Coastal water resources and watershed management

Impact Of Warm Water In Stream On Water Quality Of Headwater Reservoir

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As remarkable geographic reasons, most of rivers in Japan form short distance and steep difference of altitude. In additions, the mountainous area is covered by headwater conservation forest to obtain fine quality water as well as suitable place for dam reservoirs. However, for these past 20 years, a water-bloom as the typical water pollution phenomena came to occur in the dam reservoir established to around 500m above sea level of the headwater conservation forest. Nutrient salts and water temperature play important issues to develop the water-bloom. We investigated the Nutrient salts and water temperatures of some upstream inletting to reservoir in Kanto mountain region. The temperatures of the sampling rivers water remarkably increased. Kosuge River was 10.4 degree Celsius in 1982. However in 2009, that of temperature was 13.7 degree Celsius. While the global warming may become one of the reasons, the warm drain water from a sewage disposal plant is also possible. In the present study, the impact of warm water in upstream on the water quality of a reservoir located in Kanto mountain region are investigated by multivariate analysis. As the results, （1）The warm water in upstream induced a density current in the reservoir. The water spread to the surface of the reservoir. The water included a nutrient salts (phosphorus, nitrogen etc.) which are requirements for the water-bloom development. (2) The nutritive salts, especially nitrogen contributed for the development of chlorophyll-a. Then, the inletting upstream water temperature in the heating season, especially from May to end of August, plays a key rule for chlorophyll-a. That becomes the index for the water-bloom production. (3) The warming water from the sewage disposal plant using the biological treatment may become the reservoir heating. The start year of increasing upstream water temperature coincided with the year of sewerage completed (1982~1986) in the drainage area.
Keywords: warm water, water quality, upstream, headwaters reservoir, Knto mountain region