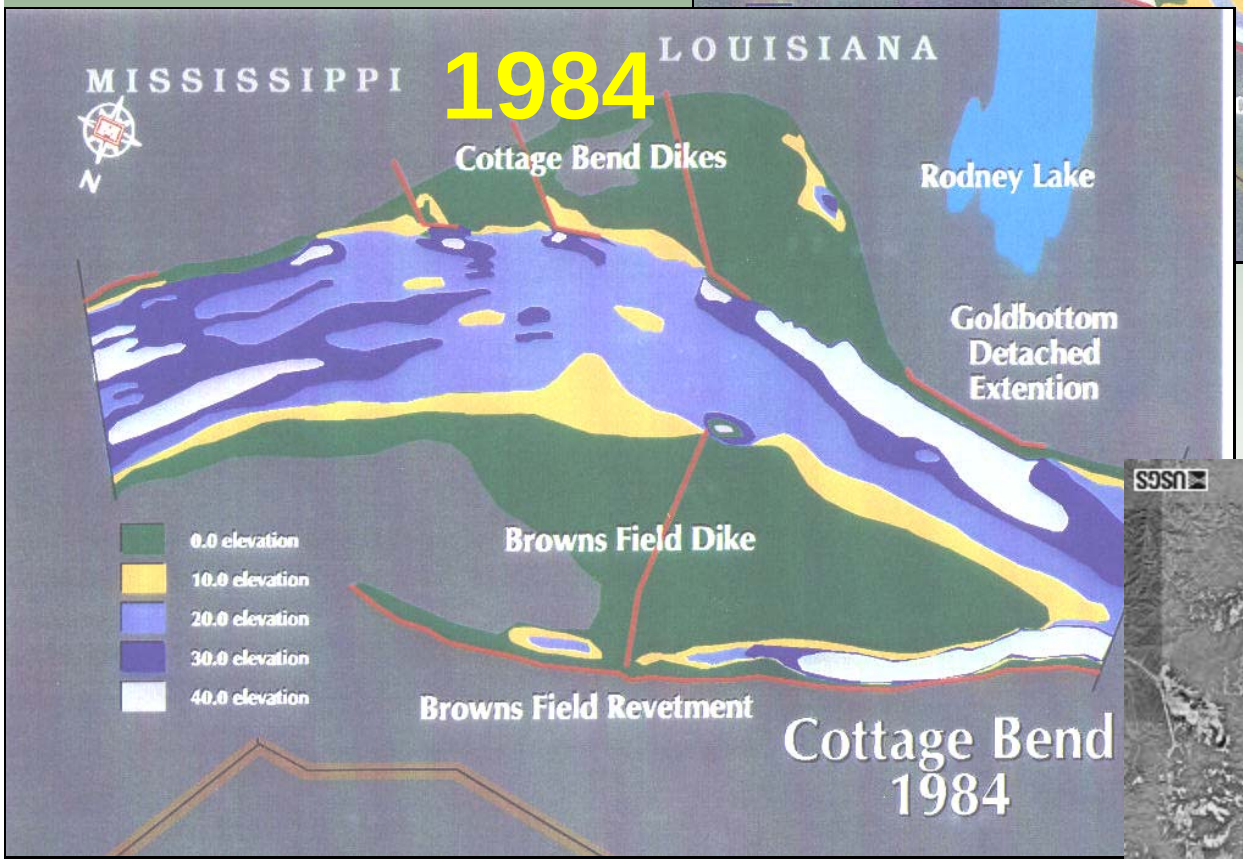
Slide 48

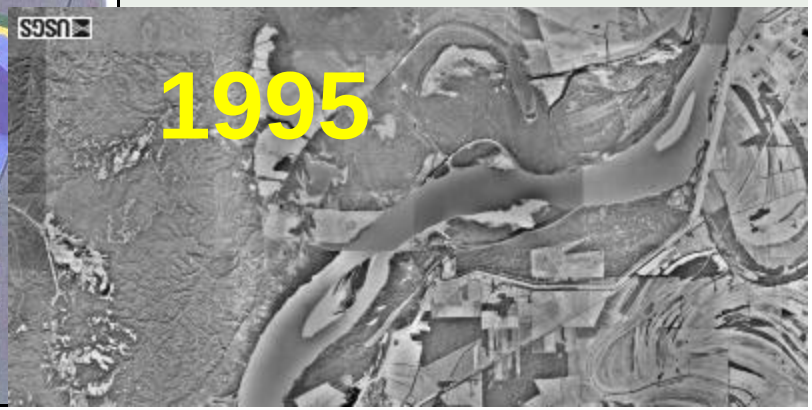
PGC2 Typical dike construction on the Mississippi River

Phil Combs, 8/29/2002

Cottage Bend

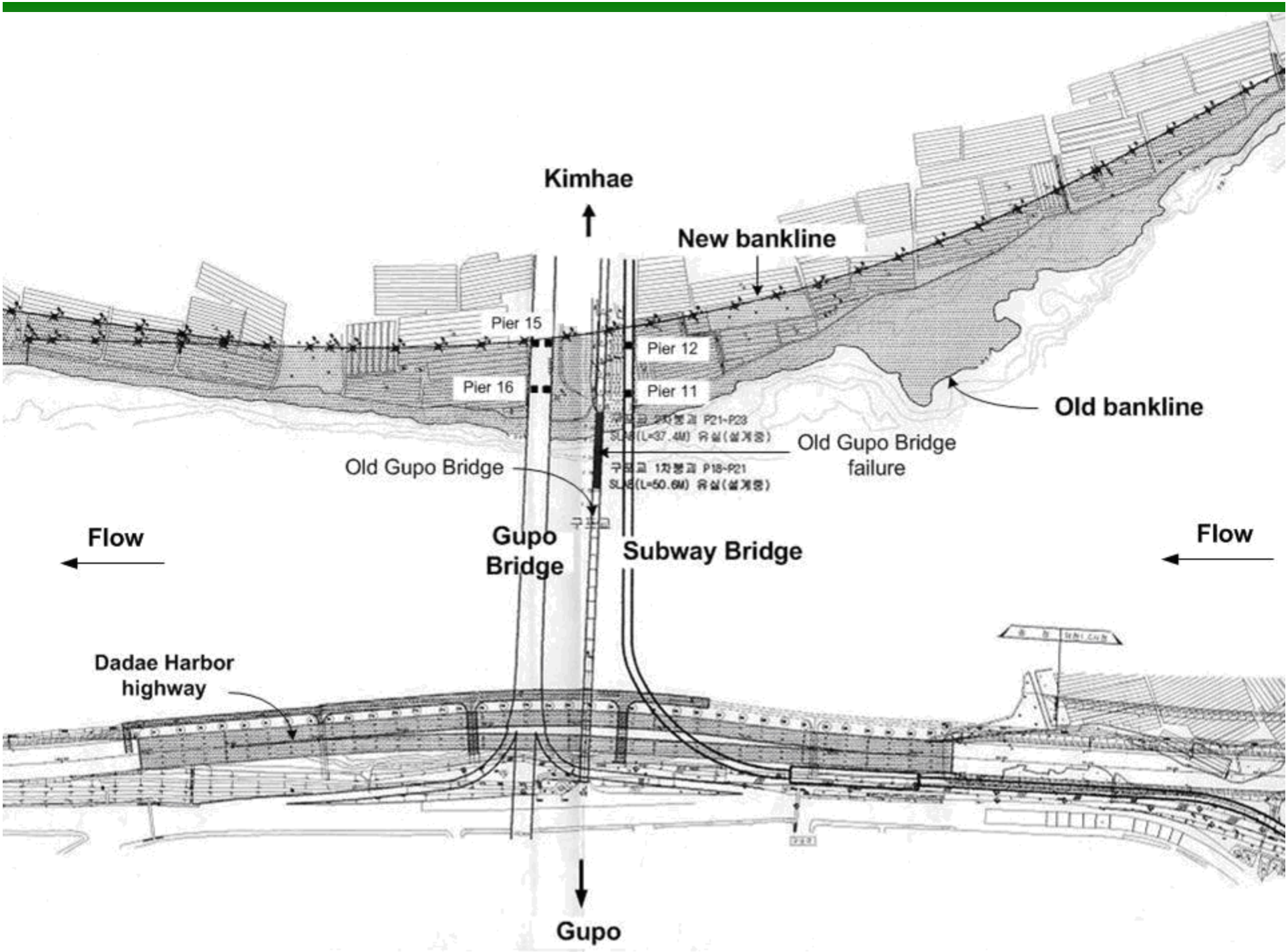






Nakdong River
Gupo bridge
Pusan city
NREB

P10

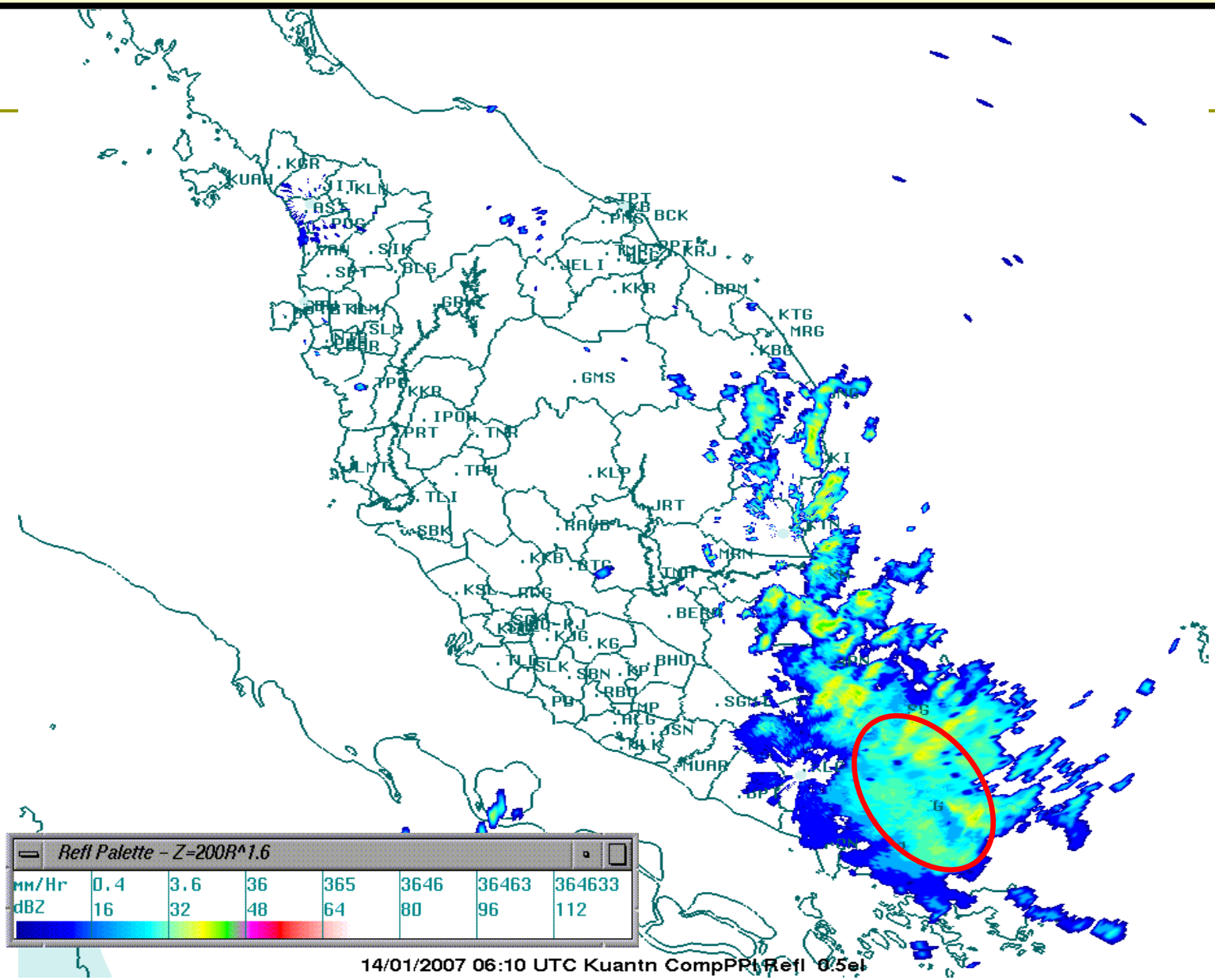

Kimhae
New bankline
Pier 15
Pier 12
Pier 16
Pier 11
Old bankline
Old Gupo Bridge failure
Old Gupo Bridge
Flow
Gupo Bridge
Subway Bridge
Flow
Dadae Harbor highway
Gupo

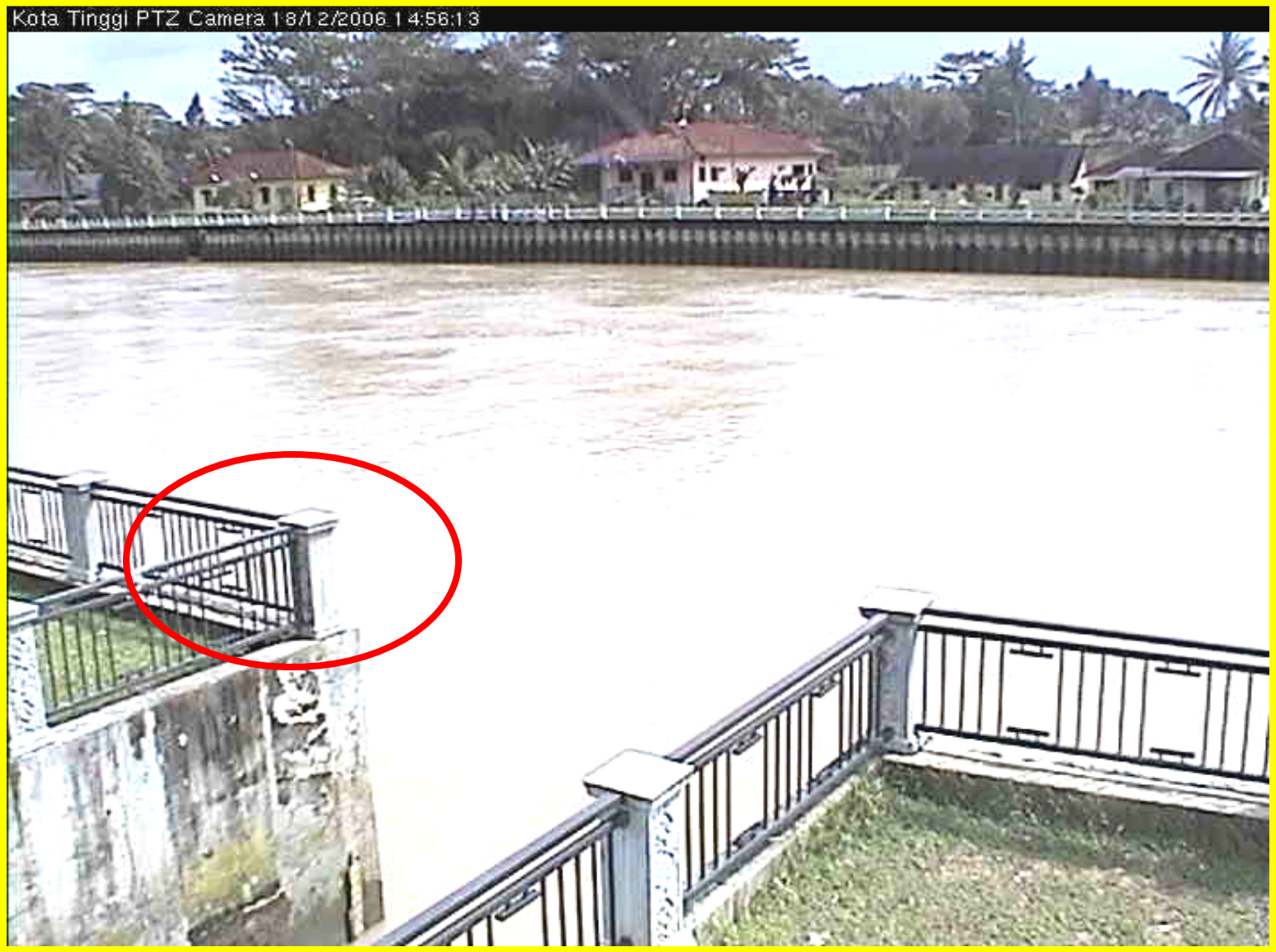
P15

Figure 12. Experiment results with synthetic filters

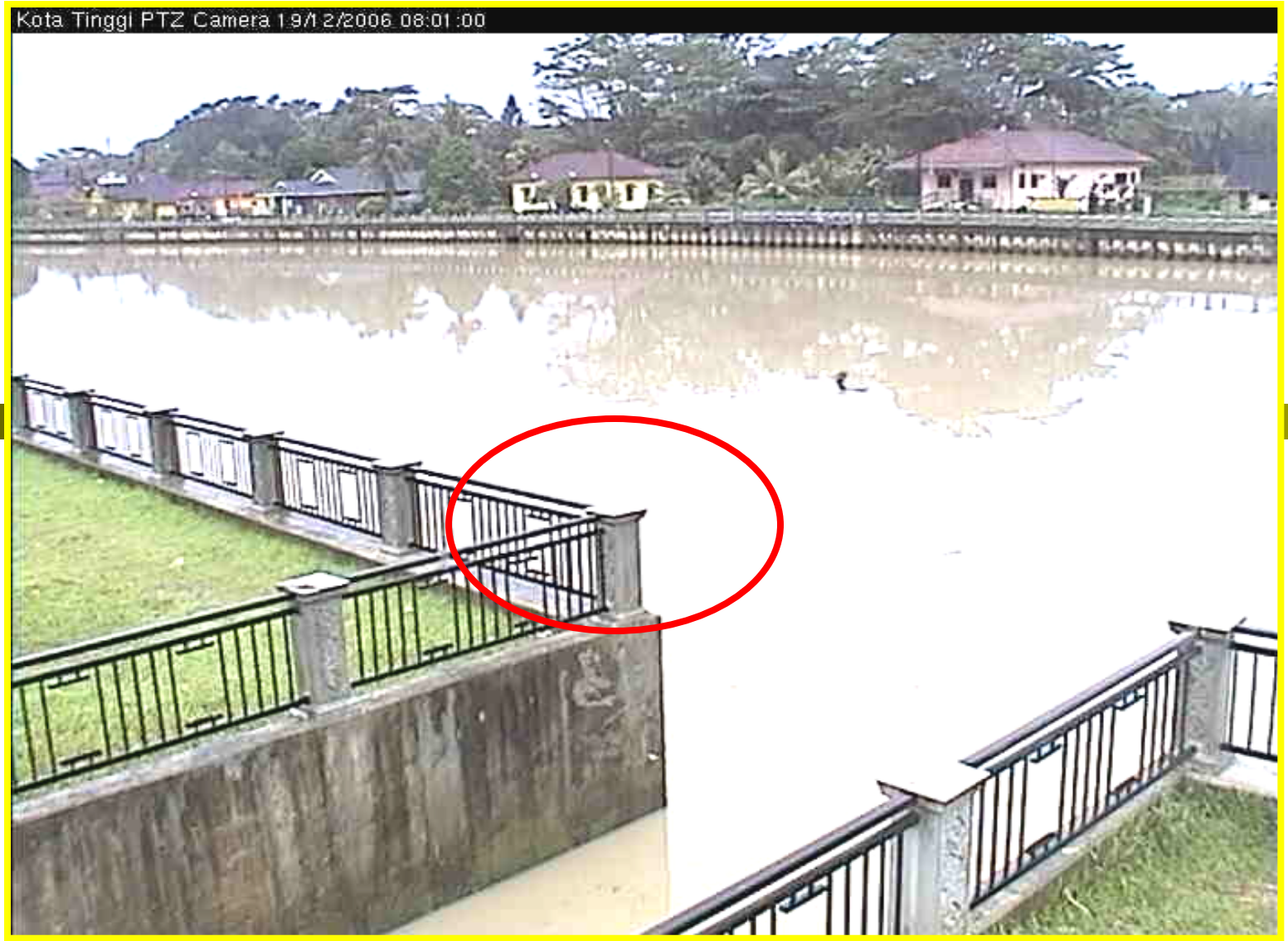
Figure 14. Gupo and Subway Bridge Piers before and after retrofitting construction

Gema Radar Cuaca Pada Jam 12.40 tengahari, 14 Januari 2007

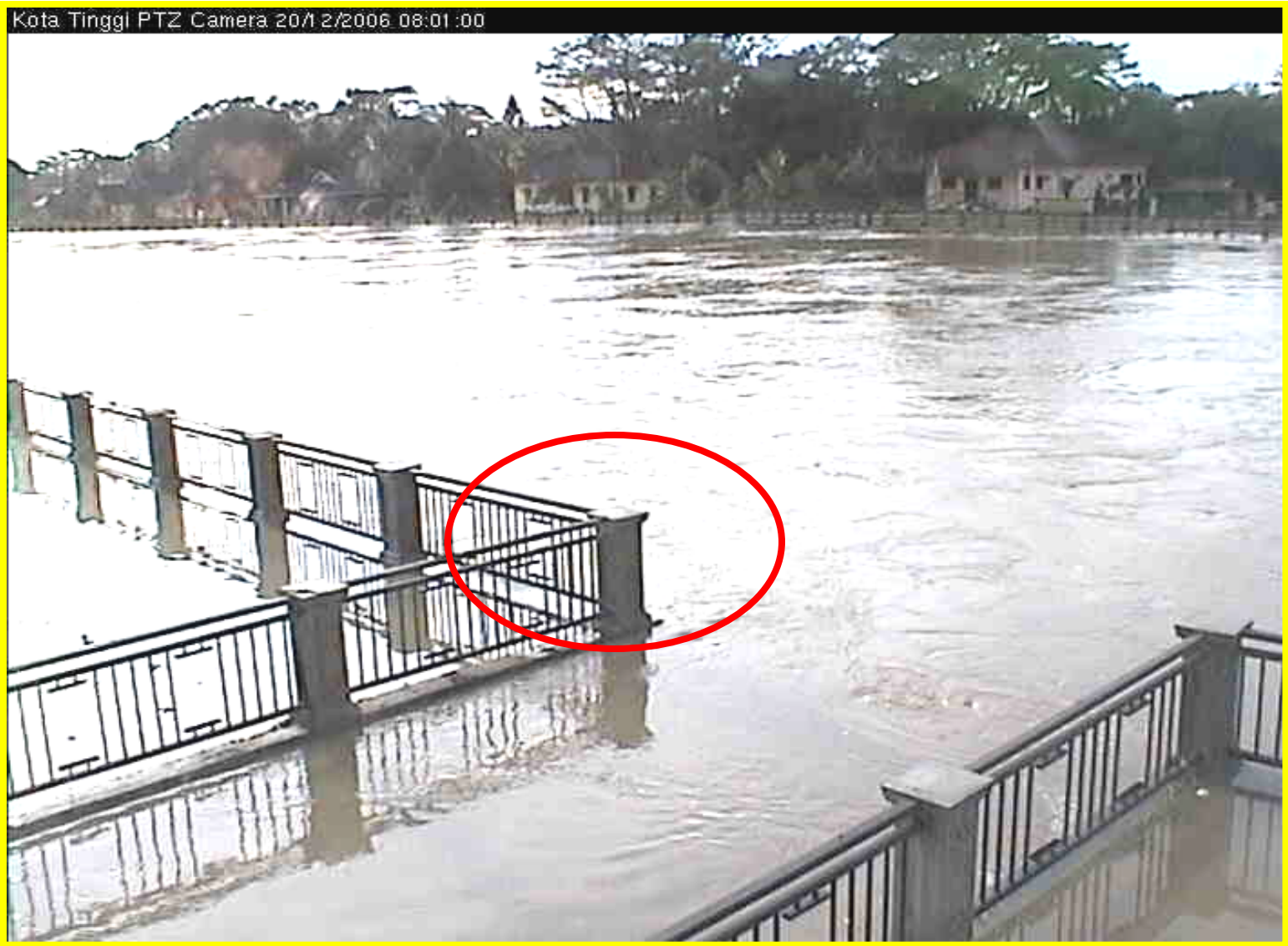




December 18, 2006



December 19, 2006



December 20, 2006

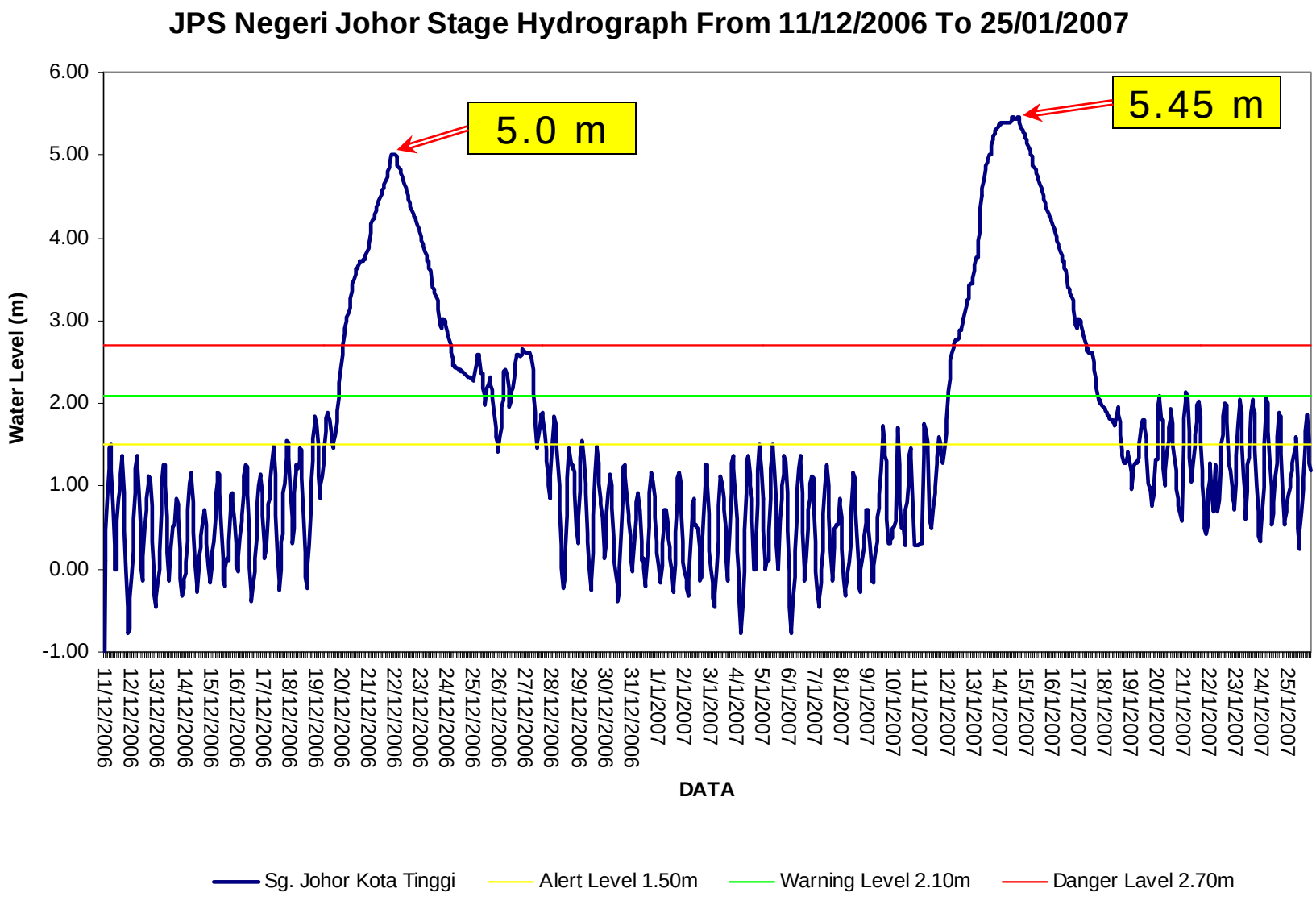
December 21, 2006

Kampung Abdullah
New Town Centre
Sri Genuang Shopping Complex
To Labis
Jalan Pee Kang Hai
Second Bridge
Jalan Sultan
Sungai Segamat
Jalan Hassan

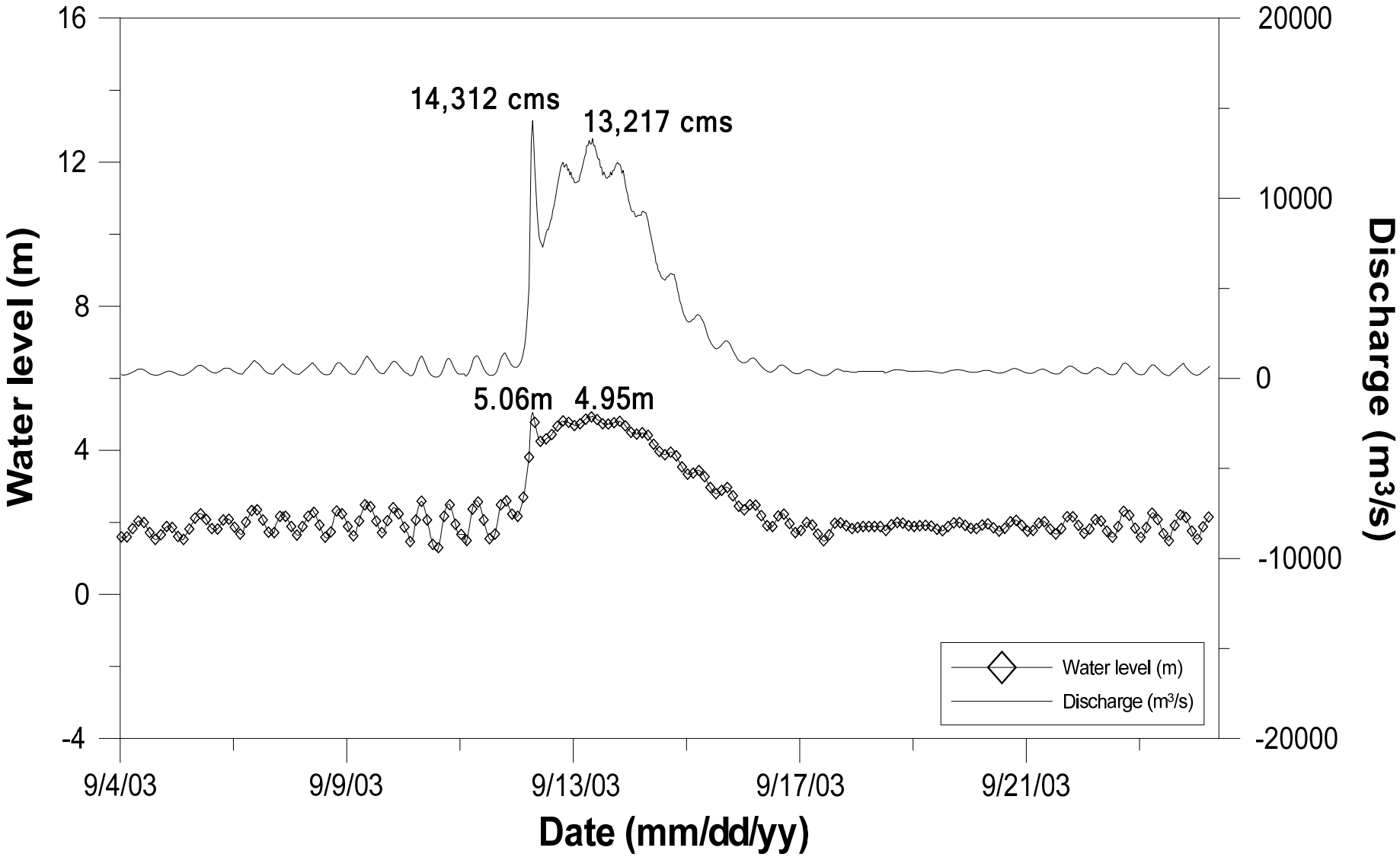
Kota Tinggi
Pustaka Seri Kota
PUSAT PERHIASAN
RIKA
MAJLIS MIRIB KOTA TINGGI
Merrybrown
SONY
Haier
SHARP
JVC
TOSHIBA
ImageHosting.com

باتو ساوار
Batu Sawar
NGGI : 14 JANUARI 2007
AN WARUNG BATU SAWAR, JALAN NIAGA 3
Bahri Mardi
Dicetak oleh : Percetakan Punca Jaya
Tel : 07-8636440

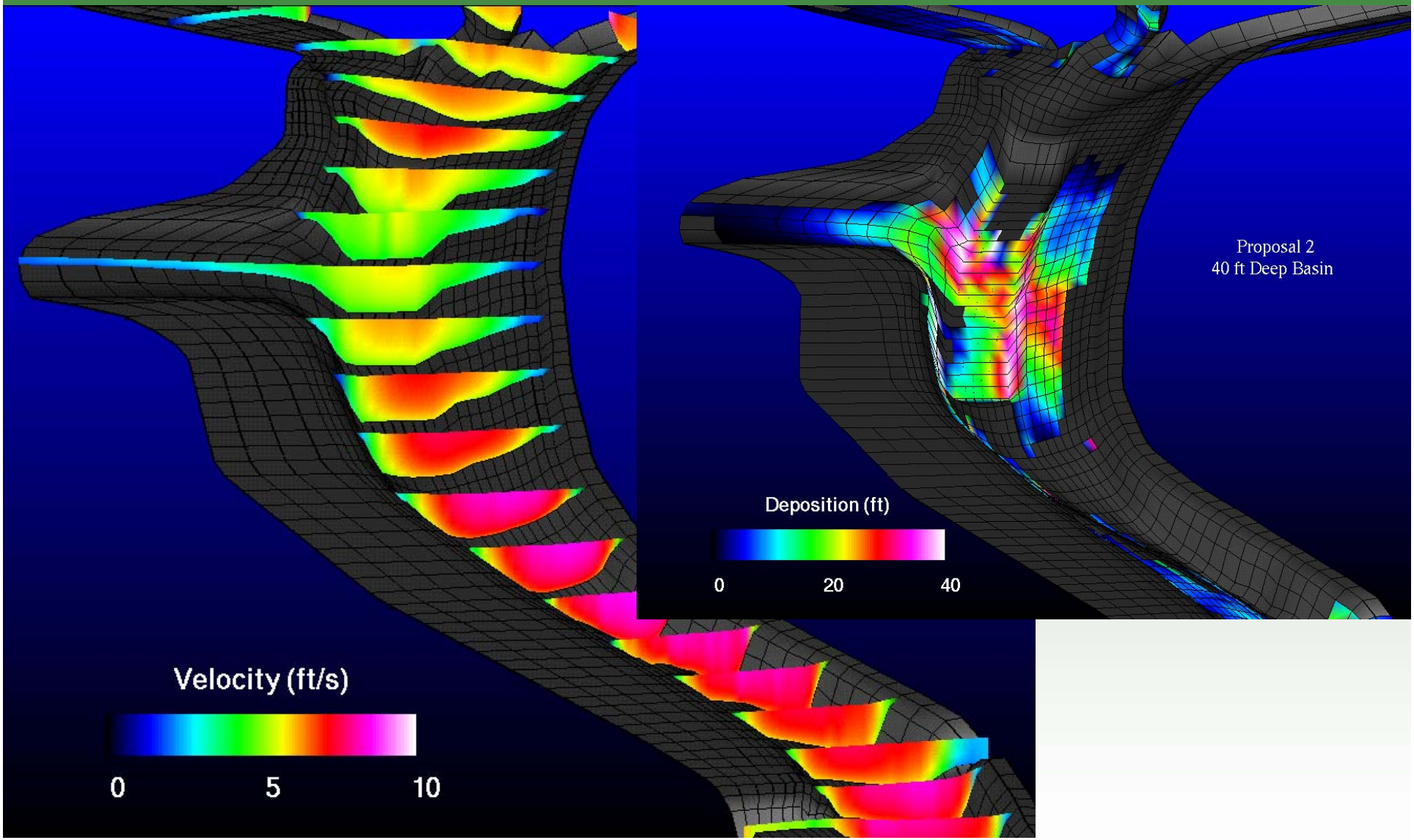
GRAF ARAS AIR SG. JOHOR DI BANDAR KOTA TINGGI



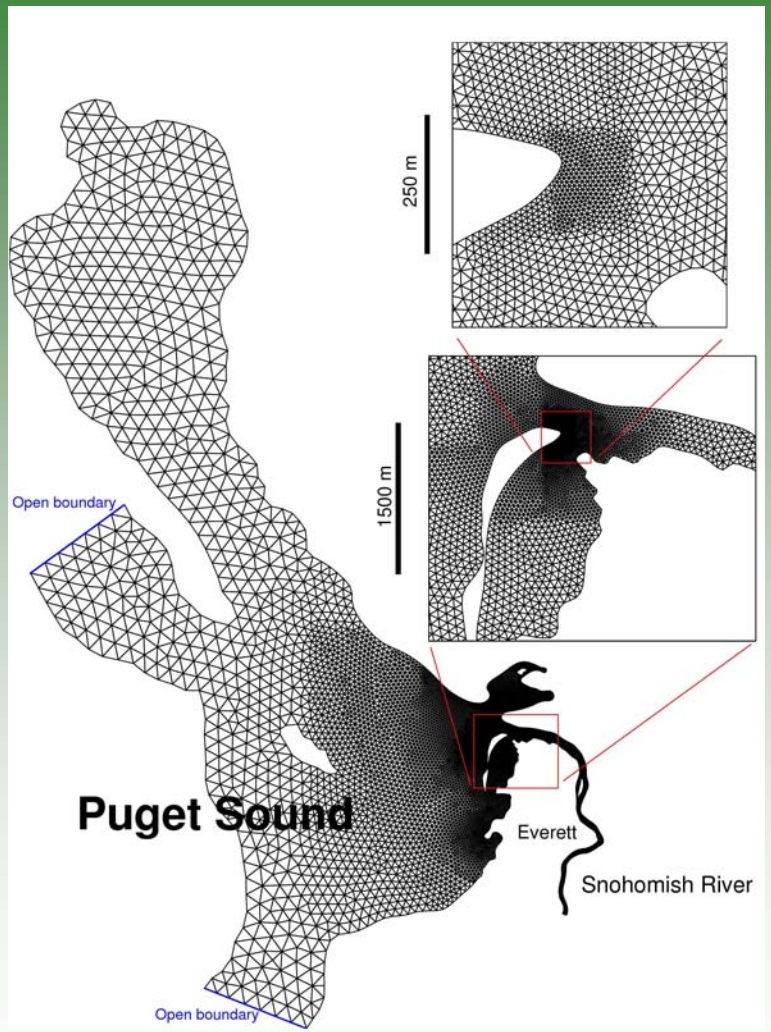
Water stage and discharge graph at Gupo bridge



Example 3-D Model Mississippi

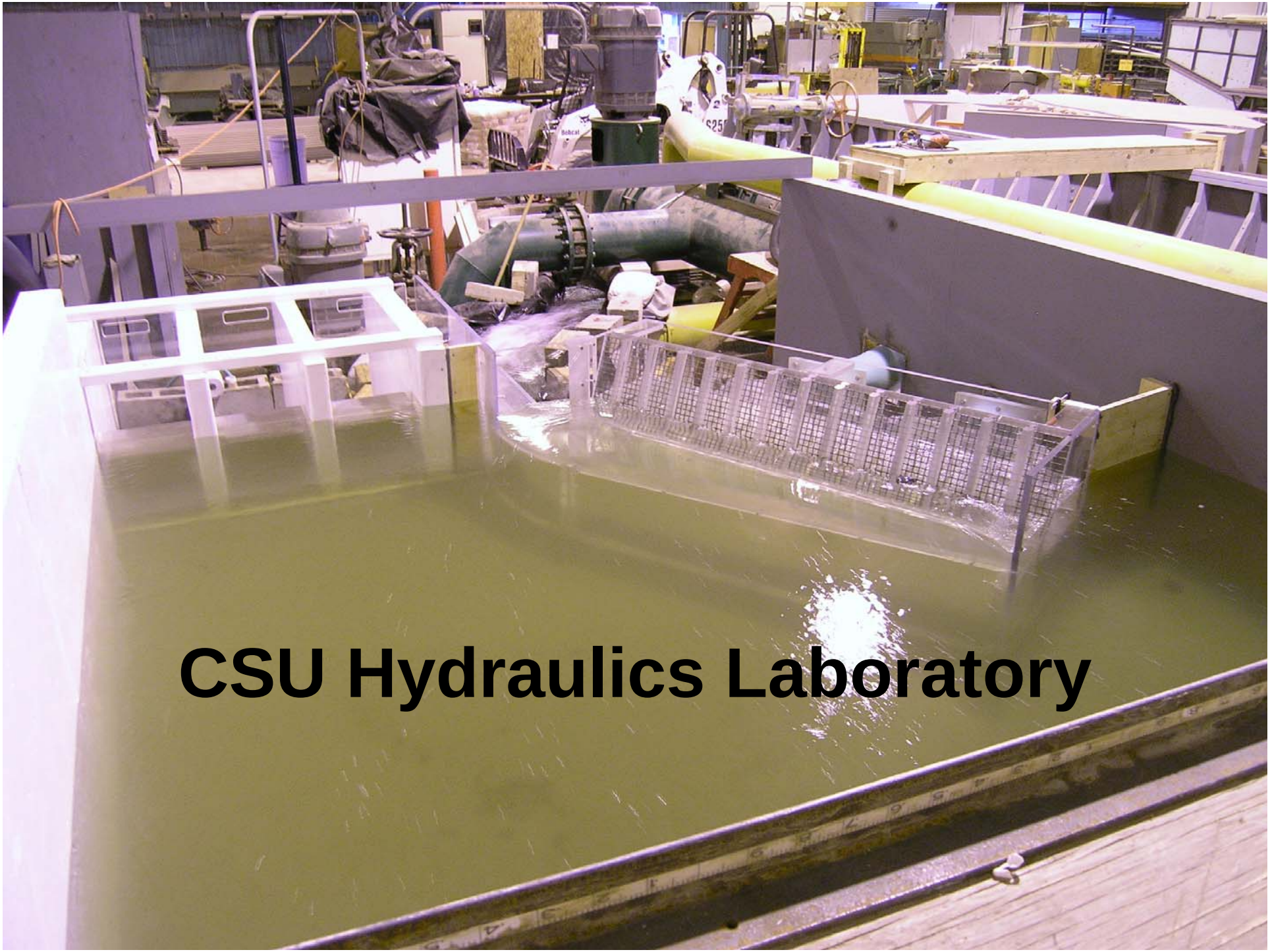


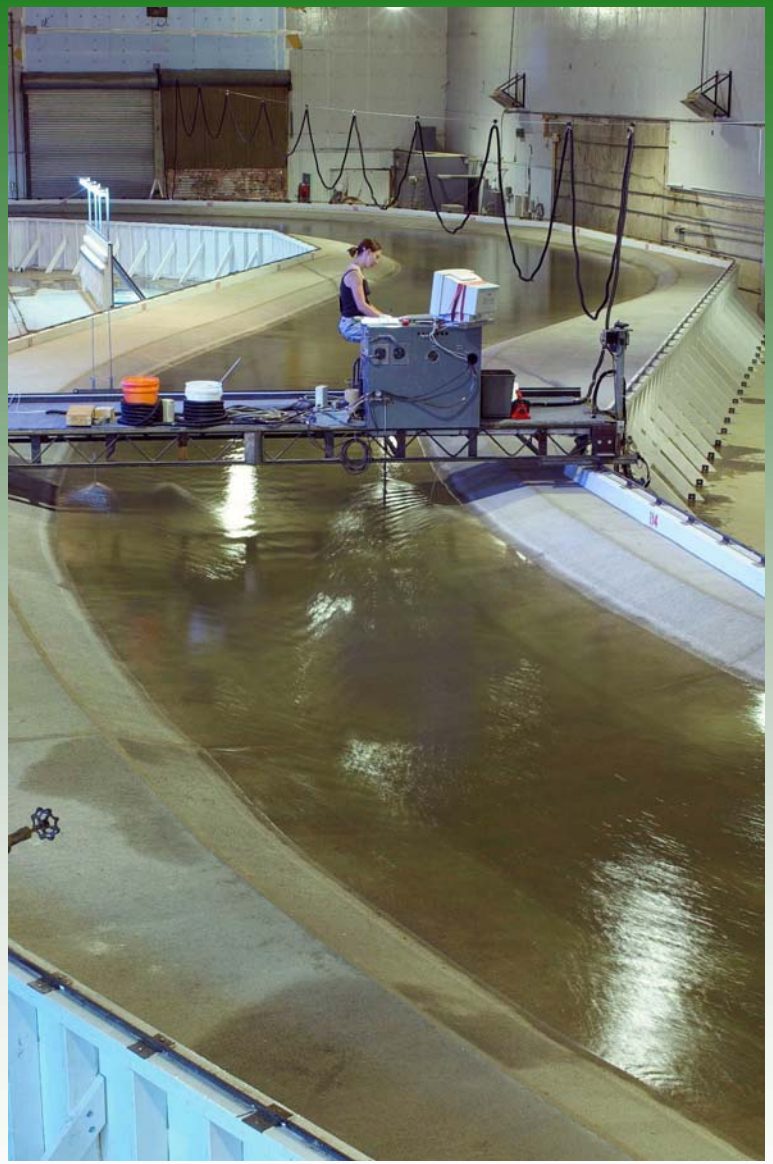
Example of Estuarine flow dynamics using SUNTANS



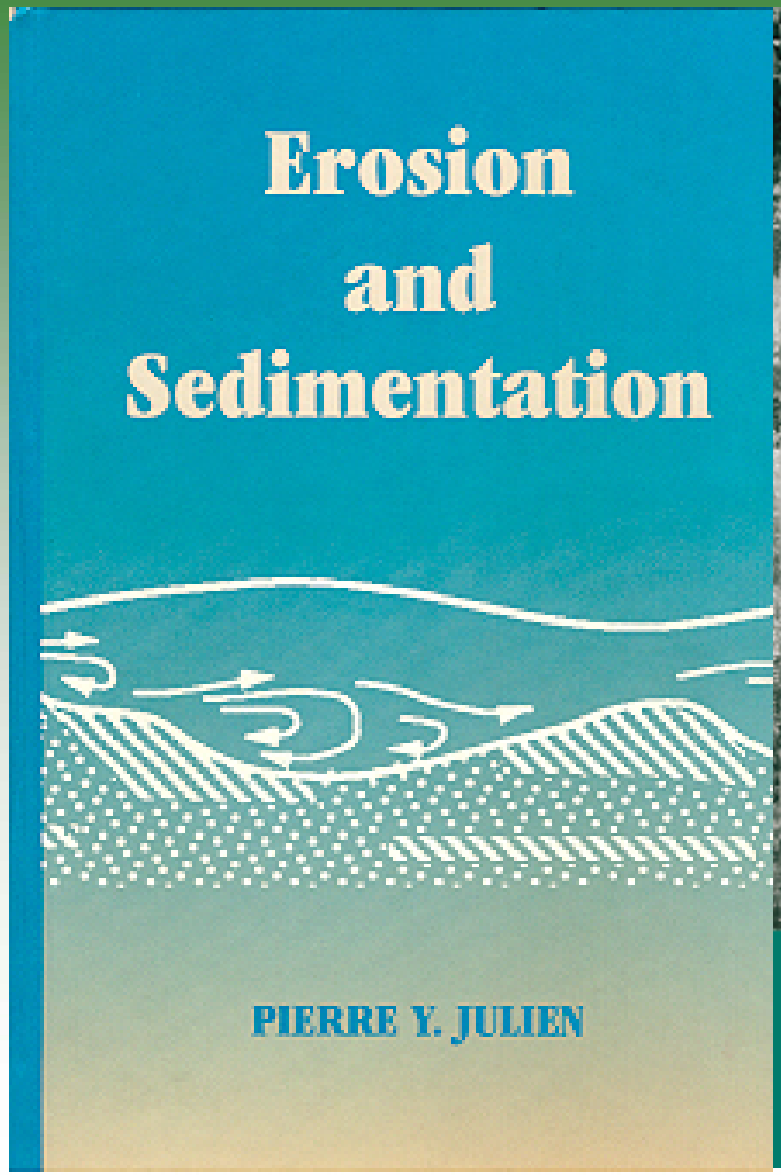
Salinity field (blue is fresh and red is salty) at the mouth of the Snohomish River, showing the oscillation of the salt wedge and wetting and drying of the intertidal regions

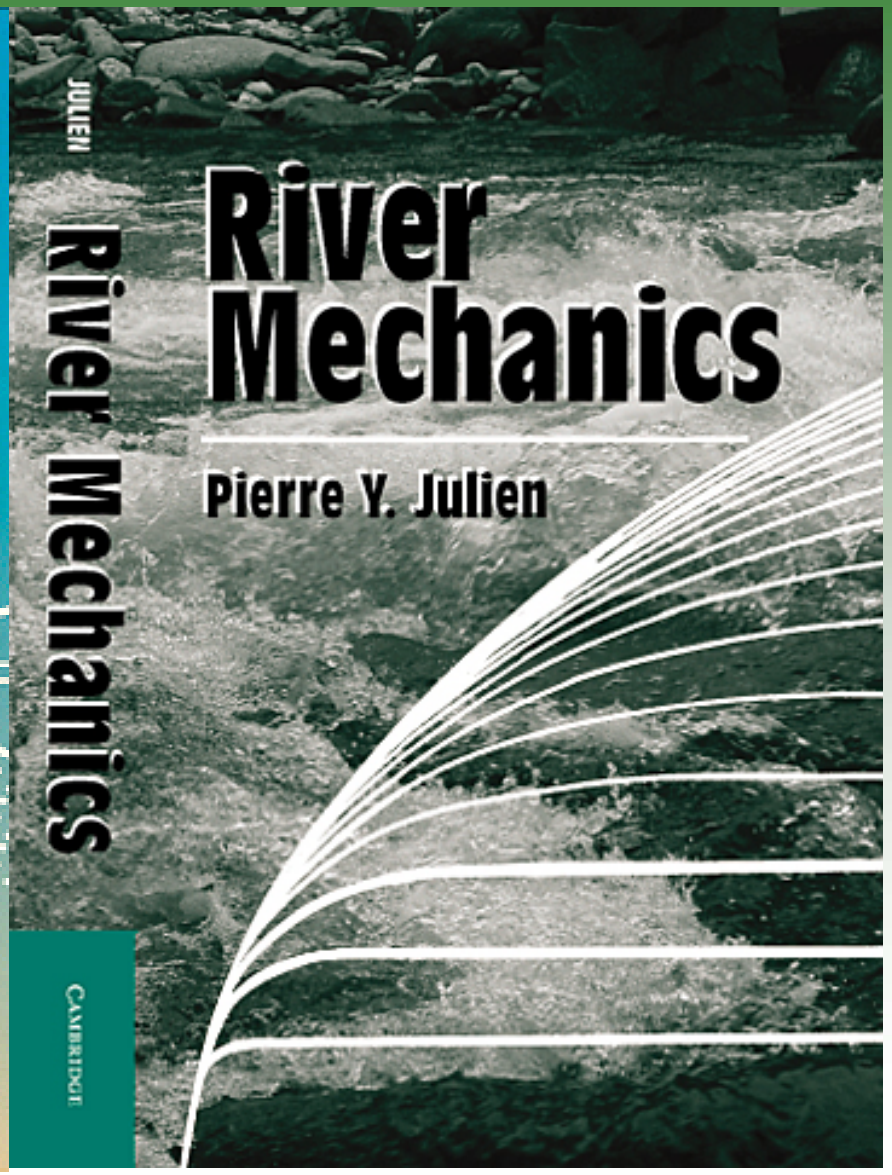
Courtesy - B. Wang


CSU Hydraulics Laboratory



Erosion and River Mechanics Textbooks





Terima Kasih!
pierre@engr.colostate.edu