Development of restoration methods of past environment situation using aerial photograph etc.

For comparison between past and present status on the ecosystems and setting the purpose of river ecosystems, we developed methods which can estimate river morphology, distribution of water depth, current velocity, nitrogen load and pattern of water level fluctuation in past.

We have assessed the difference of flooding condition to estimate the available refuge area during floods. Fish refuge area decreased from 1820s to 1960s. In particular, after two hours from the beginning of flood, the formation process of the fish refuge remarkably differed between past and present status.

The amount of nitrogen load derived from agricultural activities in 1928 and 1932 was estimated by analyzing agricultural information recorded in previous literatures. The amounts of nitrogen load from paddy fields and farms were about 1/10 and 1.4 compared with that in 2006, respectively. These results indicate that it is able to estimate the previous nitrogen load by detailed analysis of agricultural information recorded in past literatures.

We attempted to extract pattern of water level fluctuation by using time series analysis of water level data from 1975 to 2006. In the results, universality of the pattern was examined by comparing with water levels in 1890s. The results showed that time series analysis were able to extract the pattern. Particularly, flooded periods and seasonal variation of flow rate were well extracted and the pattern was very similar to in 1890s. However, we were not able to find similar patterns in the scale of floods between two periods because the flooded scale depended on stochastic variation.