

## Introduction

About 60 years ago, our city, Moriyama was famous for the habitats of fireflies, but they have become almost extinct because of the urbanization. Recently, some activities have been on the way in order to regenerate fireflies in our city. As one of them, we have been working on this project, in which we will make Amagaikie-river area suitable for fireflies to grow naturally. This area is located in the middle of the city, surrounded by shopping malls, busy streets and strong street lights, making it difficult for fireflies to survive.

Nevertheless, the area is attractive since a lot of people gather to enjoy the beautiful sound of water from the river even though it has been urbanized. Actually, it is the very reason why we believe our project is important. In the area, some kindergarten children release larvae of fireflies into the river every year, but we have very few adults so far. Thus, we have come to think that environment in which the larvae emerge really matters. Above all, we have focused on the landing spaces for the larvae.

## 1. Life of fireflies

- From June to July : Eggs on mosses in the river
- From July to March : Larvae, eating *kawanina* in the river (Figure 2)
- From March to May : Landing onto wet soft soil to become pupae
- From May to July : Being adults and start to fly

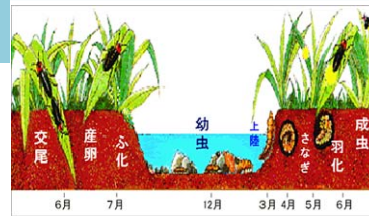


Fig. 2. Thiaridal snail (Kawanina)

Fig. 1. Life of fireflies

## 2. Release of firefly larvae

In order to find conditions in which larvae can land and become pupae, we released them into 4 points, A, B, C and D (Figure 3), considering the differences in quality of the river(water) beds among them. We released 50 larvae into each point, 200 in total.

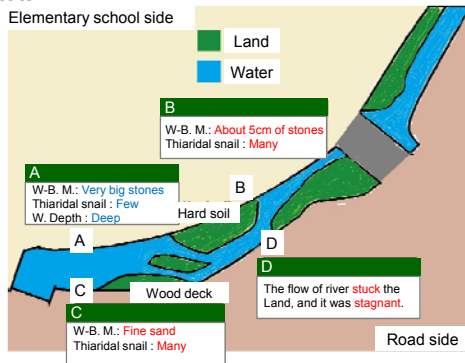


Fig. 3. Map around the Amagaikie

## 3. Maintenance of landing point

Neither of the shores of Amagaikie-river met the condition for firefly's larvae. We arranged them so that the larvae could come out of the river more easily.

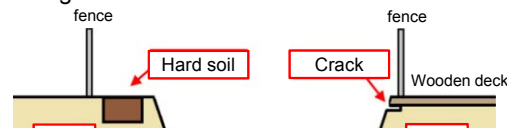


Fig. 4. figure of the river

On the shore near release point A, B, hard soil covered the surface. We made 3 plots. (Figure5)

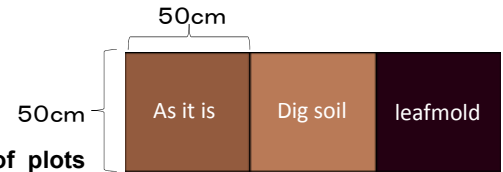


Fig. 5. figure of plots

On the shore near the release point C, D, there was a wooden deck, so there was no point to land larvae. Then, we installed a planter with some leaf mold as shown Figure 6. Also, there was a crack between the wooden deck and the shore, so we installed a net to cover the crack from the planter. (Figure 4)

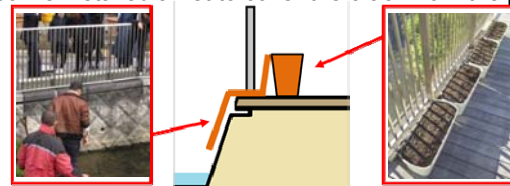


Fig. 6. maintenance in point CD

## 5. Cleaning bottom of the river

The river will get dirty if mosses remain stuck to the rocks. Then, we hit upon the idea of playing in the river and catching some fish with some children to get rid of the mosses and put it into practice on Aug. 1st 2017. (We call it *Kawagaki* project.) The result is that the mosses were removed remarkably. (Figure 8 and 9)

In addition, we interviewed some participants. Most of them said, "I want to play in this river again."

For these reasons, we think we can continue this project.



Fig. 7. this project

Fig. 8. before

Fig. 9. after

## 4. Results and Discussion

In order to check the effect of our maintenance of the shores and releasing the larvae, we looked into the number of the larvae, then, we found one climbing the net at point D. It shows us that the larvae can climb nets. As for the number of the adults, we only found 3 so far. Therefore, we must say we are on halfway through our research.

Moreover, a rise of water happened after we released the larvae, which we think led to the poor result.

## 6. Conclusion

① We have found that larvae climbed the net and saw some adults flying. From the results, we can say we have made the environment for the regeneration of fireflies to some extent.

→ In order to increase the number of flight, we will conduct some surveys on the environmental conditions in the other river out of our city and improve our environment for fireflies.

② We have to protect the larvae from being washed away.

→ By installing devices (Figure10), we will make the flow of the river be slower.

③ Many people applied for *Kawagaki* project, which we mentioned in #5, and the mosses were removed remarkably.

→We will continue this project and provide citizens with places they can come into contact with the river. By doing so, we'll make citizens play in river and remove the mosses constantly.



Fig. 10. Image of devices installed in the river