

MARSEILLE  
DU 27 MAI  
AU 3 JUIN  
**2022**



ICOLD  
27<sup>TH</sup> CONGRESS  
90<sup>TH</sup> ANNUAL  
MEETING



CIGB  
27<sup>ÈME</sup> CONGRÈS  
90<sup>ÈME</sup> RÉUNION  
ANNUELLE



Committee J – Reservoir Sedimentation  
Workshop « SEDIMENT BYPASSING AND TRANSFER »

## Bypass efficiency

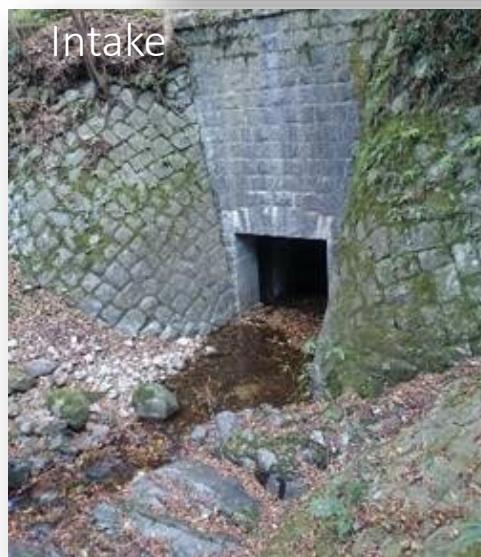
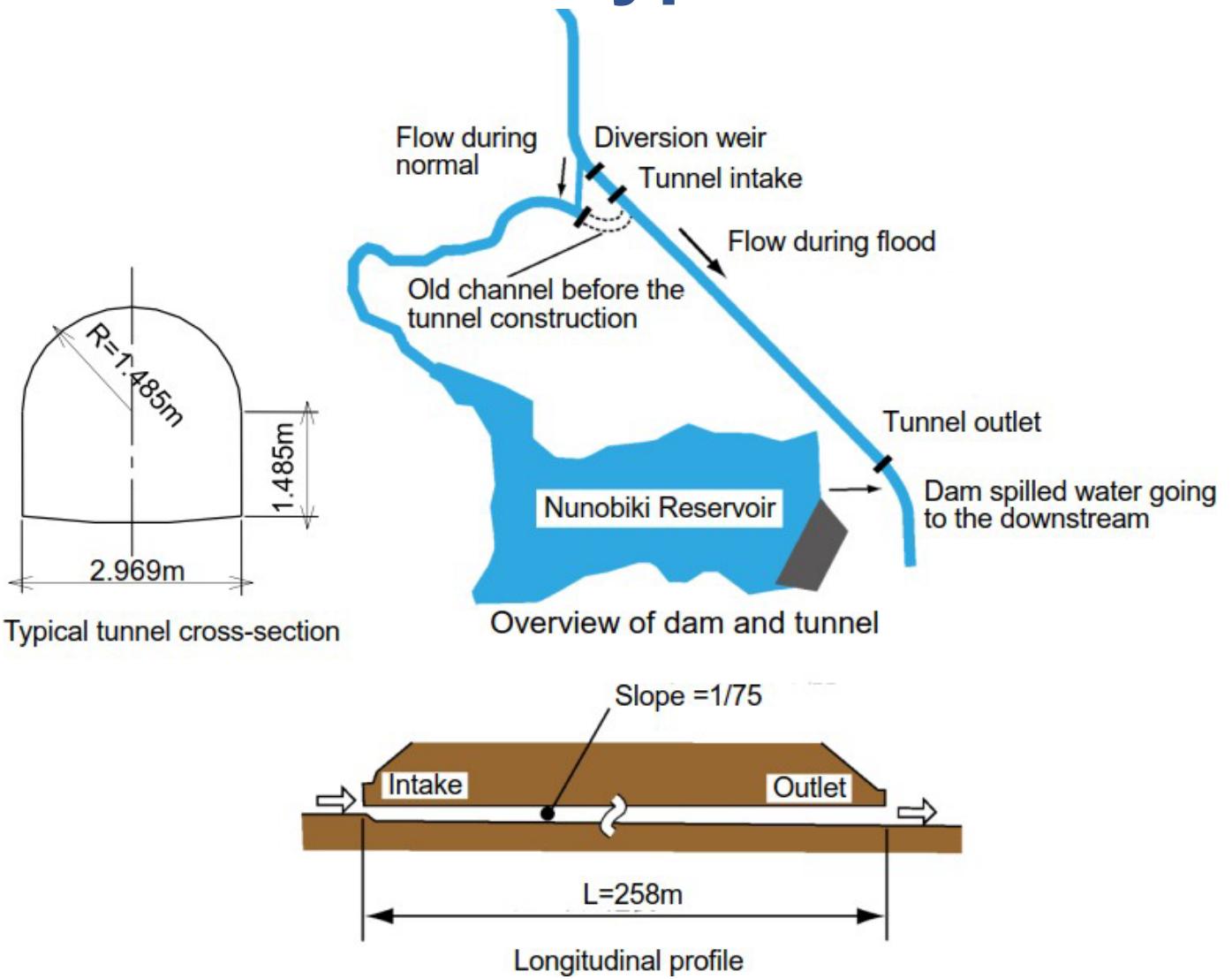
Christian Auel  
FH Münster – University of Applied Sciences

# Nunobiki Japan

Inauguration	1900
Catchment	10 km <sup>2</sup>
Dam height	33 m
Reservoir volume	0.76 Mio m <sup>3</sup>



# Nunobiki Bypass Tunnel



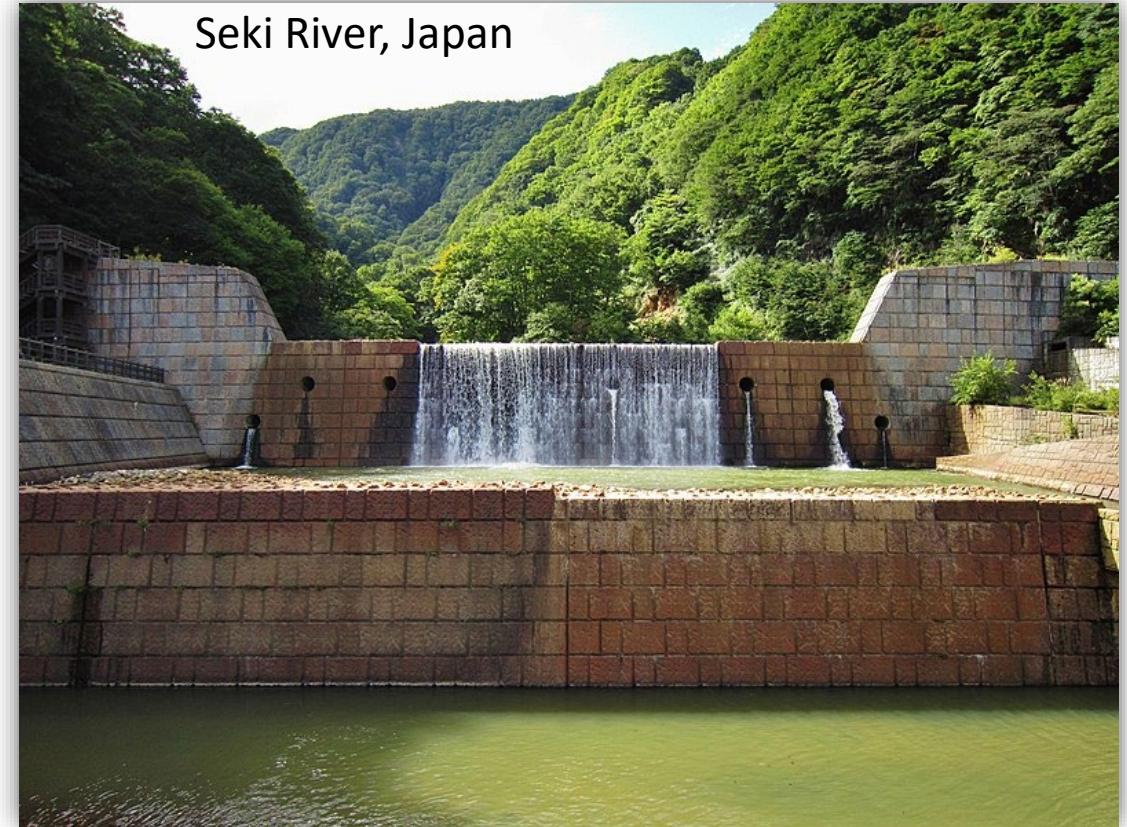
# Nunobiki check dams

Takano River, Kyoto, Japan



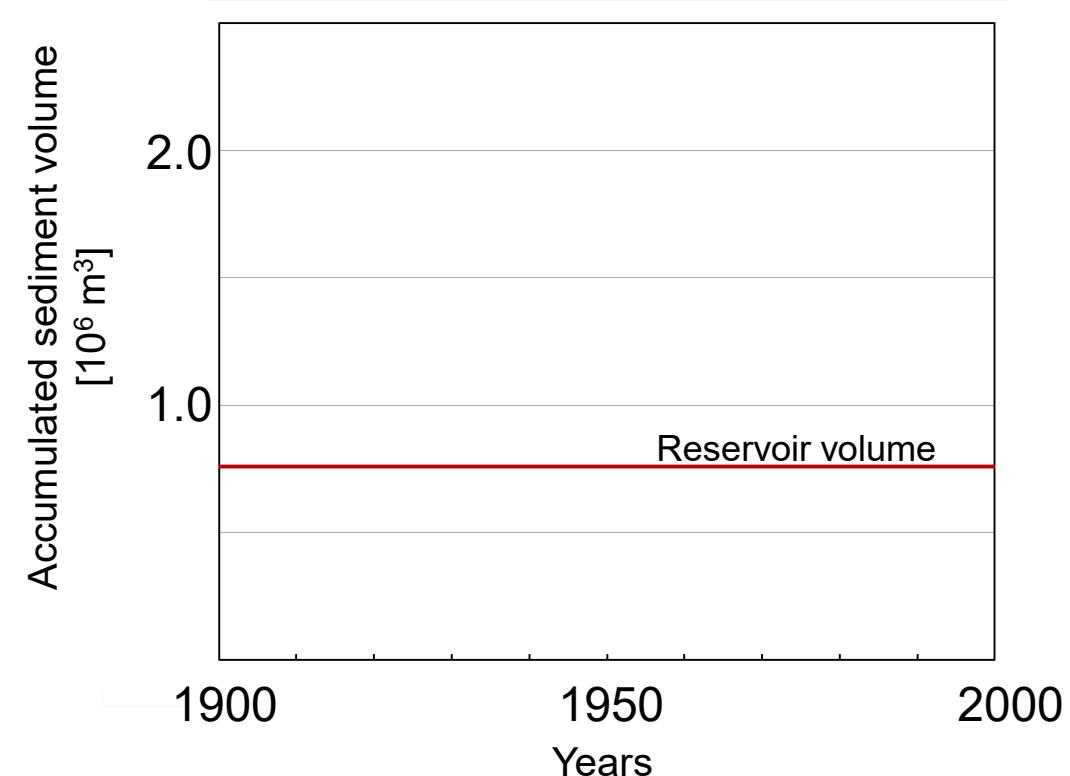
© Auel 2016

Seki River, Japan

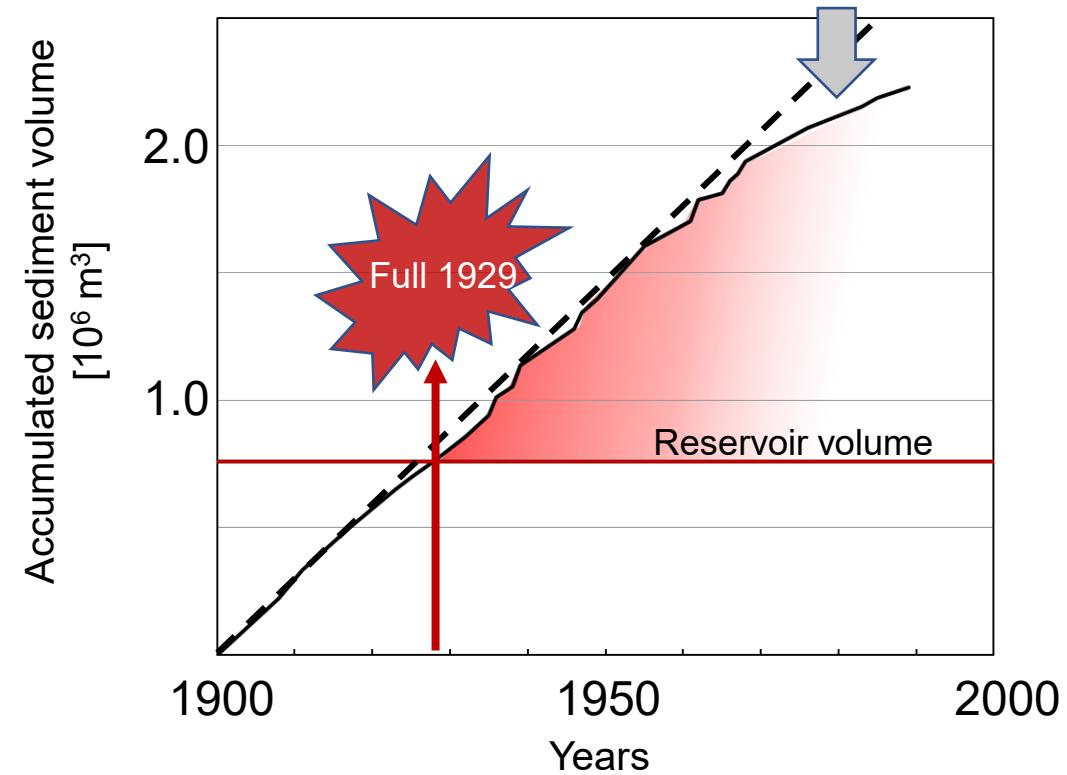


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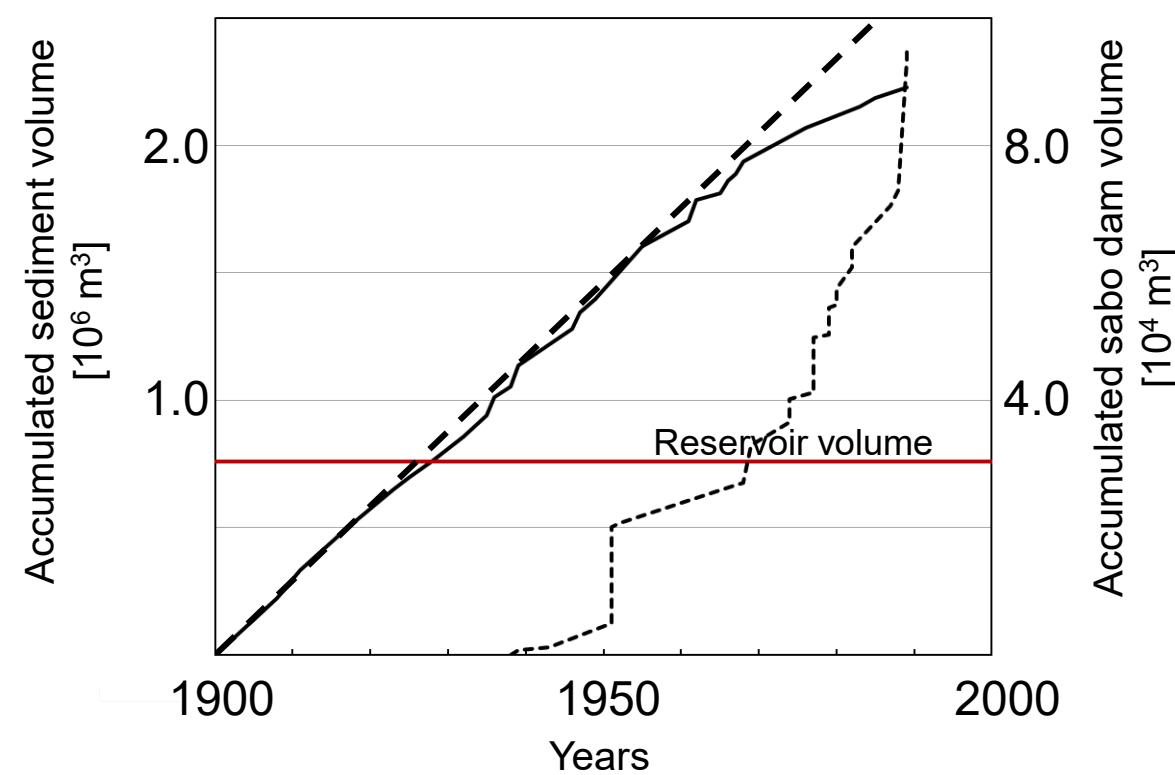
# Sedimentation Nunobiki reservoir



# Sedimentation Nunobiki reservoir

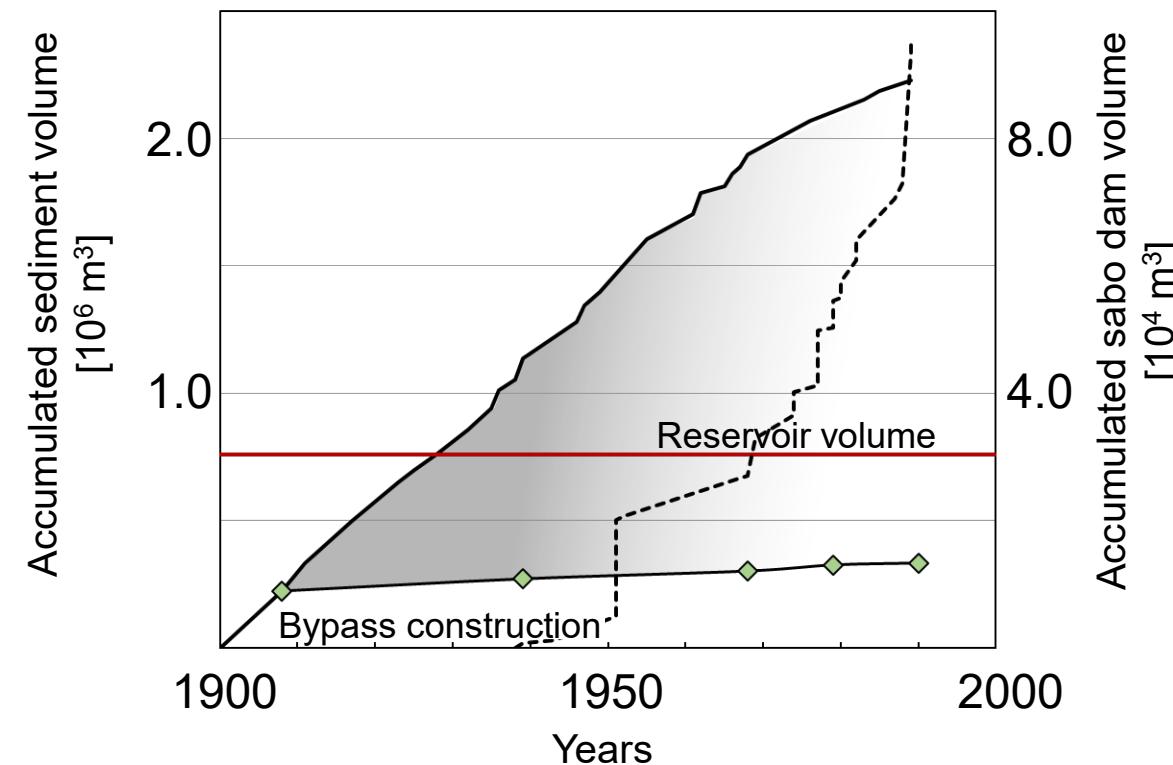


# Sedimentation Nunobiki reservoir



# Sedimentation Nunobiki reservoir

Bypassed sediment volume  
94% of incoming sediment



# Asahi Japan

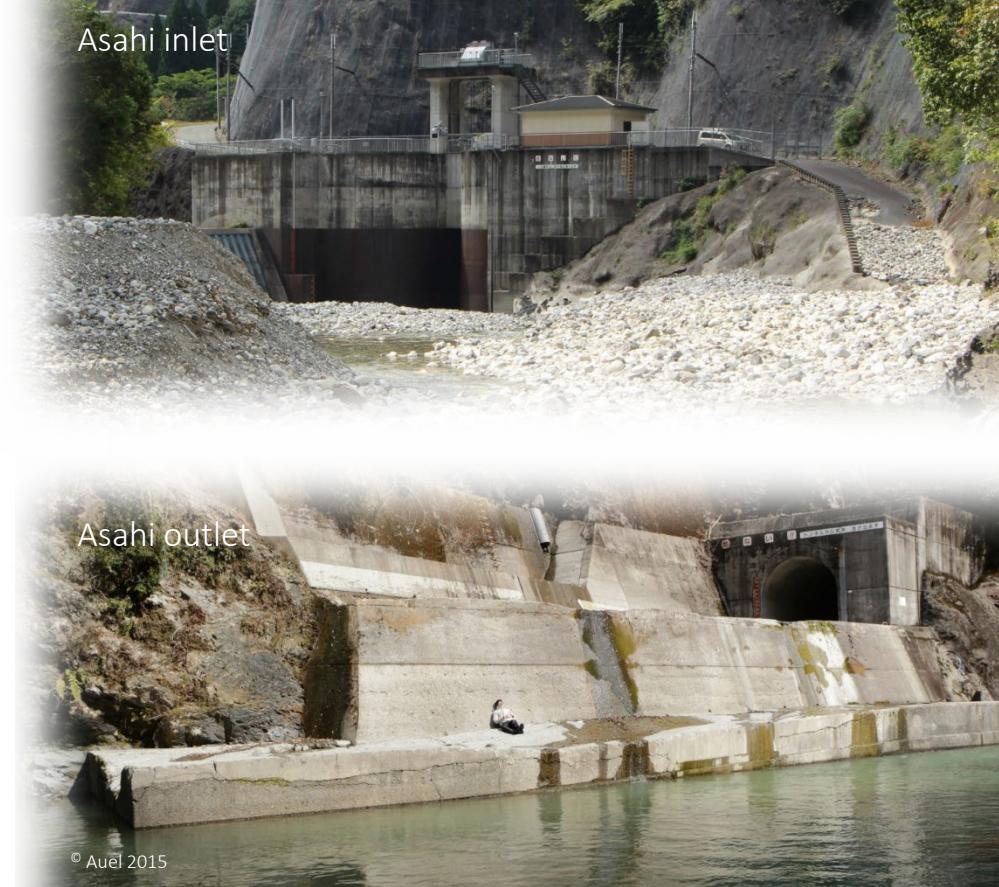
Inauguration  
Catchment  
Dam height  
Reservoir volume

1978  
 $39 \text{ km}^2$   
86 m  
15.5 Mio  $\text{m}^3$



# Asahi bypass

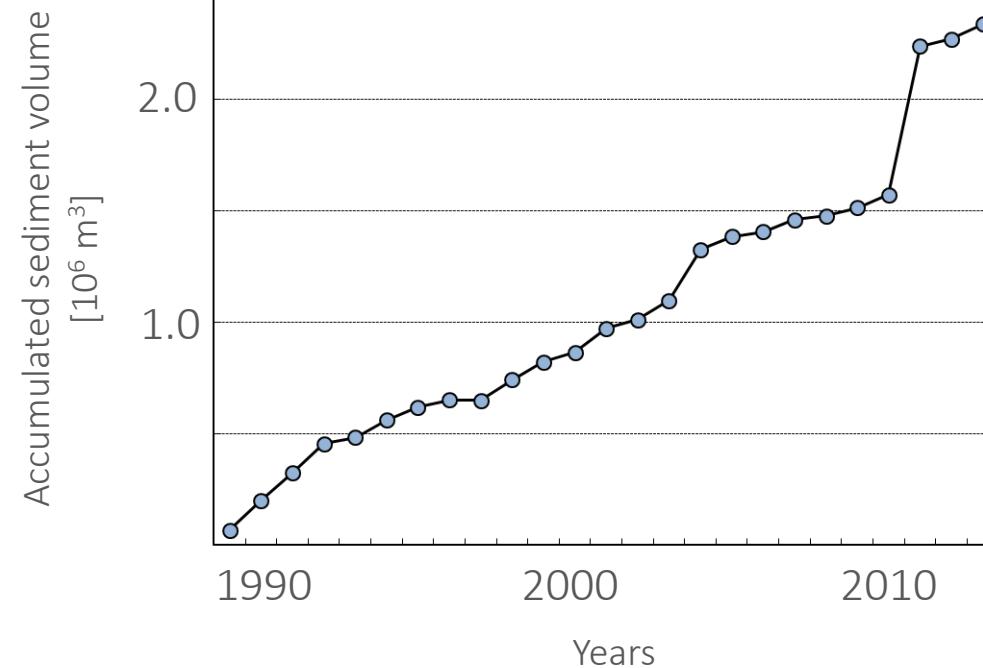
Length	2350 m
Archway Cross section	13 m <sup>2</sup>
Slope	2.9%
Discharge	140 m <sup>3</sup> /s



# Sedimentation in Asahi reservoir

Annual measurements

● Sediment volume without bypass



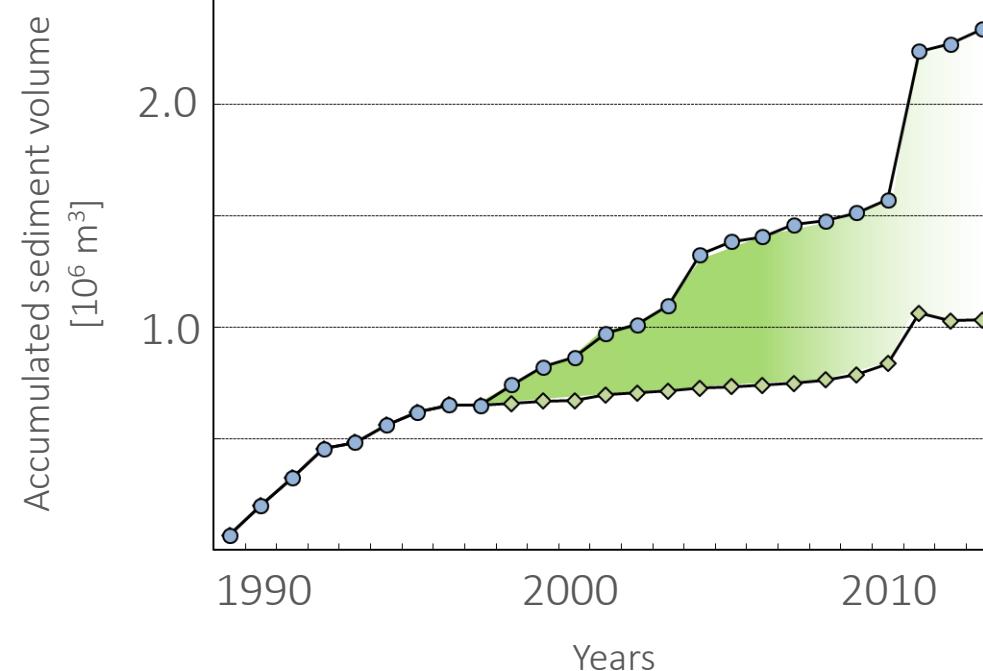
Source: Auel et al. 2016 ICOLD

# Sedimentation in Asahi reservoir

Annual measurements

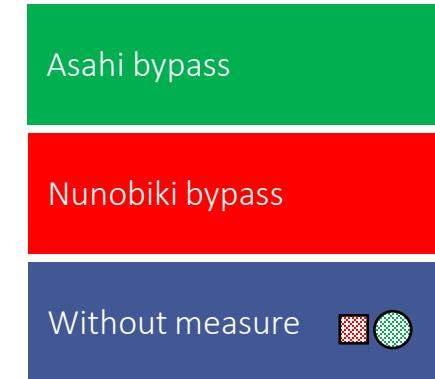
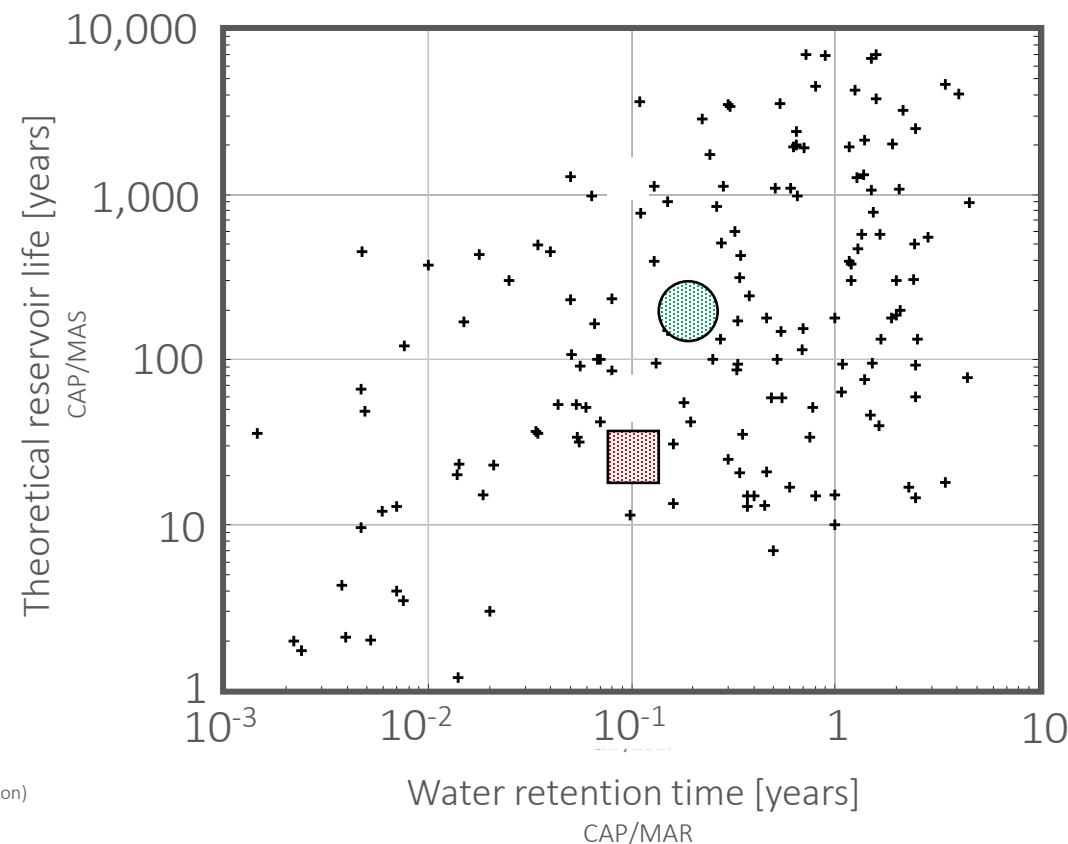
Bypassed sediment volume  
77% of incoming sediment

- Sediment volume without bypass
- ◆ Sediment volume with bypass



Source: Auel et al. 2016 ICOLD

# Sediment Management Efficiency



# Sediment Management Efficiency

