

## Evaluation on the Influence of Great East Japan Earthquake and Its Reconstruction Projects to the Coastal Environment and Marine Resources Based to the Salt Industry

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### Summary

First of all, research papers and reports concerned to the influence of Great East Japan Earthquake (called GEJE, here after) to the environment of shallow coastal area, biological resources and industries were collected and summarized in this research subject. Second of all, in order to evaluate the influence of various works for disaster restoration to the water quality and ecological damage under the present state, microscopic creatures, seaweeds growth and stress conditions of fish living near the construction site were evaluated. Focused sea areas were three; Shizugawa-bay, Mangoku-bay, and Ishinomaki-bay.

According to the result of reference materials investigation, important points were considered as following two; comparing the difference of bottom conditions of shallow coastal area, Tsunami damaged significantly to the creatures of mudflats and sand area than that of reef area, and the time for the recovery of mudflats and sand area were also estimated to be longer than that of reef area. Many researchers also pointed out the lack of scientific data such as water environment and ecology concern to the damaged shallow coastal area by GEJE. Many regions, at the rim of Pacific Ocean, are facing to the coming huge earthquake and Tsunami, and must prepare to protect not only human life and industry, but also even the natures, it is important to arrange the damage of GEJE appropriately and utilize them for the planning of restoration design.

It was confirmed that each bay showed different concentrations of various harmful matters including heavy metals. This result was similar with the previous researches. As for the risk of bio-accumulation of these heavy metals, it had not confirmed clearly. However, further investigation was necessary to definite this problem. The bacterial flora in sea water showed different tendency between each bay, however, number of total viable bacteria were the size of  $10^5$  Cells/mL and the number of heterotrophic bacteria were the size of  $10^3$  CFU/mL. It was not confirmed that compositions of heterotrophic bacteria showed significant differences between each bay, depth and season. Growth of seaweed was not so good near the construction site of new embankment.

Evaluation results on stress of fish around the construction site, it was indicated that particulate matter generated due to the constructions might cause the slight functional disorder of gills. However, major stress hormones in the fish blood were not suggested that the fish was under the circumstances of highly stress load all the time. Moreover, glycogen and lipid content of liver didn't show the unusual phenomenon, significant alternation due to the pollution of environment was not recognized at this site. Therefore, the fish in this area was

concluded not to get into the energy shortage and to be able to show the normal stress reaction.

From the results described above, we could clarify a part of influences of GEJE and restoration constructions to the water quality, seaweed growth, environment of microorganism, and physiological index of fish. It is very important to develop this research for the countermeasure of coming huge earthquakes in the future.