

Local Material Engineering and River Monitoring

2 August 2010

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

JICA Expert Hirotada MATSUKI

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

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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

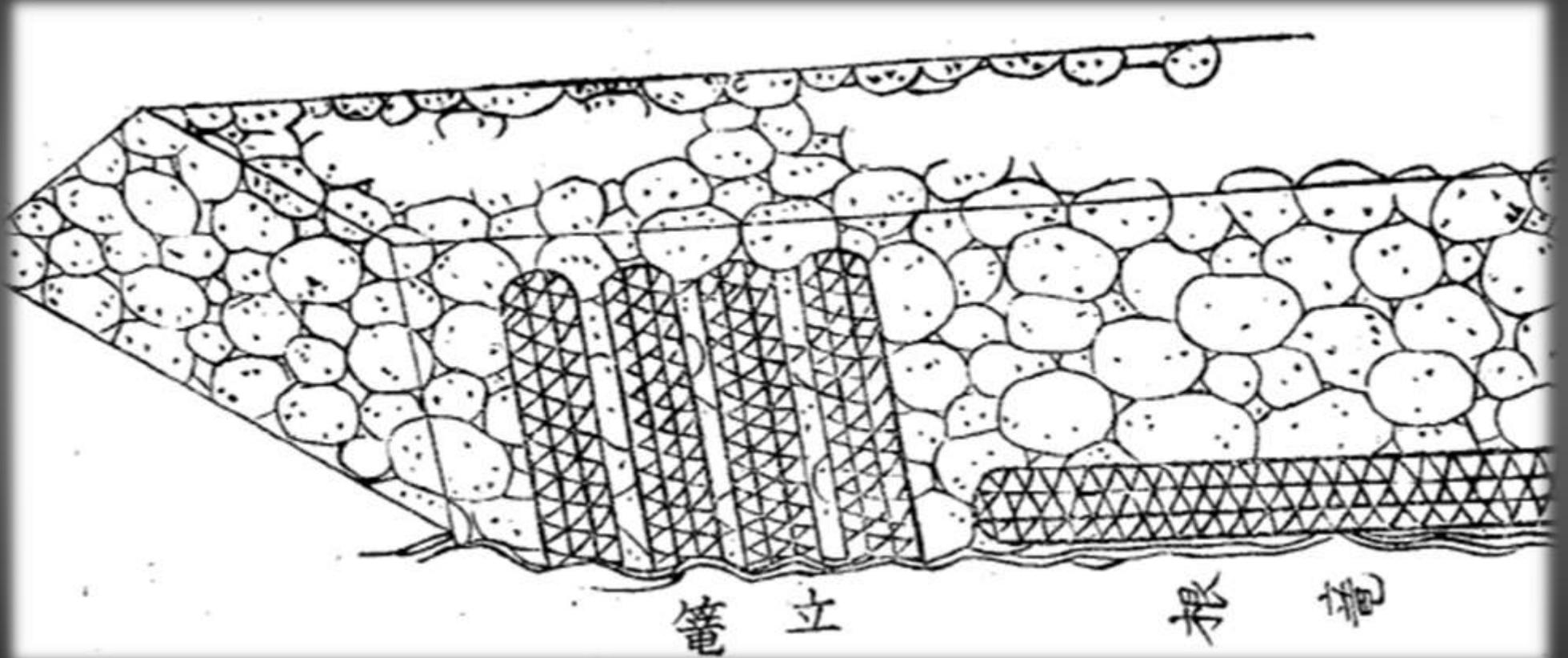
+ flow control system

- **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

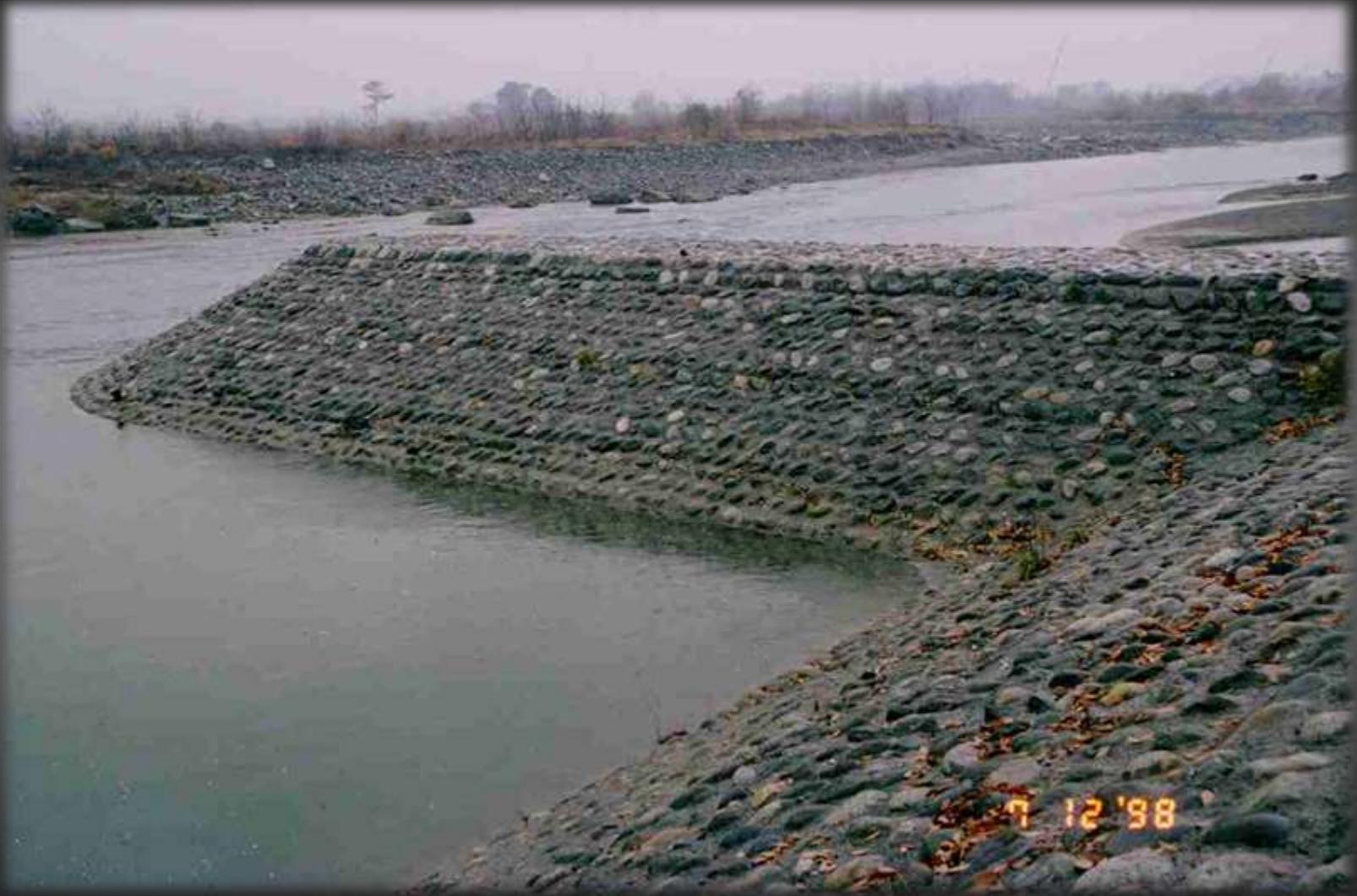
- **slope protection** --- **turfing** ⁽⁶⁾
- **foundation** ----- **box frame** ⁽⁷⁾
- **foot protection** ---- **gabion** ⁽⁸⁾ / **fascine mattress** ⁽⁹⁾

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



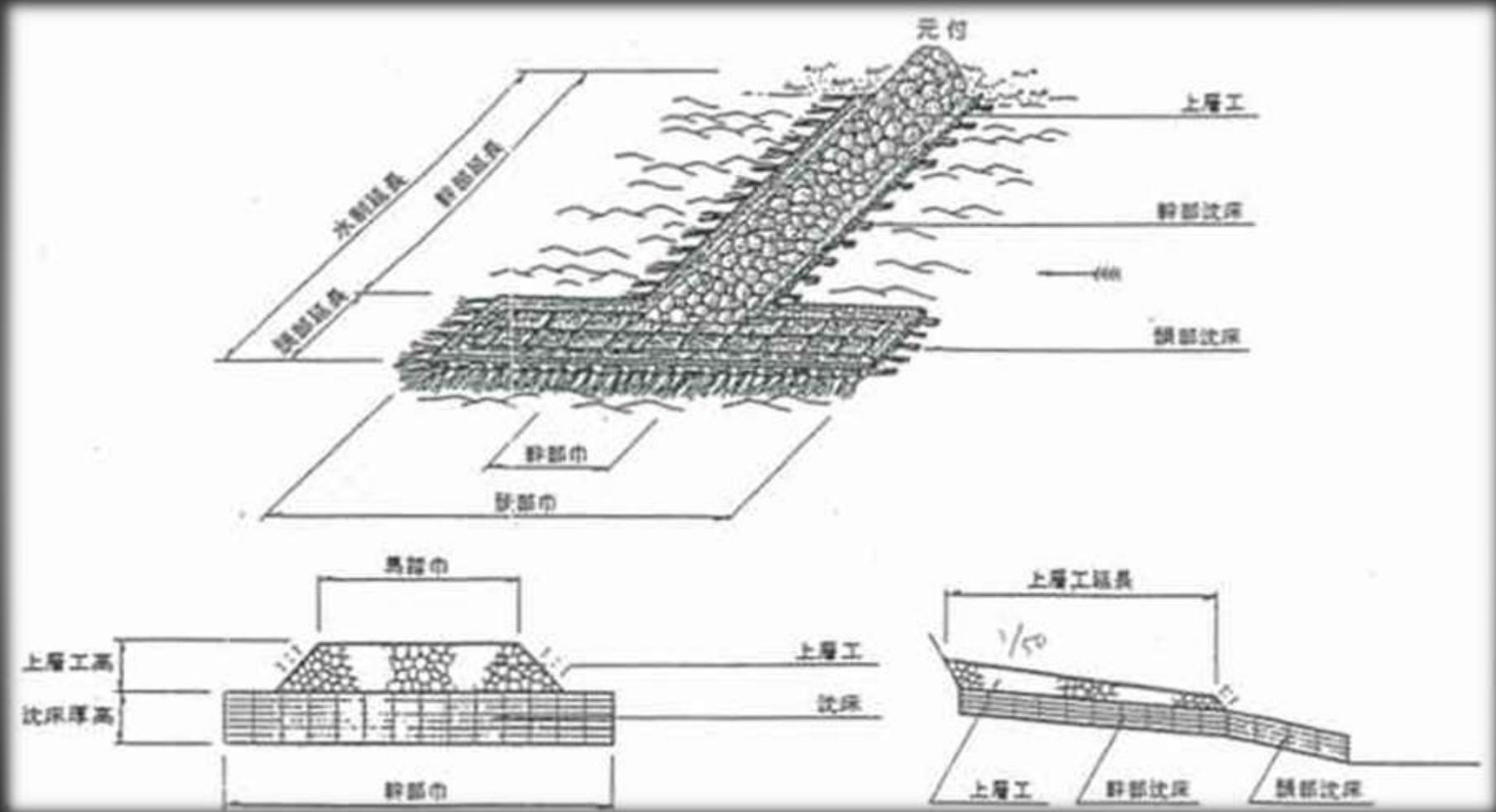
on a river engineering textbook 1876, Japan

(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)



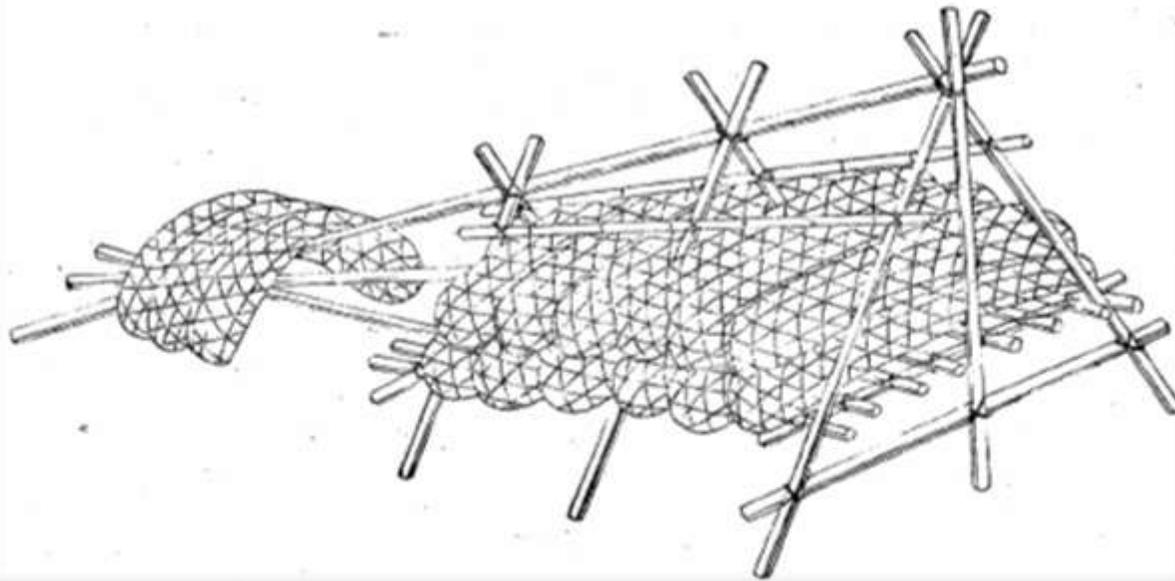
(3) flow slower ---- pile sleeve (kui)



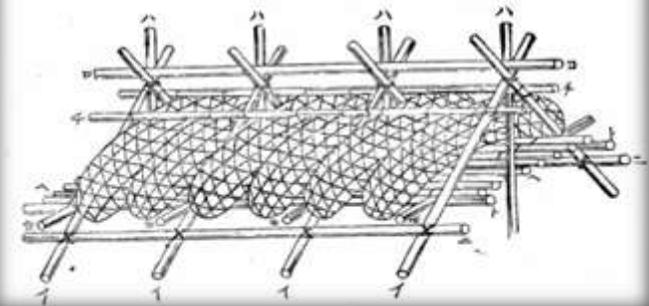
Ibigawa River, Japan

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

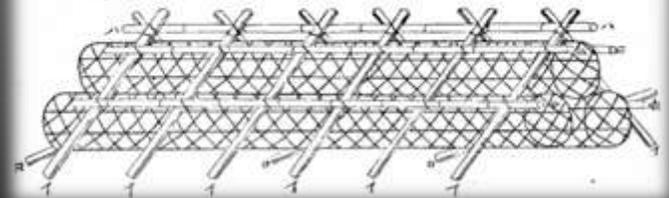
大聖牛仕立上之圖



大聖牛仕立上之圖
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尺木牛側面之圖
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(4) flow slower ---- fabricated ox (ushi)



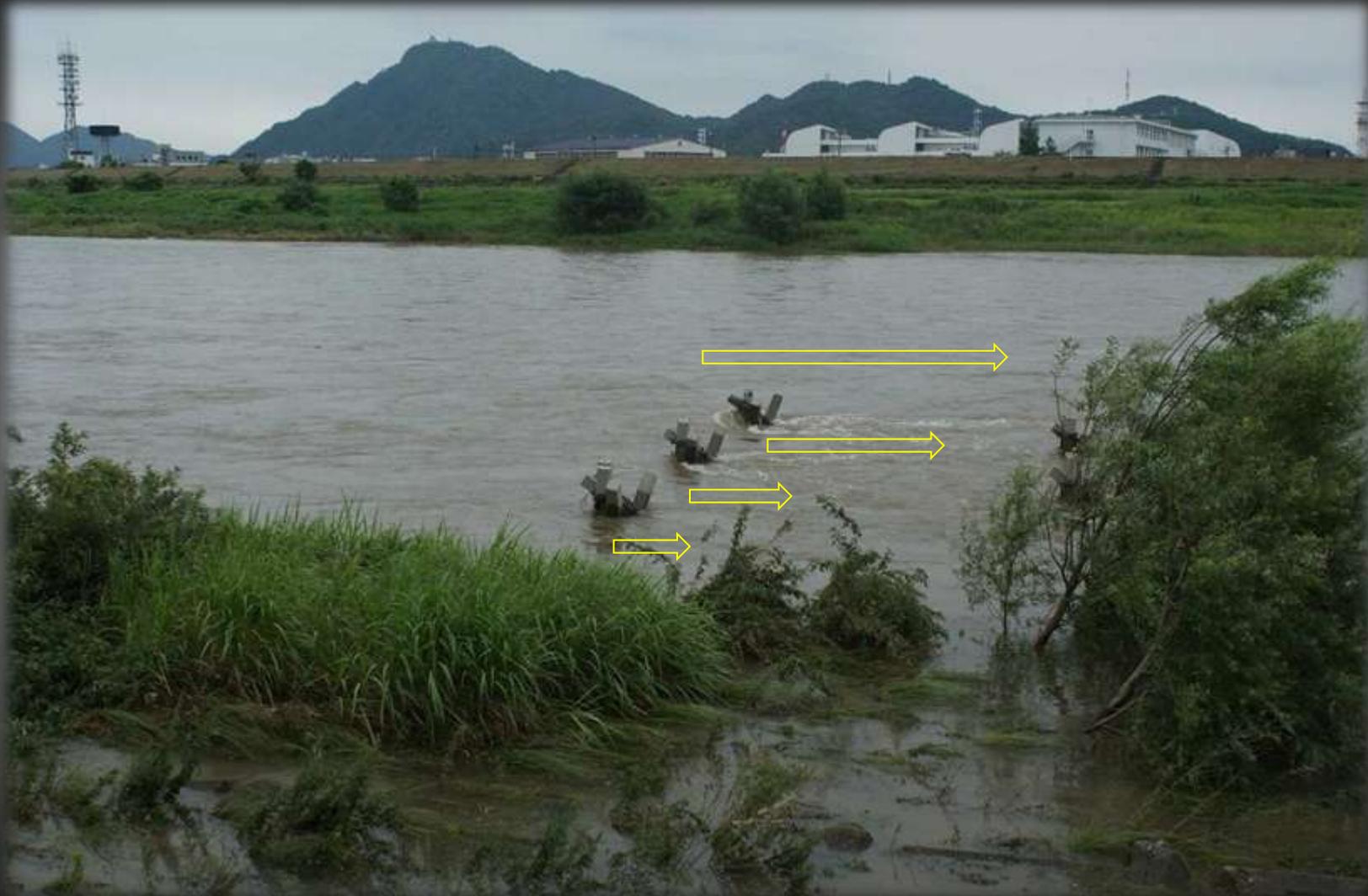
at Kamanashigawa River, Japan

(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)



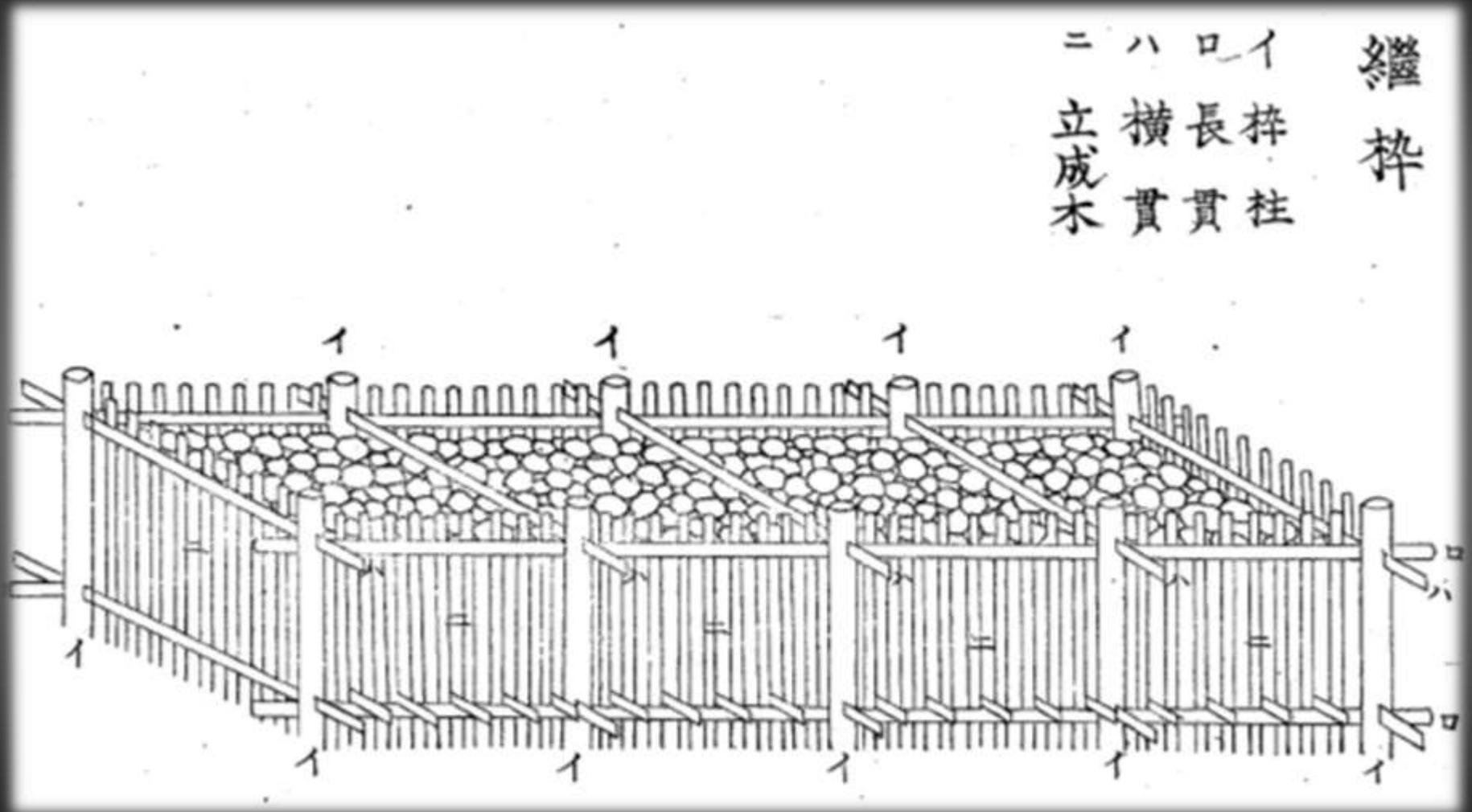
Ongagawa River, Japan 22

(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)

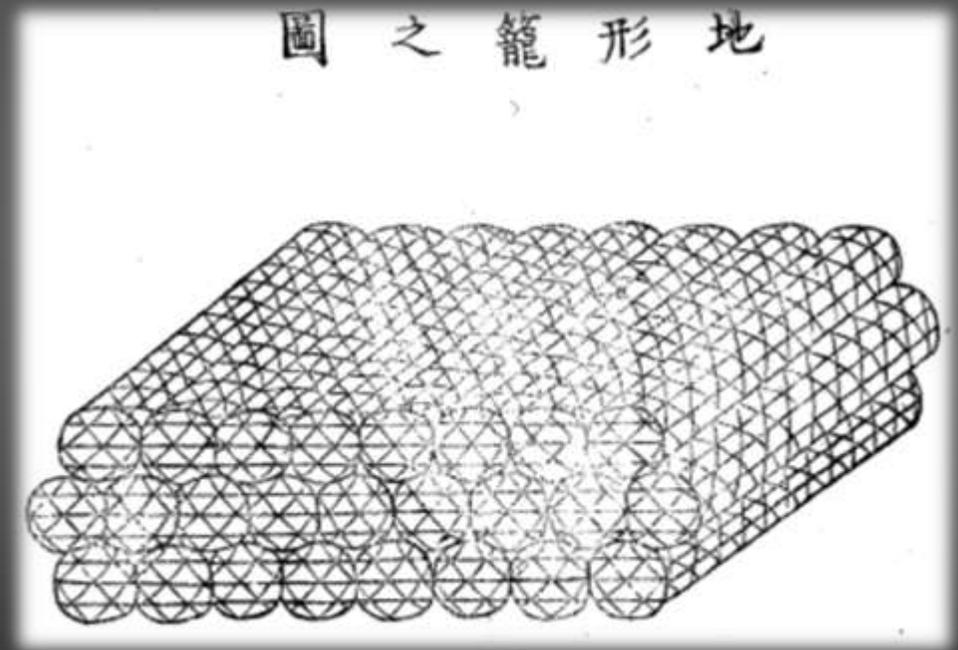
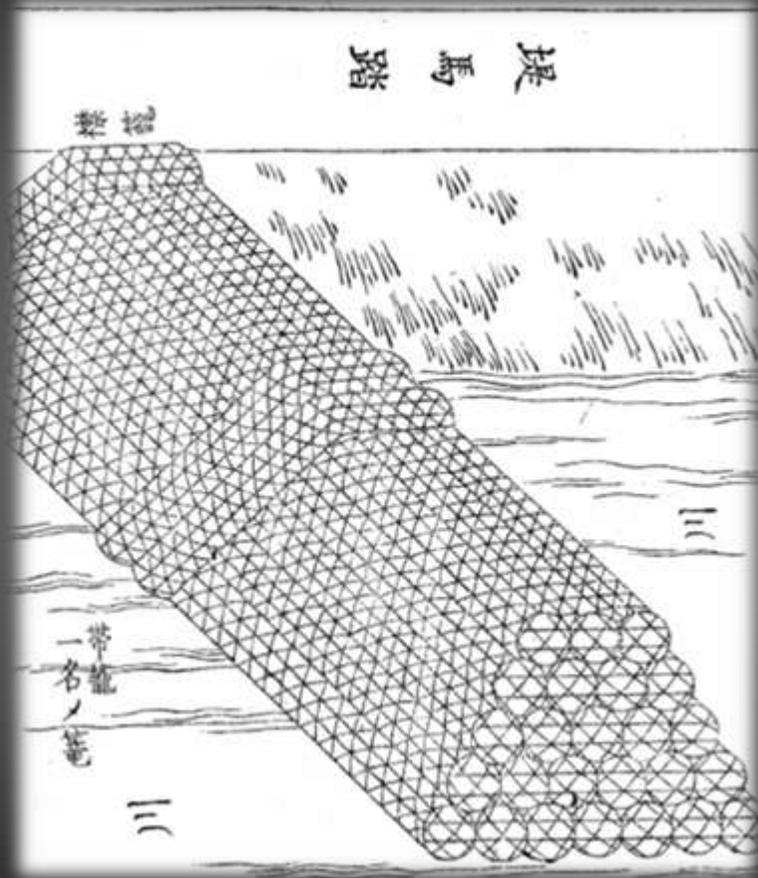


(8) riverbank protection -- foot protection -- gabion (kago)



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

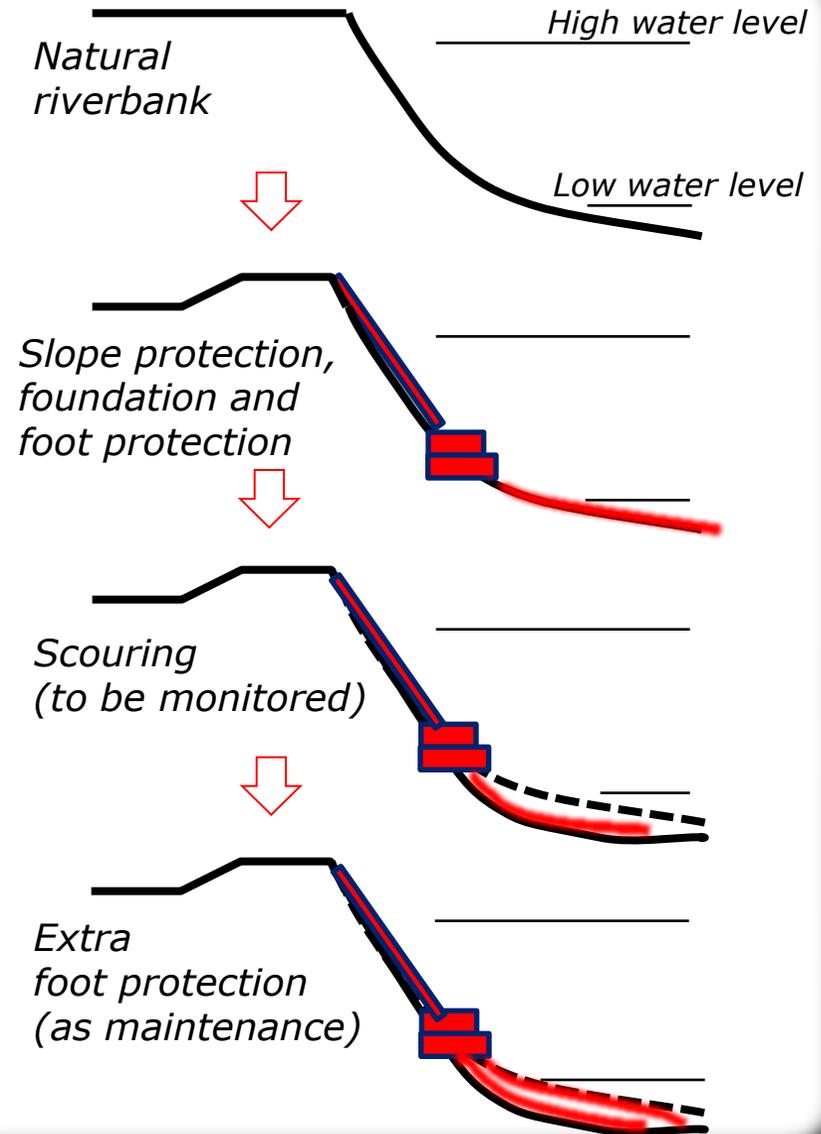
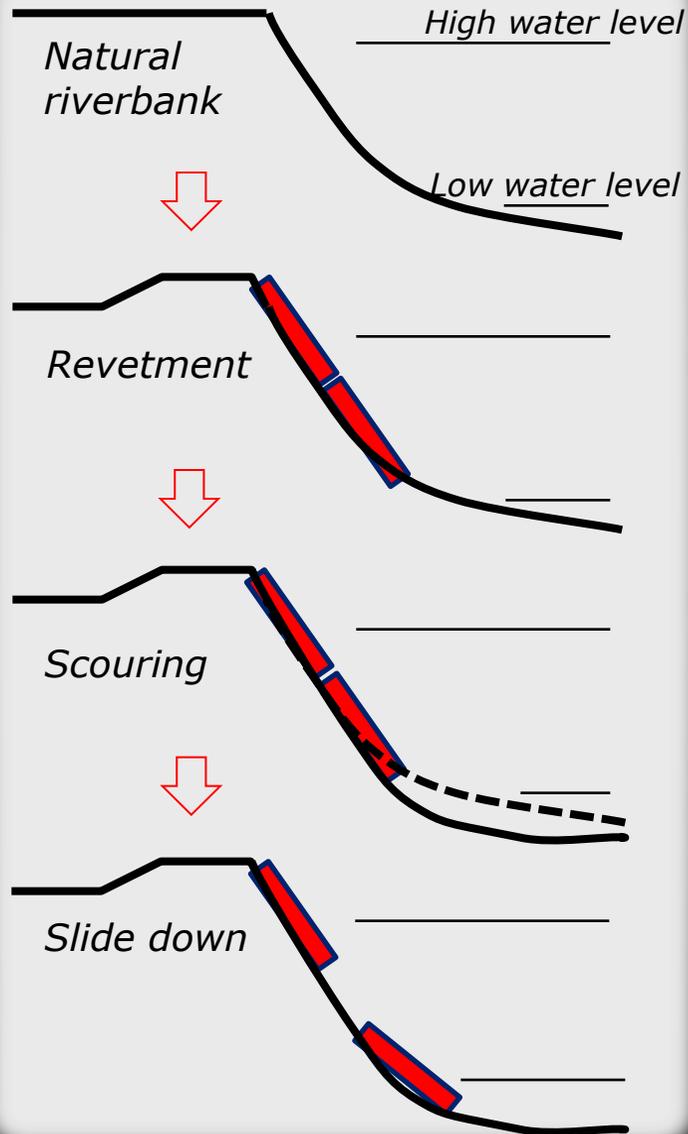
- *slope protection* --- *turfing*

- *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