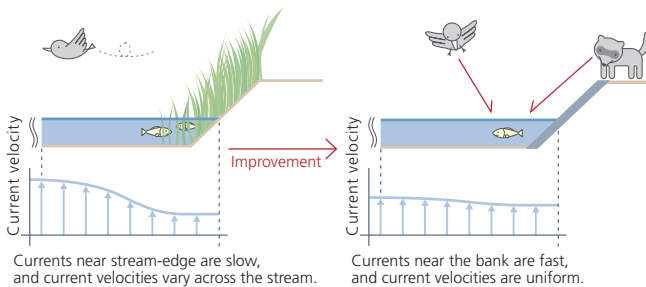
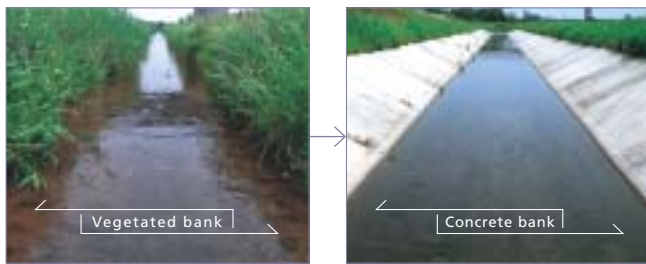


# Terrestrial and aquatic parts of stream-edge vegetation

## Differences between vegetated bank and concrete bank



|                | Stream-edge current velocity | Current velocities across the stream | Danger of being found by predators | Shading effect | Refuges | Food from the land section |
|----------------|------------------------------|--------------------------------------|------------------------------------|----------------|---------|----------------------------|
| Vegetated bank | Slow                         | Various                              | Low                                | High           | Yes     | Much                       |
| Concrete bank  | Fast                         | Uniform                              | High                               | None           | No      | Few                        |

## Stream-edge vegetation, creates habitats for aquatic organisms.

### Objectives

In the aquatic-terrestrial ecotone, stream-edge vegetation has an important role for the maintenance of aquatic and terrestrial organisms. Most stream-banks are naturally covered by plants, except for streams whose banks have been strengthened with concrete. Such bank protection works have reduced stream-edge plants and also aquatic and terrestrial organisms.

Functions that were lost when concrete banks replaced the natural vegetation should be understood in order to improve and restore the habitats of stream organisms. The effects of waterside plants covering the ground and stream surface on aquatic organisms have been investigated since fiscal 2002 at the Aqua Restoration Research Center in partnership with the Chubu Technical and Engineering Office of the Ministry of Land, Infrastructure and Transport.

### Methods

#### Surveys

Experiments were conducted along experimental stream A at the Aqua Restoration Research Center. The experimental stream A is straight, approximately 800m long, and about 3m wide. Surveys were conducted in late September and October and involved the following:1) collection of fish and crustaceans by applying electric shocks in order to determine the

quantity of these organisms;2) measurements of physical variables (water depth, current velocity, substrate composition, and areas shaded by plants);3) determining the amount of food for these organisms (algae, benthic invertebrates, particulate organic matter, and drifting organic matter), and 4) investigating the contents of the collected fishes' stomachs. This report describes the differences in the quantity of fish and crustaceans and physical conditions between the treated and control sections.

### Design of experiment

Five kinds of sections were established along experimental stream A, as shown in Figure 1. Each section was 15m long. Class A sections were vegetated banks where stream-edge plants (plants that grow in water) and plants on the ground, were left intact. In Class B sections, stream-edge plants were left intact (in-stream cover), but plants growing on the ground were cut down. In Class C sections, stream-edge plants were cut down, but plants on the ground were left intact (overhanging cover). In Class D sections, both stream-edge and ground plants were cut down (no plants). Class E sections were covered by concrete revetment. There were four sections for each class (A to D), and two Class E sections. During the experiment, concrete blocks were placed at the end of each section, allowing the fish to move through, so as to control the uniformity of the water's depth in all sections. It was confirmed in advance that the quantity of fish and crustaceans, physical conditions, and the amount of food in the water were equivalent in Class A to D sections before the plants were cut down.

## Physical conditions change as a result of plants being cut down.

The physical conditions of each section class are summarized in Table 1. Class A, which is the control and vegetated bank, was characterized by overhanging cover, in-stream cover, and slow current velocity near the bank. Class B had no overhanging cover, and the current velocity near the bank was slow. In Classes C and D, the current velocity near the banks was faster than in Classes A and B, as a result of there being no in-stream cover in C and D. In Class E (concrete revetment), the current velocity near the bank was fast due to the surface of the concrete banks being smoother than that of other kinds of banks.

## In-stream covers affect the distribution of aquatic organisms.

### Result 1

The type of stream-edge structure was closely correlated to the biomass of fish (Figure 2). In the figure, the quantity of fish is the total of three trials. The quantity differed by class, and was the largest in A (vegetated bank), followed by B (in-stream cover), C (overhanging cover), D (no plants), and E (concrete revetment), in that order. It was especially notable that the quantities of fish in C, D, and E, where there was no in-stream cover, were dramatically smaller than that in A. The quantity in B, which lacked overhanging cover, was smaller than that in A, but the difference was not as notable as that between A and the other sections. This shows that the disappearance of in-stream cover