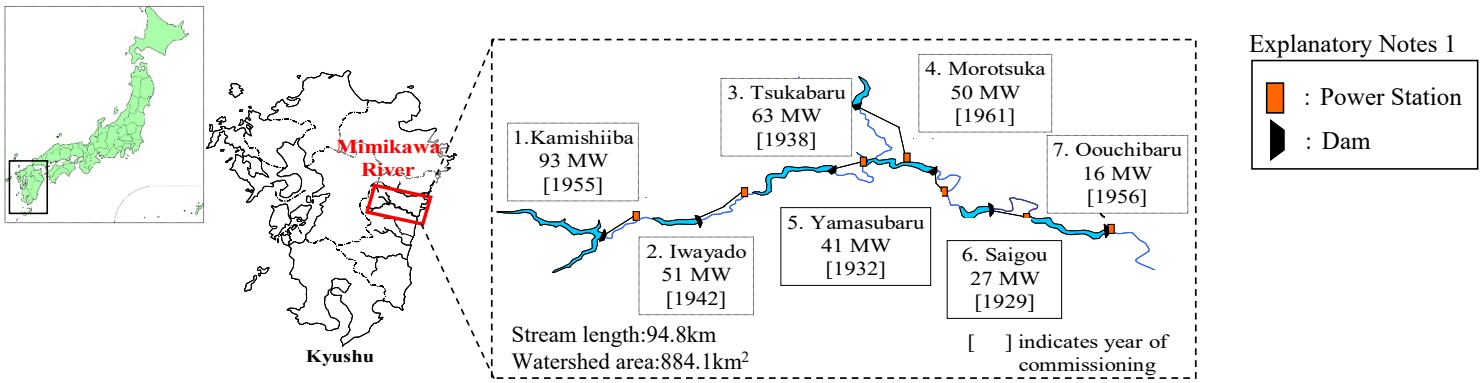
KEPCO's Approach for Integrated Sediment Flow Management in the Mimikawa River Basin(1/2)

1 Hydroelectric Power Generation in the Mimikawa River - Overview

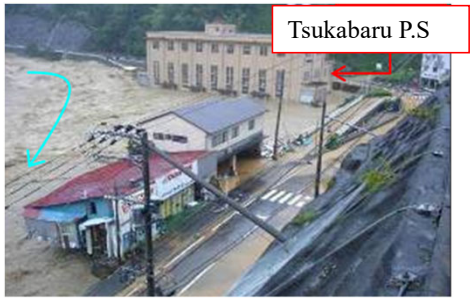
■ The Mimikawa River Basin has seven hydro PSs and dams, providing more than 20% of KEPCO's total hydroelectric power (in both kW and kWh) and constituting KEPCO's main source of hydroelectric power.



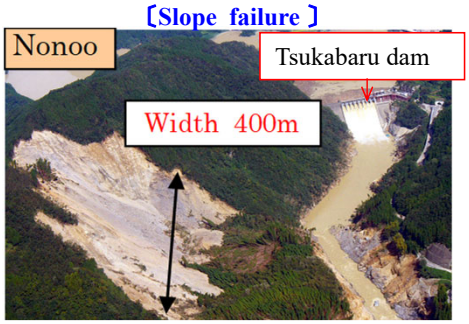
2 Damage Caused by Typhoon 0514

■ In September 2005, record-breaking rainfall from Typhoon0514 caused slope failures (491 locations) and flooding (424 residential buildings) in a wide area of the basin.

〔Flooding in Morotsuka〕



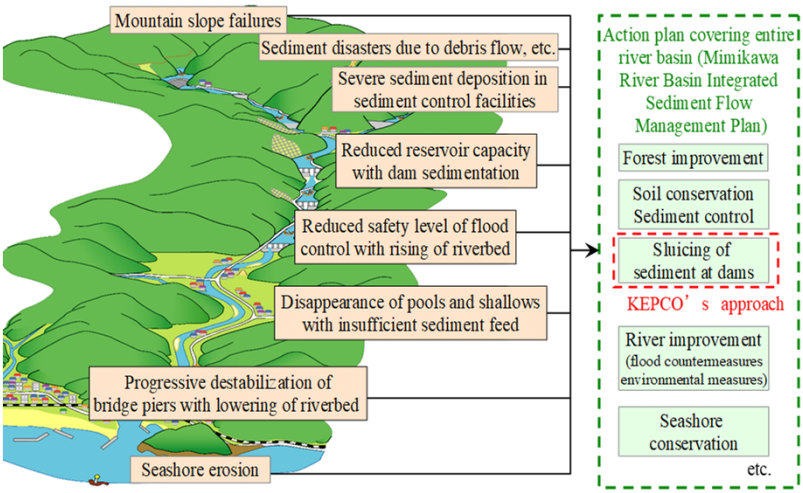
〔Slope failure〕



3 Integrated Sediment Flow Management - Overview

■ With the Typhoon 0514 disaster, a range of problems over the entire river basin caused by sediment became more apparent.

■ Miyazaki Prefecture, the river administrator, has decided to manage the entire river basin, from mountainous areas to dams, rivers and seashore ; and advanced integrated sediment flow management



4 KEPCO's action plan

Restoration of original sediment flow of river, which has been interrupted by dams ⇨ **Sediment Sluicing**

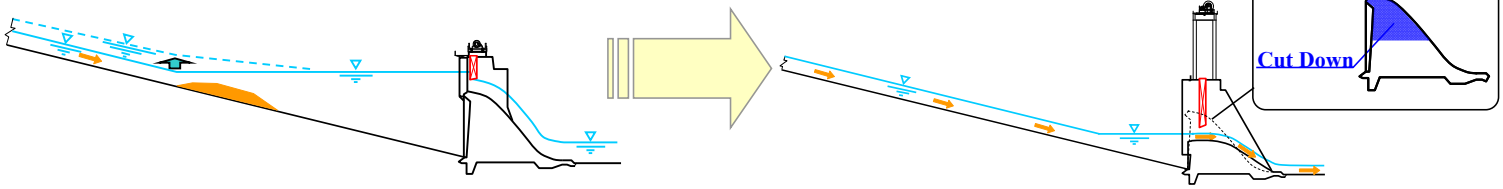
■ This approach lets inflow sediment from upstream pass dams by pre-drawdown to create a state close to a natural river state when heavy rainfall due to a typhoon is expected. This is called "sediment sluicing".

■ Sluicing is to be implemented from 2017 at "Oouchibaru Dam" , without dam modification, and at Saigo Dam, by means of partial modification of dam structure.

■ Sluicing is to be implemented from 2021 at Yamasubaru Dam, by means of partial modification of dam structure.

Current dam operation

Planned sediment sluicing



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5 Dam Modification

■ For Yamasubaru and Saigou Dams, with the existing structure it is not possible to do the necessary drawdown in order to carry out sediment sluicing.
⇨ Sluicing function are now being added to dams by partially cutting down their overflow sections without causing structural damage.

〔**Yamasubaru**〕

Of the eight existing radial gates , two in the center will be removed, and the overflow section cut down by approx. 9m to install one radial gate (W13.6m×H.15.5m)

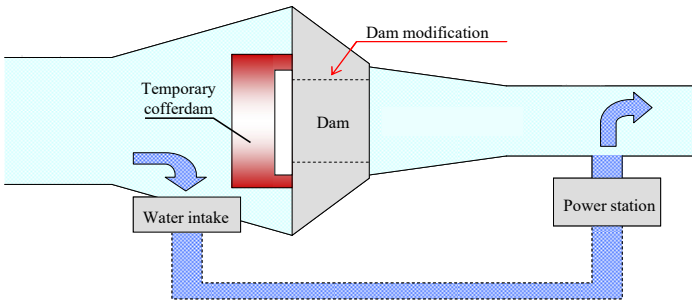
〔**Saigou**〕

Of the eight existing roller gates, four in the center will be removed ,and the overflow section cut down by approx. 4m to install two roller gates (W17.6m,×H10.2m).

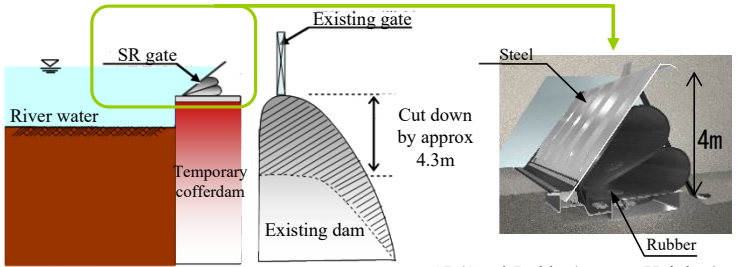
6 Characteristics of Dam Modification

■ Wile dam modification work is carried out, a temporary coffer dams are installed upstream of dam, and the river diverted through a headrace to allow power generation to continue.

Diversion of river water by power generation



Temporary cofferdam



SR(Steel-Rubber) gate : Height 4m

7 Estimating effects and verification of Slucing

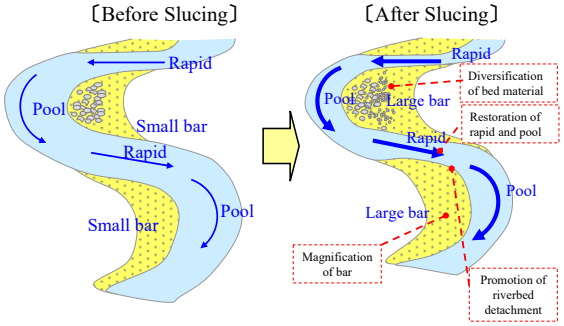
Effects estimation

■ The following effects are expected in flood control and environment as a result of riverbed state simulation and river environment surveys:

・Flood control : Sluicing will lead to improve safety in dam upstream regions. It is also expected that there will be no remarkable changes in flood water level in the upstream regions since inflow sediment from upstream will be spread out thinly and widely in the downstream regions.

・Environment : It is expected that sluicing will lead to diversification of bed material, restoration of rapid and pools in river channel, promotion of riverbed detachment of algae. As a result, recovery of the original river environment and increasing diversity of flora and fauna is anticipated

〔Before Slucing〕 〔After Slucing〕



Verification

■ To verify these effects, KEPCO has been carrying out environmental monitoring since 2007, and will evaluate these effects by BACI method※.

※ Evaluation using BACI (Before-After Control-Impact) method
Method to understand effects of sediment sluicing at dams by comparing changes in river environment before/after sluicing and at locations affected/unaffected by sluicing.