

Local Material Engineering and River Monitoring

2 August 2010

***Training workshop on riverbank erosion control
at Danang, Vietnam***

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Time-honored lessons in Japanese river engineering

suggested in "Flood Risk Management"

written in the 17th century

"FLOOD RISK MANAGEMENT"

Japanese river engineering in the 17th century

Contents

1. Introduction

2. River dike

3. Riverbank protection

3-1 Box frame

3-2 Deflector

3-3 Gabion

3-4 Pile sleeve

3-5 Fabricated ox

3-6 Willow/bamboo planting

3-7 Turfing

4. Flood management

4-1 Flood features

4-2 Flood fighting

4-3 Vegetation preservation

4-4 Floating objects

4-5 Activity on the opposite bank

4-6 scouring dragon

4-7 River facility maintenance

5. Closure dam

5-1 Diversion for Atsuta Shinden

5-2 Diversion for Fukawa Shinden

5-3 Diversion of Yahagigawa River

5-4 Diversion of Kizugawa River

5-5 Diversion near Yokosuka Harbor

6. Typical engineering

6-1 Coastal dike

6-2 Tsunamis flood management

6-3 Flashflood protection

6-4 Riverbed excavation

7. Water resources development

7-1 Irrigation and drainage

7-2 Reservoir

7-3 Ditch

Introduction

- + *the writer (a master engineer)*
*tried **to transfer the know-how***
to young/future engineers
- + *river facilities to be managed **year by year***
- + *river engineering **for the next generation***

principles of river dike building/management

- + ***no breaching** (although it is difficult to shutout overflow)*
- + *wide basement, gentle slope, wide crown*
- + ***weaken flow first, build dike next***

Riverbank management facilities

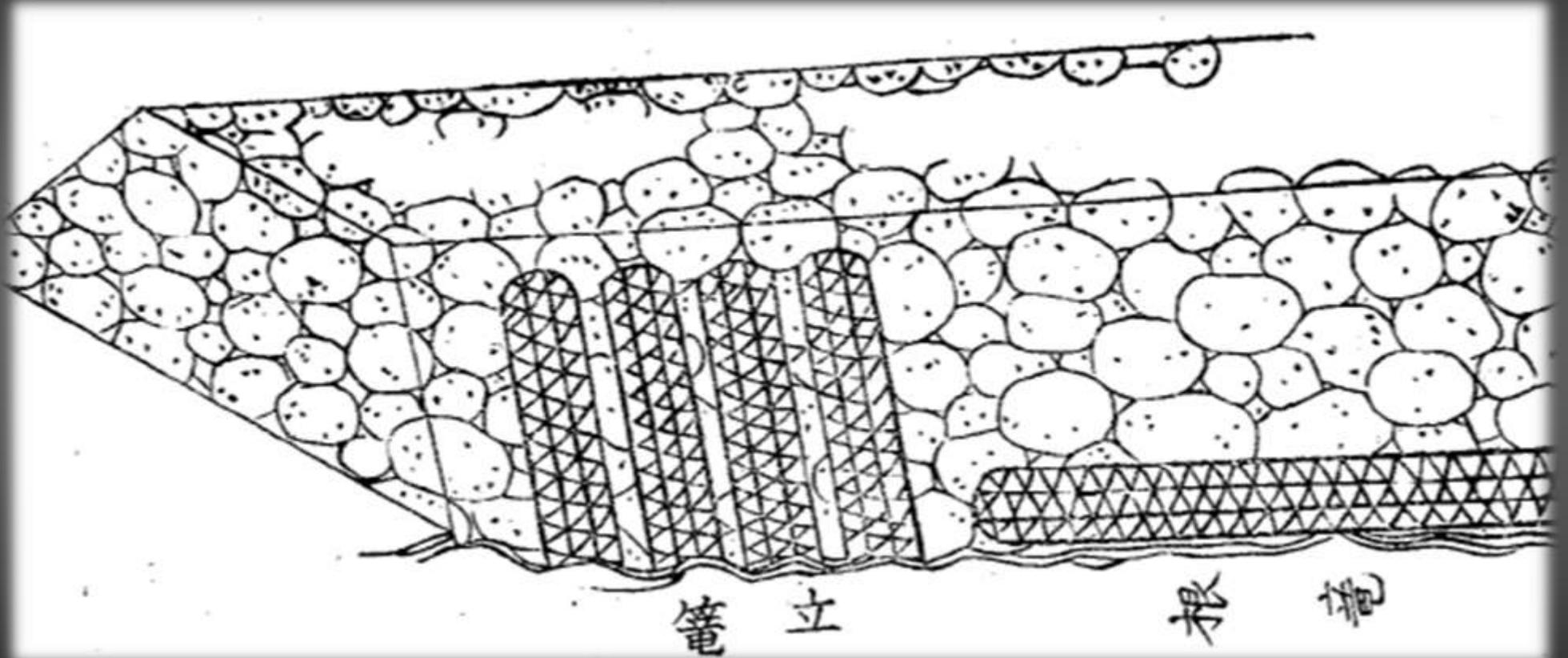
+ flow control system

- **flow rejecter** ----- **high-type groyne** ⁽¹⁾
- **flow slower** ----- **low-type groyne**
deflector ⁽²⁾ / **pile sleeve** ⁽³⁾ /
fabricated ox ⁽⁴⁾ / **willow planting** ⁽⁵⁾

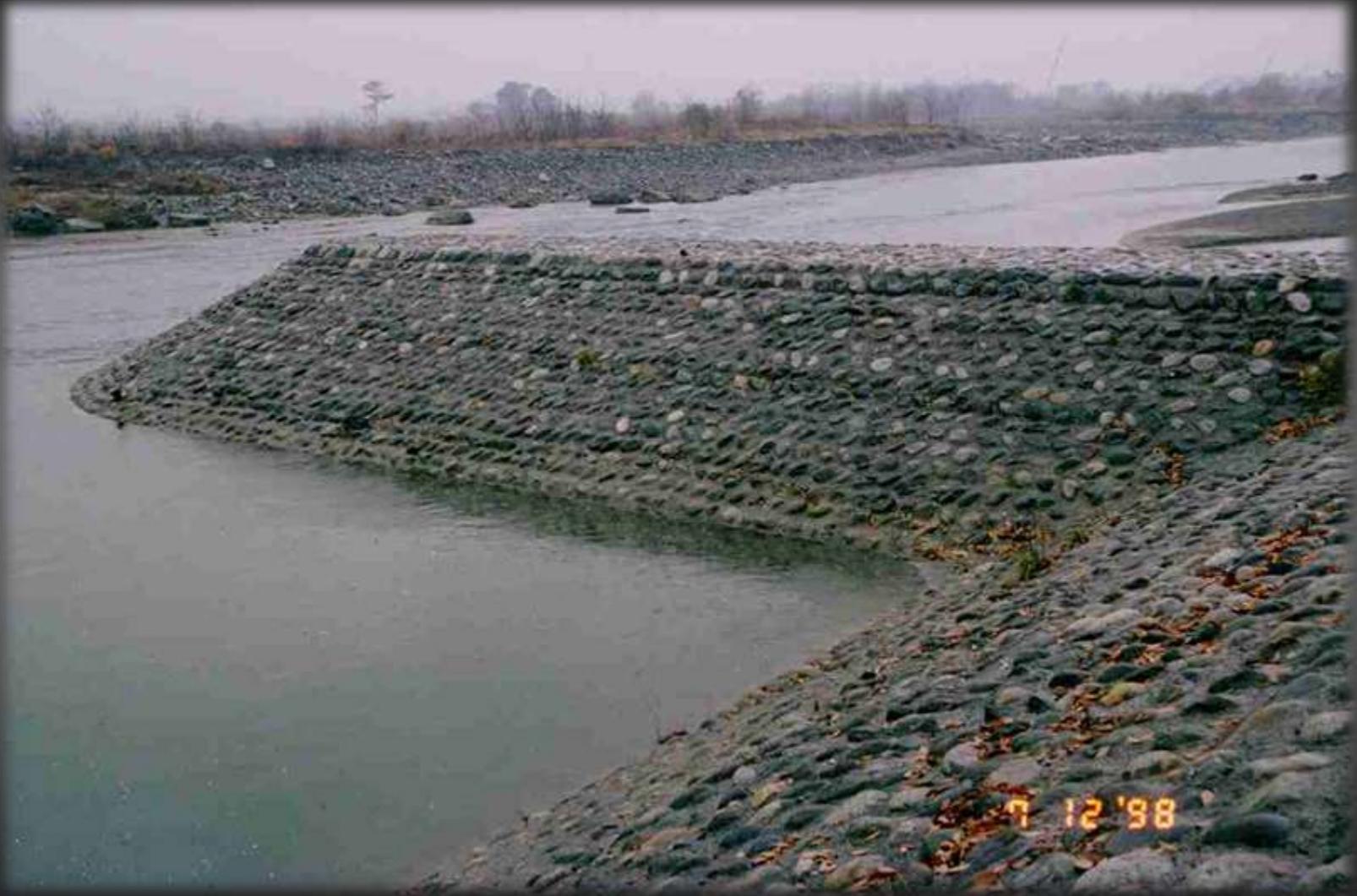
+ riverbank protection system

- **slope protection** --- **turfing** ⁽⁶⁾
- **foundation** ----- **box frame** ⁽⁷⁾
- **foot protection** ---- **gabion** ⁽⁸⁾ / **fascine mattress** ⁽⁹⁾

(1) flow repellent ---- high-type groyne (suisei)

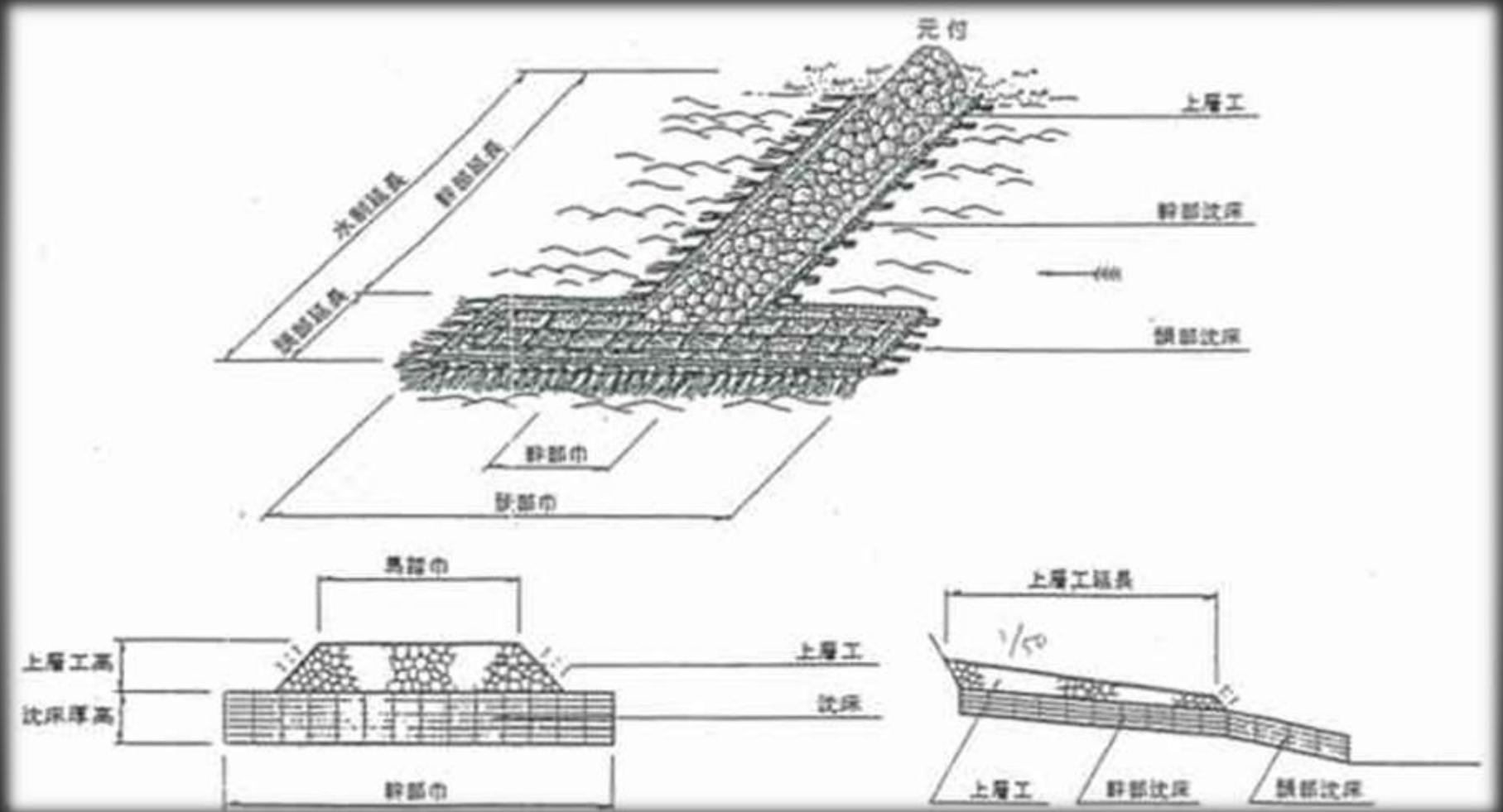


(1) flow repellent ---- high-type groyne (suisei)



Fujigawa River, Japan

(2) flow slower ---- low-type groyne = deflector (seusei)



(2) flow slower ---- low-type groyne = deflector (seusei)



Kisogawa River, Japan

(2) flow slower ---- low-type groyne = deflector (seusei)



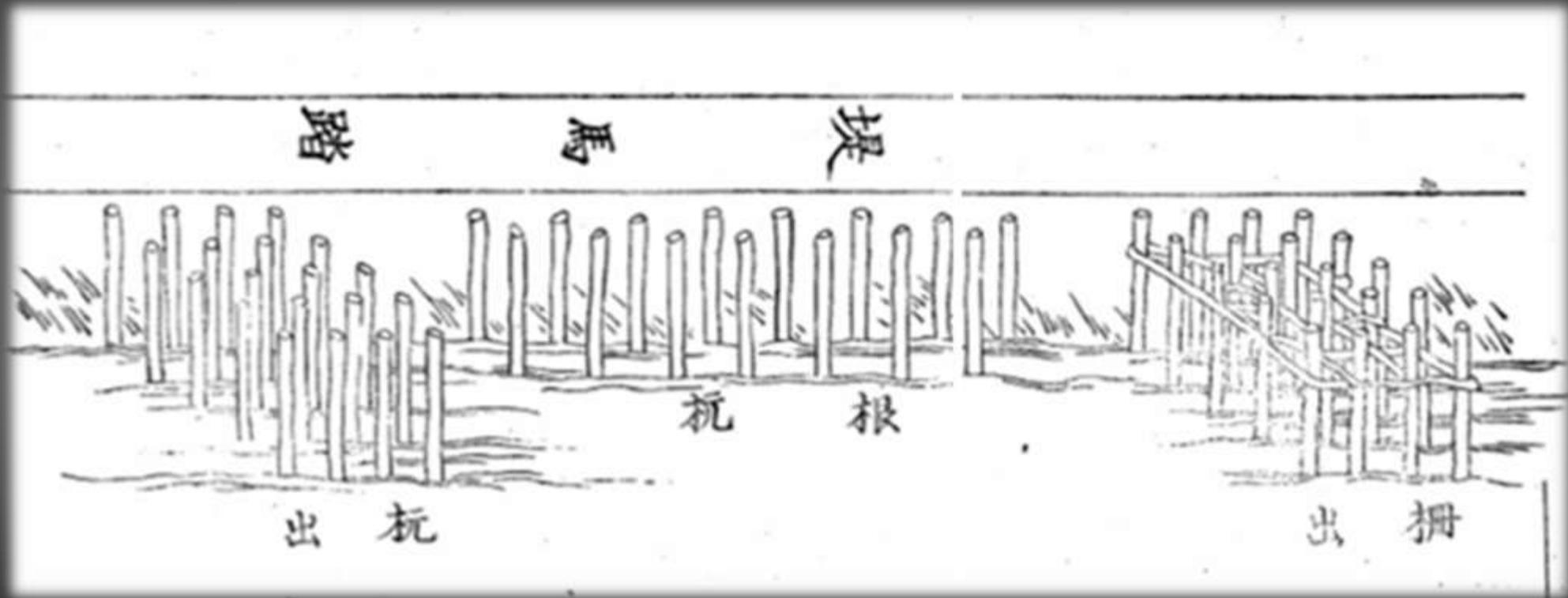
Kisogawa River, Japan

(2) flow slower ---- low-type groyne = deflector (seusei)



capturing sediment at Kisogawa River, Japan

(3) flow slower ---- pile sleeve (kui)



(3) flow slower ---- pile sleeve (kui)



Ibigawa River, Japan

(4) flow slower ---- fabricated ox (ushi)



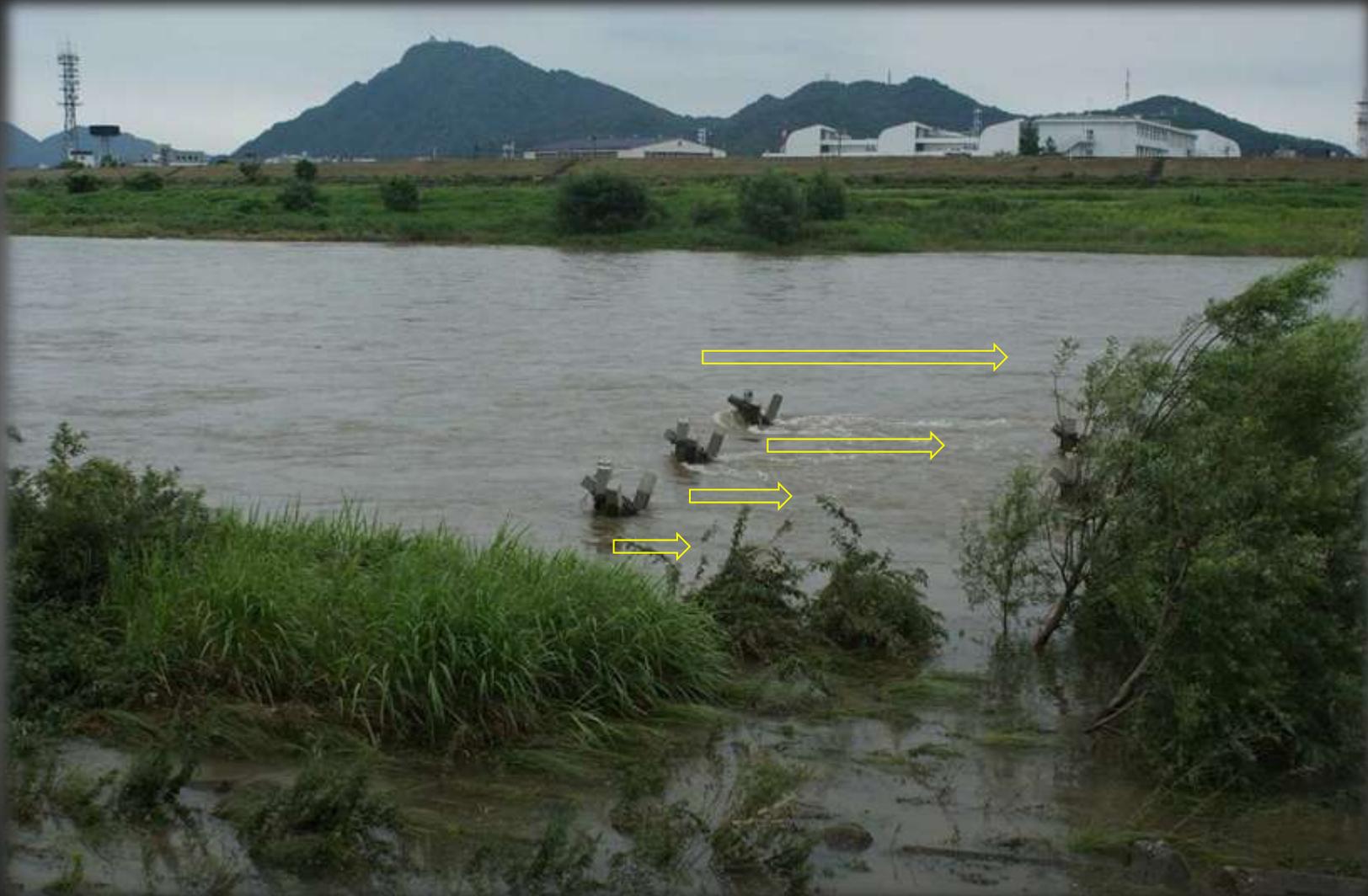
at Kamanashigawa River, Japan

(4) flow slower ---- fabricated ox (ushi)



working at Nagragawa River, Japan

(4) flow slower ---- fabricated ox (ushi)



working at Nagragawa River, Japan

(5) flow slower ---- willow planting (ryushiko)



just planting at Ongagawa River, Japan

(5) flow slower ---- willow planting (ryushiko)



working in flood at Ongagawa River, Japan

(5) flow slower ---- willow planting (ryushiko)



(5) flow slower ---- willow planting (ryushiko)



Kisogawa River, Japan 21

(6) riverbank protection -- slope protection -- turfing (shiba)



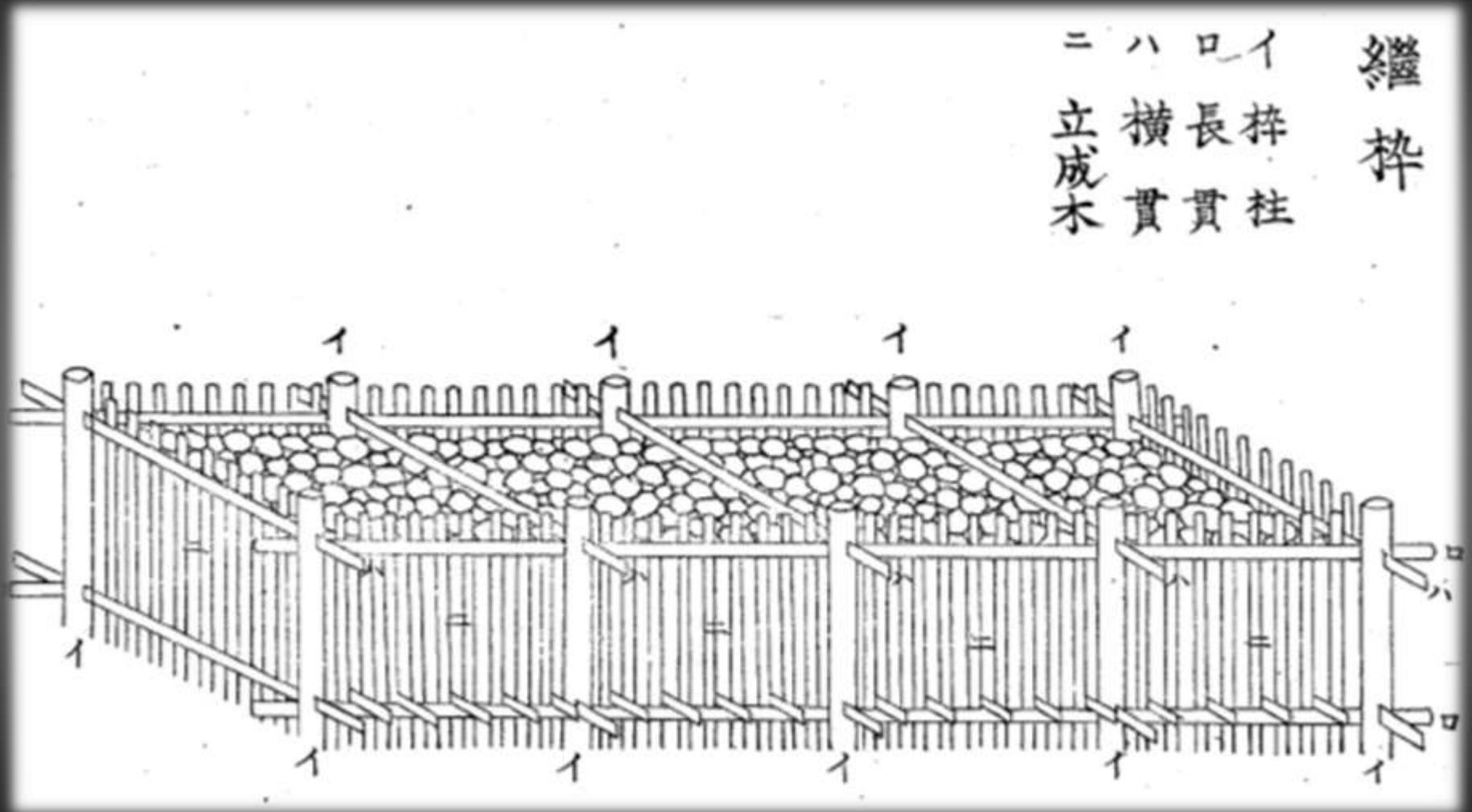
Ongagawa River, Japan 22

(6) riverbank protection -- slope protection -- turfing (shiba)



Ongagawa River, Japan 23

(7) riverbank protection -- foundation -- box frame (waku)



(7) riverbank protection -- foundation -- box frame (waku)



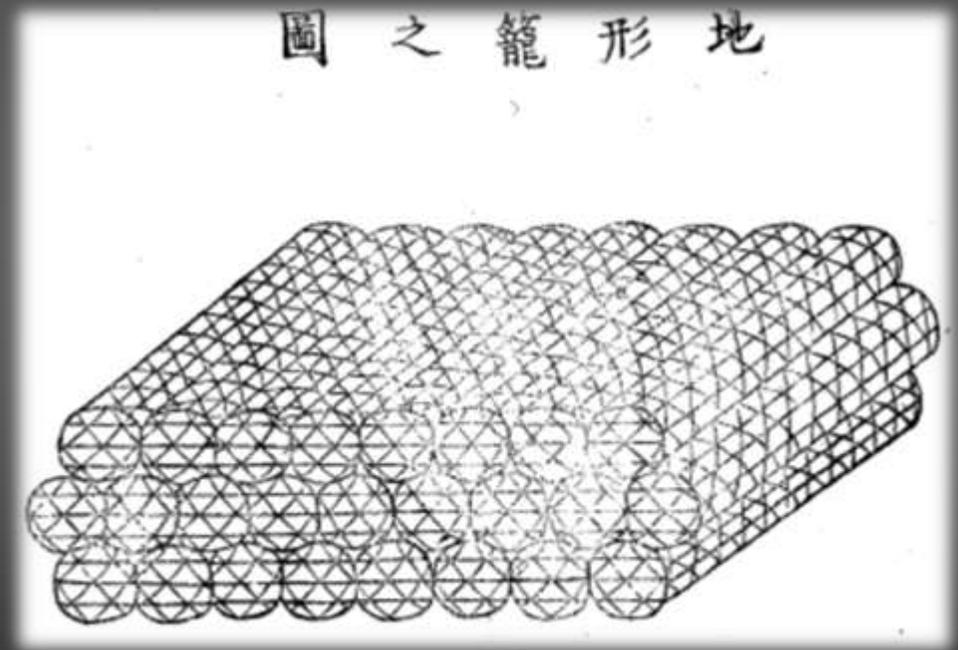
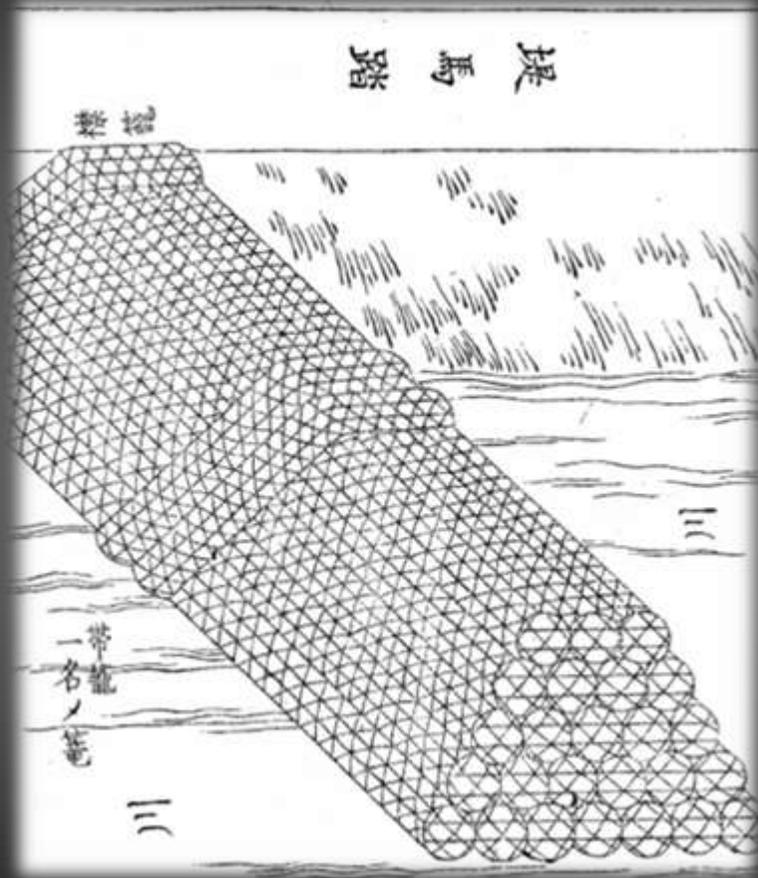
Nagaragawa River, Japan 25

(8) riverbank protection -- foot protection -- gabion (kago)



demonstrated in Takasu Museum, Japan 26

(8) riverbank protection -- foot protection -- gabion (kago)



(9) riverbank protection -- foot protection

-- fascine mattress (soda)



Sinanogawa/Nagaragawa/Ongagawa River, Japan 28

Riverbank management

+ flow control system

- *flow rejecter* ----- *high-type groyne*

- *flow slower* ----- *low-type groyne*

(deflector/ pile sleeve/ fabricated ox/ willow planting)

+ riverbank protection system

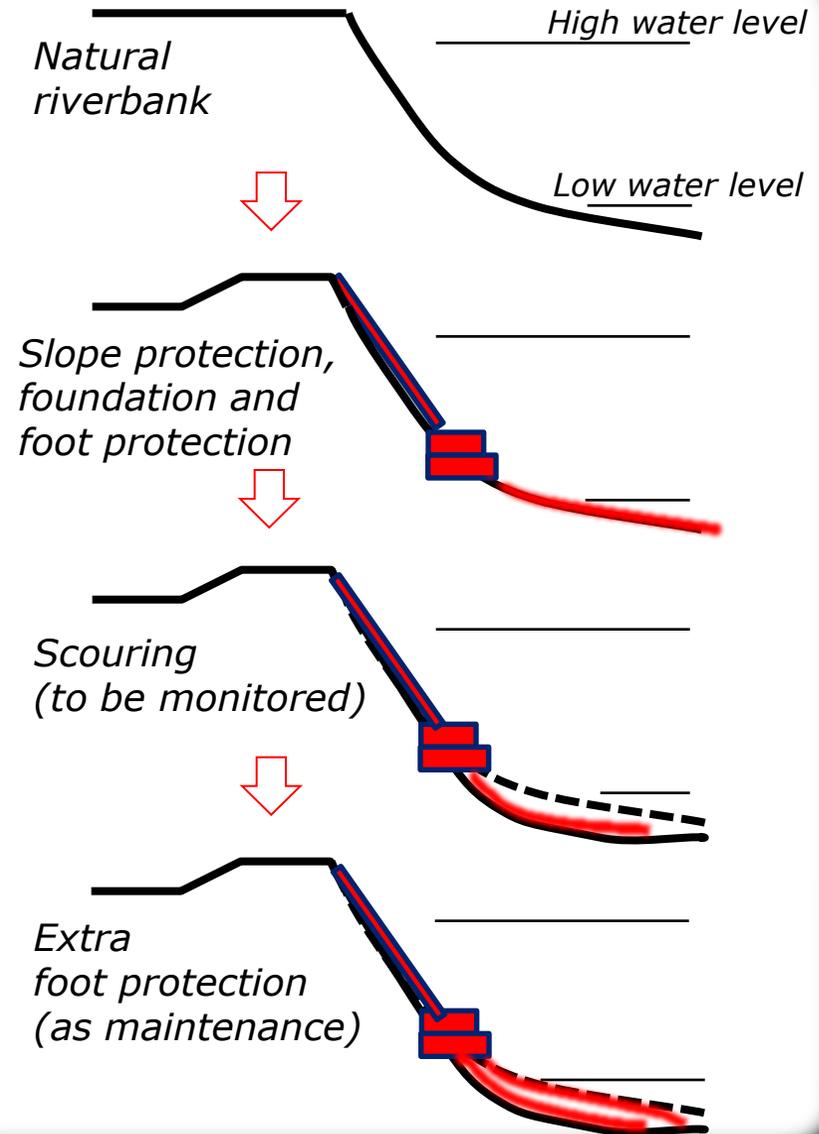
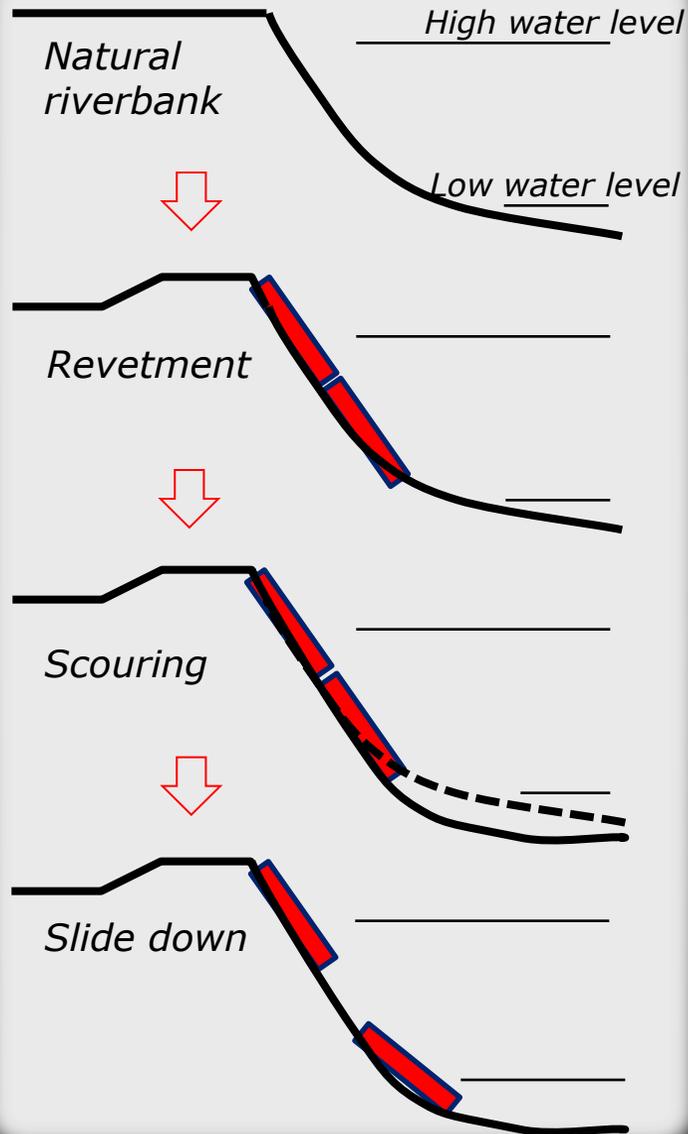
- *slope protection* --- *turfing*

- *foundation* ----- *box frame*

- *foot protection* ---- *gabion/ fascine mattress*

+ monitoring and maintenance ⁽¹⁰⁾

(10) riverbank protection -- monitoring and maintenance



Thank you very much for your attention.

by Hirotada MATSUKI