4대강살리기 사업 국제학술대회
International Conference
on River Restoration for Green Growth
Oct. 7(Fri)-8(Sat) 2011

Case Studies in River Management

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Colorado State University

1) *Case Studies of River Management in the US*

2) *Interesting River Management Issues in South Korea*

Middle Rio Grande, USA

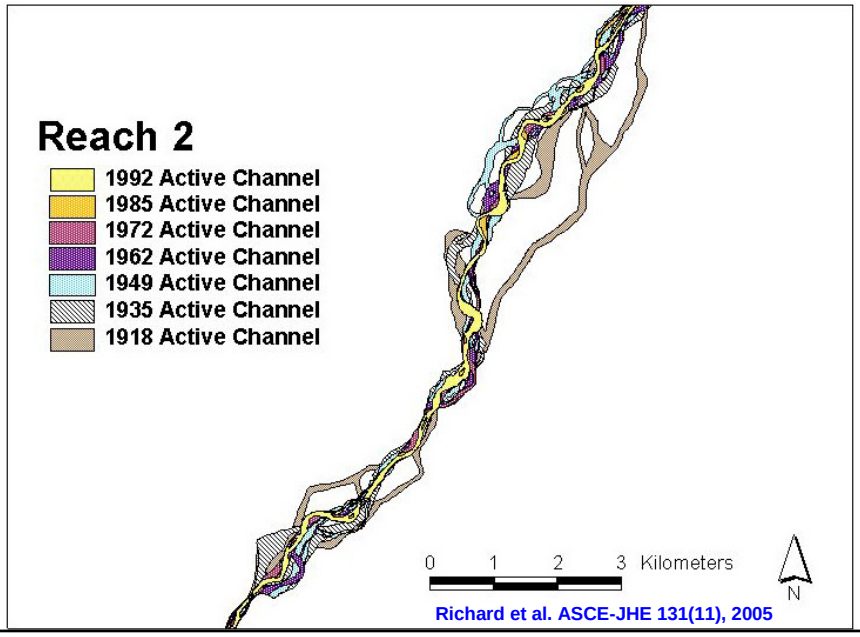
The Rio Grande

- Length : 1,890mi (3,040km)
- Basin : 182,200 mi^2 (471,900km^2)
- Rainfall : N 640 ~ S 250mm/year
- Discharge
  - average : 1,475ft^3/s (40m^3/s)
  - max : 31,700 ft^3/s (900m^3/s)
  - min : 0ft^3/s (0m^3/s)
  - * Mississippi : 1,151,000 mi^2 *(6.3 times)*
    3,065,000 ft^3/s*(97 times)*
    N 2,000~ S1100mm/year

The Middle Rio Grande

- Length : 170mi (272km)
  (Cochiti Dam – Elephant Butte Dam)
- Basin : 28,120 mi^2(72,000km^2)
- Average flow-rate : 123 ft^3/s (3.5m^3/s)
- Sediment (at Elephant Butte Dam) :
  3,719 acre-ft **(12,160,000 m.tons)/yr**

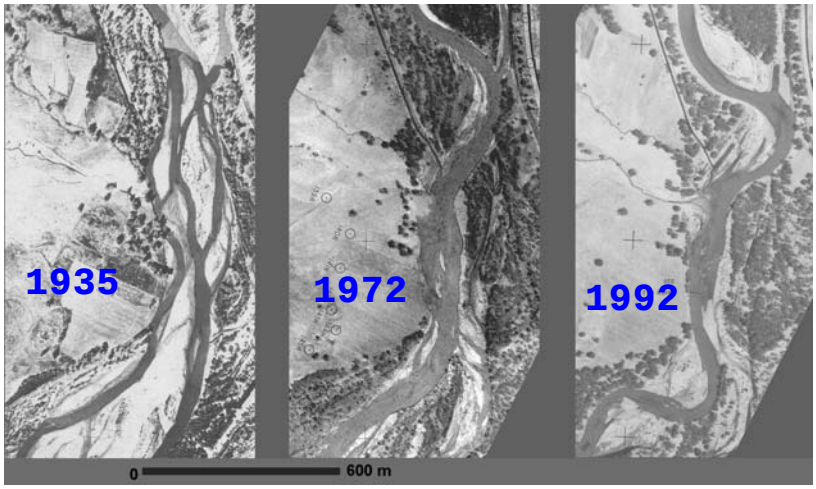
Hydraulic Geometry of the Rio Grande



Richard et al. ASCE-JHE 131(11), 2005

River Dynamics

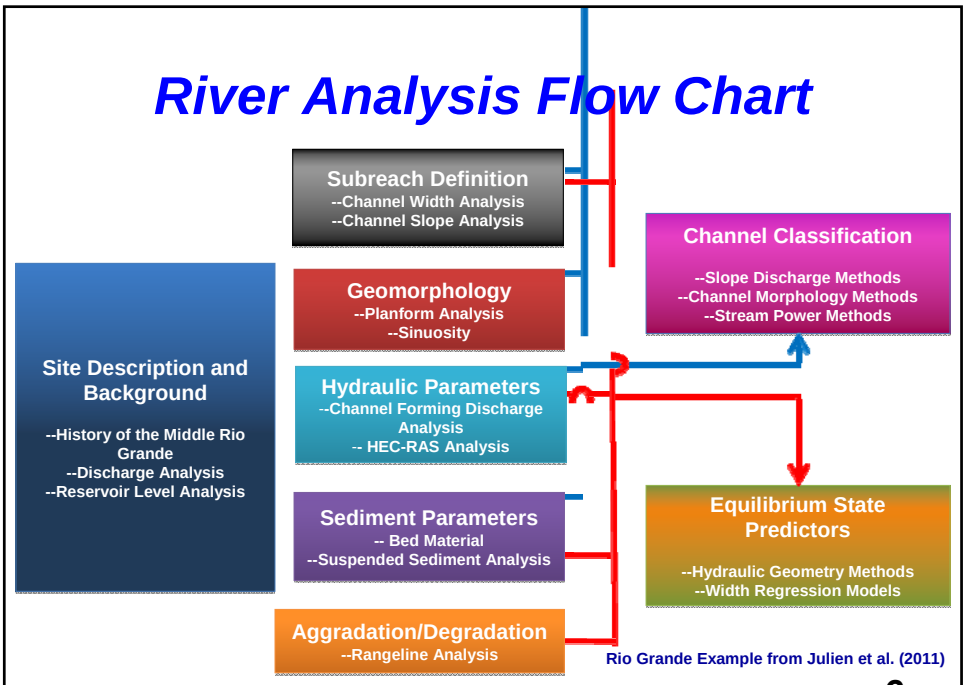
Rio Grande below Cochiti Dam, NM



Braiding Transition Meandering

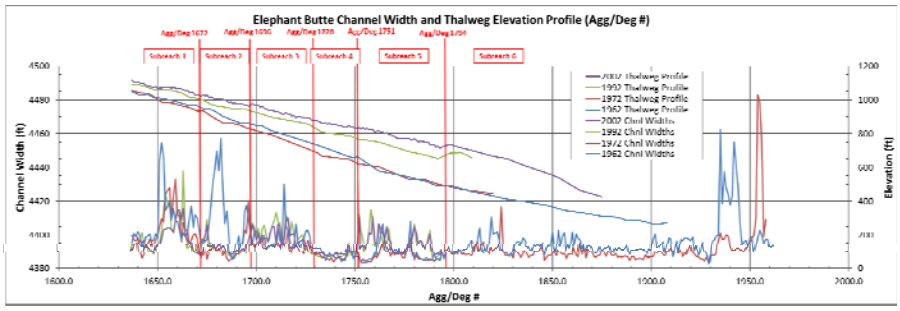
Richard et al. ASCE-JHE 131(11), 2005

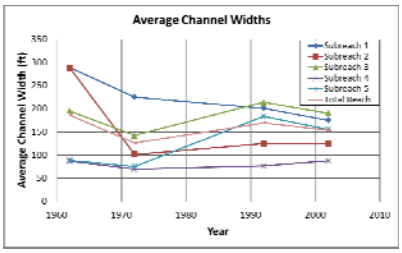
River Analysis Flow Chart

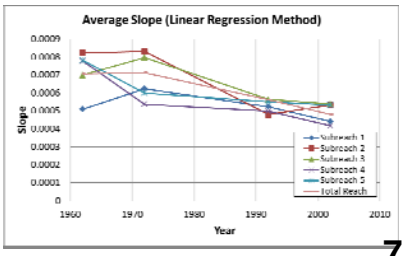


Rio Grande Example from Julien et al. (2011)

Hydraulic Analysis



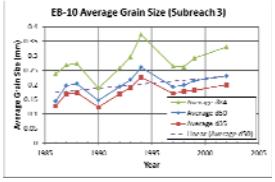


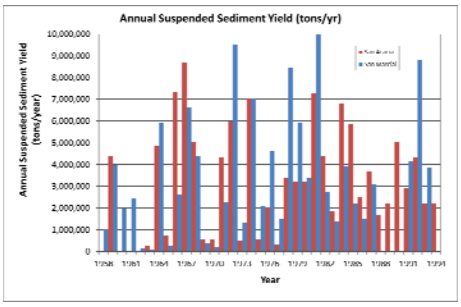


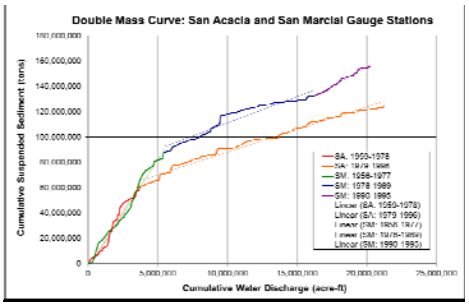
Owen et al. (2011)

Sediment Analysis

- **Purpose:** To determine suspended sediment trends.
- **Analysis includes** plotting total suspended sediment load and double mass curves (cumulative sediment vs. cumulative water discharge)







Owen et al. (2011)

River Management

Problems and Issues

Flood Control and Dam Safety
Navigation
Transportation
Water Supply
Irrigation and Drainage
Public Safety
Water Quality
Aquatic Habitat

Major Stakeholders

Federal Agencies
State Agencies
Counties and Districts
Cities and Towns
Private Sector/Companies
NGO's
Public

Laws and Regulations

International Treaties
Water Delivery Compacts
Water Rights
Clean Water Act
Endangered Species Act

Things remembered from Case Studies in the US

1) Alluvial rivers are dynamic systems changing mostly during floods

2) River management requires monitoring of hydraulics and sedimentation

3) River management involves stakeholders and requires laws and regulations

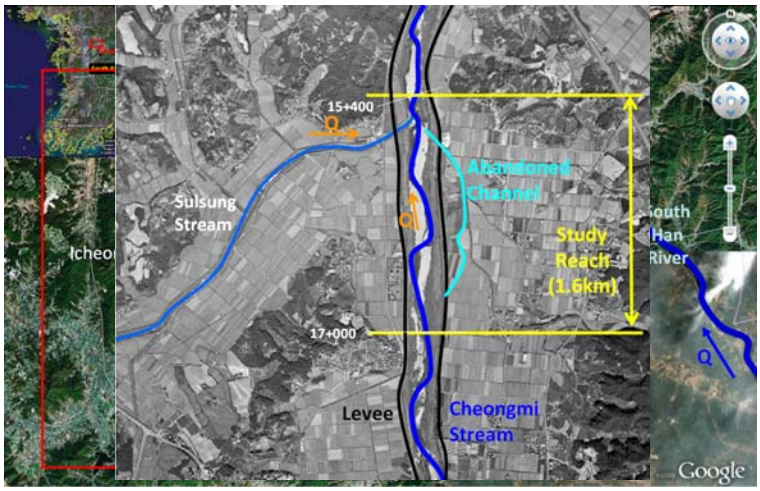
International Conference
on River Restoration for Green Growth

1) Case Studies of River Management in the US

2) Interesting River Management Issues in South Korea

Restoration of Abandoned Channels

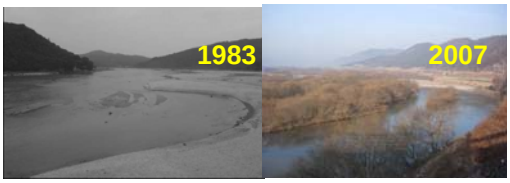
Cheongmi Stream and Mangyeong River

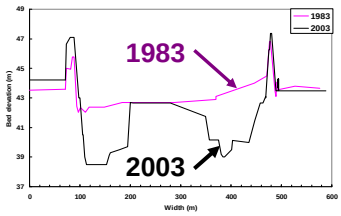


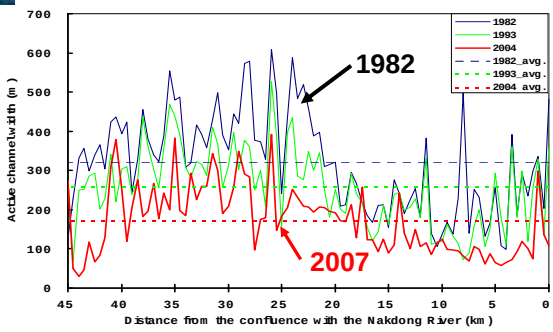
In Collaboration with KICT – ECORIVER21 – **Kim Jaehoon et al. (2011)**

Changes in Active Channel Width

Hwang River below Hapcheon Dam

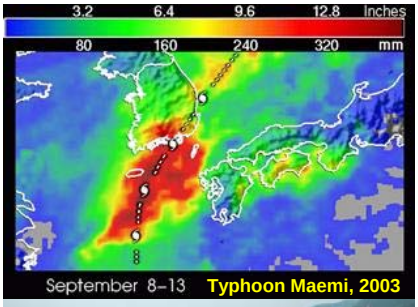






Shin Youngho and Julien, ASCE- JHE, 137(1), 2011

Soil Erosion Modeling using RUSLE and GIS

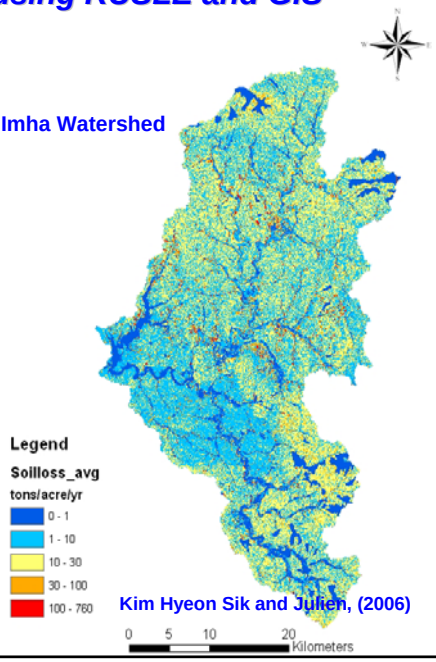


Typhoon Maemi, 2003

Duksan Stream

Kim Jaehoon (2011)

Imha Watershed



Kim Hyeon Sik and Julien, (2006)

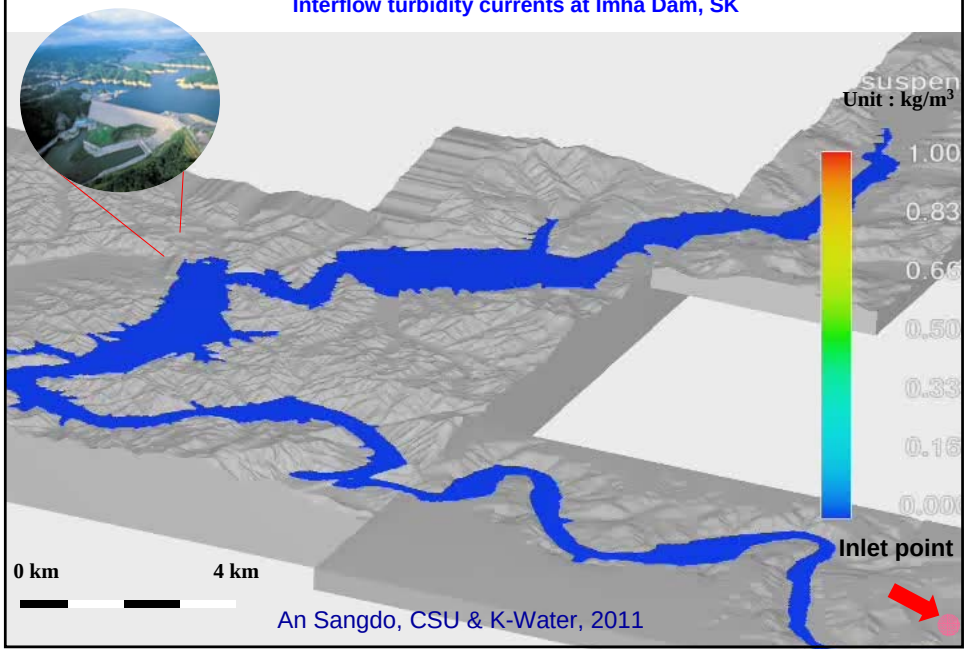
Water Quality Issues

Imha Dam, South Korea

An, Sangdo, CSU and K-Water, 2011

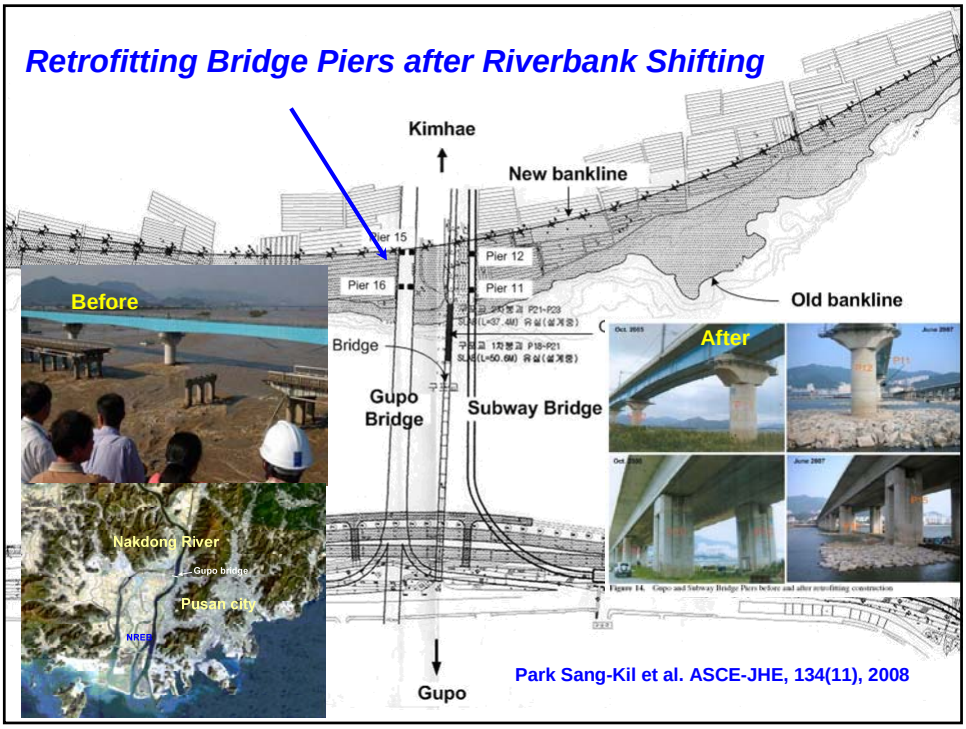
Water Quality Modeling

Interflow turbidity currents at Imha Dam, SK

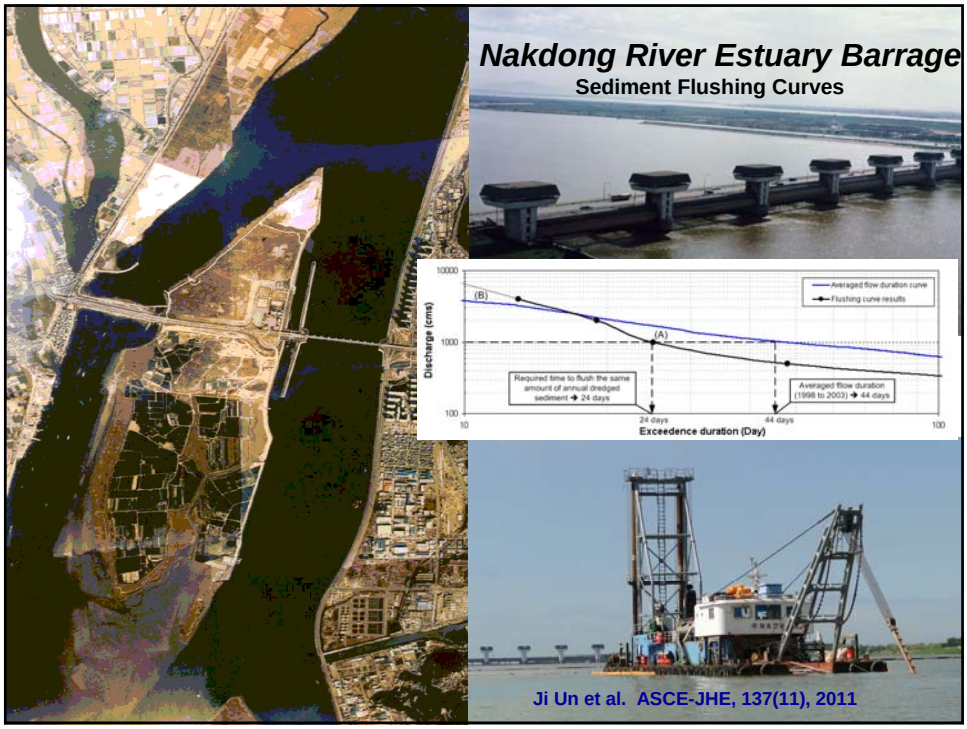


An Sangdo, CSU & K-Water, 2011

Retrofitting Bridge Piers after Riverbank Shifting



Park Sang-Kil et al. ASCE-JHE, 134(11), 2008



Things remembered from Interesting Issues in South Korea

1) Impact of typhoon on upland erosion

2) Changes in river geometry and river restoration

3) Reservoir sedimentation, density currents and water quality modeling

MLTM K water

Acknowledgments

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- ***J. England,** USBR*
- ***D.C. Baird,** USBR*
- *So many others…*

Thank You!

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