Measures for Environmental Preservation

The following facilities have been installed in the reservoir to conserve the water quality of the reservoir and discharged water.

1) Selective Intake Works

In order to prevent discharging cold and/or turbid water, water is always taken from the most appropriate depth through these facilities, taking into account the distribution of water temperature and turbidity in the reservoir. These measures reduce the impact on agricultural and domestic water taken downstream and aquatic organisms.

2) Submersible combined aerator

Hypolimnion aerator causes excess air with its operation. About 90% air is emitted into the atmosphere through discharger on the water surface. “Submersible combined aerator” is aiming at the efficient use of this excess air. Development of automatic discharger allowed for stable emission of the excess air and realized combined aerator in deep/shallow water.

Aeration Device in Surface Layer

Since the surface layer of the reservoir warms from spring to summer, a thermocline gradually forms between the upper layer and the lower layer where the water is still cold. This thermocline prevents water from mixing easily. This device encourages the circulation of water between the layers by aeration from a pipe installed in the reservoir, thus lowering the thermocline. These measures reduce the impact of discharging cold water when the intake depth is lowered.

Aeration Device in Bottom Layer

Dissolved oxygen near the bottom layer of the reservoir tends to run short in summer. By taking water from near the bottom layer into the device, dissolving oxygen into the water, and then returning it to the bottom layer, generation of hydrogen sulfide and inorganic phosphorus is restricted. These measures help prevent the smell of hydrogen sulfide during discharging through conduit gates and blooms of phytoplankton.

Course of Hiyoshi Dam

Floods due to rain fronts and typhoons have often damaged the Yodo River Basin including the Katsura River. Since the Katsura River has a narrowed part called the Hozu Valley, the Kameoka Basin located upstream of the valley had been often submerged (as shown in the photo: Typhoon No.10, 1982), causing much loss of life and damage to property. On the other hand, securing water resources in response to rapid population growth in the cities along the Yodo River had become a major social issue, and prompt measures were necessary to meet this water demand.

Under these circumstances, Hiyoshi Dam was planned (the name was originally “Miyamura Dam”). At that time, 201 households (216 houses) lived in the area that was to be submerged due to the dam construction. Thanks to their understanding of this project and their cooperation by relocation, etc., the dam was completed after 37 years after it was planned. Now, Hiyoshi Dam actively helps to control floods and to supply water along the Yodo River.
Purpose (1): Flood Control

By temporarily storing water in the dam reservoir during floods and by discharging water at a safe rate for the downstream areas, Hiyoshi Dam can reduce the damage caused by floods.

Hiyoshi Dam was constructed under a plan to control the 100-year floods. However, since river improvements in the lower reaches of the Katsura River are still in progress, flood-control operation with discharges of up to 150 m$^3$ has been provisionally carried out for controlling the 20-year floods. This operation is designed to maximize the effectiveness of flood control by the dam.

Purpose (2): Maintenance of Normal Function of River

Hiyoshi Dam can discharge supplemental water for the vested water rights along the Katsura River and environmental preservation to maintain the normal functions of the river water. This supply has greatly reduced downstream water shortages. However, the capacity of the dam is limited. If the dam were to continue discharging supplemental water for a long time without rainfall, the water level of the reservoir would decrease and the desirable flow rate downstream could not be secured. Therefore, the amount of supply is coordinated among the related members.

Purpose (3): Development of Water Use

Hiyoshi Dam has created additional water use of 3.7 m$^3$/s (sufficient for approx. 1 million people). It can supply domestic water to Kyoto Prefecture (Otokuni District: Muko City, Nagaokakyo City, and Oyamazaki Town), Osaka Prefecture (Osaka Water Supply Authority), and Hyogo Prefecture (Itami City; and Hanahin Water Supply Authority: Amagasaki City, Nishinomiya City, Ashiya City, and Kobe City).

*Osaka Water Supply Authority supplies domestic water to the whole of Osaka Prefecture except Osaka City.

Power Generation for Dam Operation

The Hiyoshi Dam Hydropower Plant can generate electric power of up to 850 kW by using water taken through selective intake works (up to 3.0 m$^3$/s) and turning a watermill. This clean electric power is effectively used for operation of the dam facilities, and the excess is sold to electric utility companies. This reduces the cost of dam operation.