

# River Basin Management, Adv.

## Chapter 6 RESERVOIR SEDIMENTATION AND SEDIMENT TRANSPORT MANAGEMENT ALONG A RIVER

### Dam and Reservoir

Types of dam:

Fill type, Gravity type, Arch type

Purposes:

*Multi-purpose dam*

flood control=peak cut of hydrograph

water resources←water resources development

normal discharge=’water right’ discharge+river maintaining discharge

(traditional water right, environmental flow)

hydro-power

※ pumped-storage hydroelectricity

### Capacity of reservoir

DWL (design) maximum flood (1/200) water level with opening emergency gates

SWL (surcharge) limit for flood control

*Flood control by cutting the flood hydrograph peak*

(→design flood discharge →design high water level of river)

NWL (normal) limit for water resources storage

*Water resources management by releasing to keep “normal discharge”*

Limiting Water level for flood season

LWL (low) lower limit for water resources

upper limit of sediment deposition ←100year

(reservoir sedimentation, dam sedimentation)

### Sediment issue related to dam

#### Reservoir sedimentation

Design sedimentation ←100year

Profile of reservoir sedimentation

Sediment supply from reservoir ⇔ Dam operation

Higher concentration during flood

Long term release of flow with higher SS ← long term higher turbidity in reservoir

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Effect on ecosystem (fishery) downstream of dam

#### Countermeasure against reservoir sedimentation

Dredging ←Sediment trap sub-dam

Pumping (dredging) → Conveyance by boat in reservoir

Flushing

Sluicing through gate

Bypass sediment removal tunnel

With sub-dam and entrance (Wash load, Bed load)

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Suction ← pumping, siphon

Dry dam

Ex. Masudagawa dam (Shimane pref.)

mono-purpose for flood control



## River Sediment Management

Sediment yield management – Erosion control (Sabo)

Check dam

Channel works (consolidation)

Hill-side works (slope works)

Sediment transport management

Aggradation → sabo-works

Degradation ← sabo-works, dam sedimentation, dredging, gravel mining

Local maintenance ← local scour, bar degradation

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### Integrated management of sediment

Sediment yield ← Sabo erosion-control

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Reservoir sedimentation ← Sluicing

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River sediment management

Degradation

terrestrialization of riparian area, local scour

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→ riparian forestation

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*Changes in riparian ecosystem*

Coastal zone erosion

Armouring

undisturbed bed

*Changes in attached algae and benthic organisms*

Fine sediment deposition ↔ riparian forestation

*Changes in riparian ecosystem*