

Effects of the inflow of hot spring drainage into rivers in Beppu City, Oita Prefecture on benthos in the estuary area.

*Kazuya Shimizu¹, Makoto Yamada¹, Makoto Uenishi¹, Shinji Ohsawa²

1. Ryukoku University, 2. Institute for Geothermal Sciences, Kyoto University

Beppu City, Oita Prefecture, is one of Japan's leading hot spring resorts, and people receive the benefits in various ways, including bath and heat utilization. Hot spring also very useful as a tourist resource, and it contributes to inbound. On the other hand, there have been cases where hot spring water that used or not used is discharged to surrounding rivers. Moreover previous research shows that it is affecting the ecosystems of rivers and estuaries. Although in their previous research describe the drainage from the hot spring is affecting fish. It is not clear that the extent of the impact by the hot spring drainage for benthos because the previous research uninvestigated about benthos. Therefore, we conducted a survey of the population of the benthos in the estuary area in order to clarify the impact of hot spring drainage on the benthos.

The survey was conducted in the non-tidal and tidal areas of major two rivers in Beppu City, Oita Prefecture. One is the Hirata River where hot spring drainage flows in. The other is the Hiyakawa River where hot spring drainage does not flow in among major rivers in. Ten areas of a 1-meter square at each point were randomly set and living things within those areas were collected using hand nets. After that, the samples were fixed with alcohol and brought back to the laboratory to identify the species of the benthos (crustaceans and shellfish).

Shrimps are often found in the Hirata River, especially a lot of *Palaemon serrifer* in the tidal area. On the other hand, Crabby was very common in the Hiyakawa River, especially in the non-tidal area. For shellfish, there is a big difference in *Clithon retropictus* and that was very common in the Hiyakawa River, especially in the non-tidal area. We found that *Semisulcospira libertina libertina* is common in the Hiyakawa River and *Melanoides tuberculata* Muller is common in the Hirata River.

Focusing on the results of shellfish observations, *Melanoides tuberculata* Muller lived in more places in the Hirata River, where hot spring drainage flows than in the Hiyakawa River. *Melanoides tuberculata* Muller is a hot drainage liking species known to be common in rivers with high water temperatures. From this habitat condition, we suggest that the effects of the drainage of the hot spring water may be exerted on benthos as well as on exogenous fish such as tilapia, which was previously studied.

Keywords: hot spring drainage, benthos, estuary area