

Study on the relationship between water quality and the riparian buffer zones,
Case of the Sorachi river and Chubetsu river
(河川の水質と河川緩衝帯との相関に関する研究、空知川と忠別川を対象として)

Hokkaido University, Graduate School of Environmental Science,
Division of Environmental Science Development, Course in Global Environmental Management,
Donghyun Kim

The riparian buffer zone is an area of trees and shrubs located adjacent to streams, lakes, ponds, and wetlands. The riparian buffer zone with the sufficient width can reduce the inflow of nutrients and other pollutants into a shallow subsurface water flow. The purpose of this study is to investigate the ability of the riparian buffer zones to improve the water quality in the watershed. This study is planned based on some hypotheses. Some indexes of water quality should be increased in the snow melting season. The higher the ratio of agricultural land is, the larger the values of water quality should be. A correlation between the width of the buffer zone and the water quality ought to be observed.

The Sorachi river and Chubetsu river were selected as the research area. The Sorachi river and Chubetsu river are the tributaries in the Ishikari watershed of Hokkaido, with a relatively large flow rate among the tributaries. The urban areas and agricultural lands exist separately in the watershed. The Sorachi river is often muddy and it seems to be affected by non-point sources from the agricultural land.

The river waters were sampled in December of 2015 and in April of 2016 when was a snow melting season. Additionally, the water quality survey was conducted in May and August of 2017 to investigate seasonal changes in the water quality. The number of the sampling points are 24 in the Sorachi river and 3 in the Chubetsu river.

Water temperature, pH, electric conductivity, dissolved oxygen and TDS were measured in the field. T-N, T-P, SS and COD were analyzed in laboratory. These water qualities are compared with those of the different land use of the watershed. The buffer zone was measured by using a satellite map and evaluated according to the previous studies. The correlation between the buffer zone width and the water quality were investigated to confirm the effects of the riparian buffer zone.

From the water quality analysis, the obvious differences were found in some indexes of the water quality depending on the season. SS and T-N increased in the spring season and it is presumed to be the result that occurs in the snow melting season. T-P and COD were higher in the winter season. It is assumed to be due to the decreases of the flow rate of the stream in winter season. Firstly, it was expected that most of water quality data would be higher in April and May due to the snow melting, but the result was opposite. The high concentration of these data was observed in August. In the data of water qualities from s14 to s21, where are located in the watershed of the river, there was a significant correlation between T-N and bare soil and a weak correlation between SS and bare soil of the land use. The correlation analysis showed a valid negative correlation between riparian buffer zone and the indexes of T-P, SS, and COD.