(13) Development of water quality management and control techniques for regional water use and aquatic ecosystem conservation

Research Summary

Research period: FY2016-2021
Program leader: Director of Water Environment Research Group

(1) Develop a quick and accurate assessment strategies for basin water environments

Develop assessment and monitoring techniques for water usage, the living environment and aquatic ecosystems

Locating sources of pollutant emissions in the water environment

Next-generation high-speed sequencer

Algal bloom occurrence

Investigate current impact mitigation strategies for water environments
- Inflow from urban areas and agricultural land
  → Countermeasures against non-point source pollution
- Inflow from wastewater treatment plants
  → Controlled by improving the treatment performances

Develop a simple algae surveillance using DNA sequencing
- In present conditions, specialized skills are required to identify musty odor-producing planktons
- Implement surveillance using new DNA sequencing technology

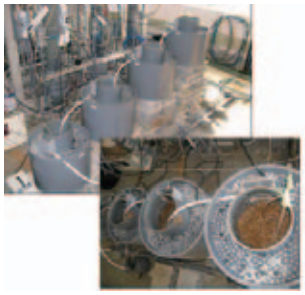
With developed techniques, monitoring and evaluation methods, we aim to preserve water usage in basins, living environments and aquatic ecosystems

Proposing management plans to improve the water environmental quality

(2) Develop adequate water treatment techniques to mitigation water quality risks

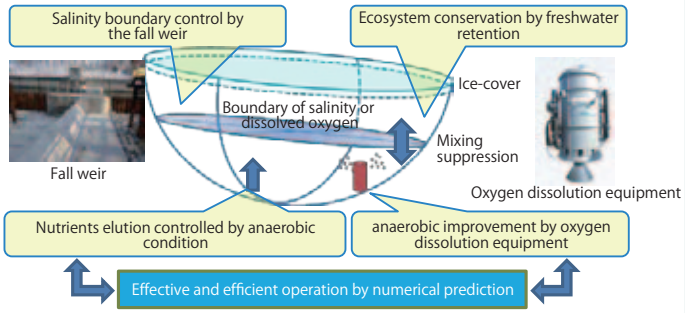
Efficient chemical contaminant removal and pathogenic microbe disinfection

- Develop technology to remove micro pollutants (e.g. pharmaceuticals, surfactant) in treated wastewater through microbial carrier processes. In particular use of low cost and energy conservation technologies to optimize the process conditions
- Aim to improve the inactivation and removal of pathogenic microorganisms in chlorine treated water through applications such as complex disinfection technology



(3) Develop more efficient and effective water quality control strategies

Investigate measures focusing on the changes in bottom layer environments and inflow load



- Develop a prediction method and measures to improve anaerobic conditions such as freezing brackish lakes and dam reservoirs
- Propose measures to adapt to the impact of climate change on water environment quality

Although various improvement measures for water quality have been implemented, serious issues are still found in water environments, such as infectious diseases that influence social activities, ecological effect of chemical substances derived from products for daily use, and occurrence of algal bloom and musty odor in reservoirs. Therefore, new strategies for evaluation, monitoring and management are required to respond to these issues. In addition, it is important to apply these techniques to the basins in an integrated manner to improve environmental quality.

In this R&D program, in order to respond to these challenges we will promote researches towards achieving the following 3 goals:

(1) Development of assessment and monitoring methods to understand the water environments of basins with accuracy and speed.

(2) Development of adequate water treatment technology for the mitigation of water quality risks.

(3) Development of water quality management focused on the bottom layer environment and the inflow change in stagnant water areas.

We aim to reflect these developments to the planning of the administrative measures and technical standards by the national government towards the improvement of water environmental quality, conservation of regional water use in basins, living environment and the aquatic ecosystem.