Monitoring of Shallow Sea Environment by Using Snapping Shrimps

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Although detecting the impacts of pollution on sea ecosystem is very important, measuring the condition of living organisms in the sea requires some skill and patience. Snapping shrimp (*Genus Alpheus*) make peculiar pulse sounds on the bottom of the sea, which we can easily recognize even while we are swimming. The shrimps are distributed over the world coastal areas, and have not suffered from fishing pressure.

One idea comes up: Can we measure the coastal sea environmental condition by counting the pulse number of the shrimp? The current study attempts to find out an affirmative answer to the question.

We use a low-cost hydrophone (waterproof microphone) that has been developed for enjoying whale songs. The pulse count can be achieved merely by recording their sounds for a few minutes by using the hydrophone without special biological knowledge.

Our field surveys conducted since 1996 shows:

The pulse counts change according to water temperature under the normal condition.

The pulse can be heard not only in Japan but also in other parts of the world.

The pulse counts seem to decrease in the place where the water quality is not very good, like the head of Tokyo Bay or the Bosporus.

The pulse counts sharply fall by the occurrence of hypoxia and red tide.

The pulse counts in different location show different values even when the environmental condition seems normal.

These results show that this method can be a useful index of water pollution on benthic animals at least in fixed-pint observations.

To use the pulse counts for the comparison among different locations, we have to investigate:

Effect of environmental conditions such as depth and bed materials that affect pulse counts.

Relation between the population of shrimp and pulse counts.

Relation between the shrimp and other living organisms.

To investigate the second point, we set up four hydrophones at each corner of a 10m by 10m square testing field, and record the pulse by using each hydrophone simultaneously. Based on the difference of the receiving time by the four hydrophones, we can determine the location of the shrimp. Based on the results, we successfully

obtain a formula that represents the shrimp population.

Although many aspects of the research are still under investigation, this method has shown premise to be a new, simple and effective technique of monitoring the ecosystem health in coastal areas.