

I have a dream

State-of-the-Art Research Opens the Door to

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I want to engage in studies that contribute to the formation of a recycling-based society by improving mountains, rivers, and the marine environment.

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After graduating from the Faculty of Fisheries and Animal Husbandry (presently the School of Applied Biological Science), Professor Yamamoto completed coursework without a doctoral degree in the Faculty of Agriculture, Graduate School of Agricultural Science, Tohoku University. He has a PhD in agriculture. He was appointed to his current position in 2004, after working as a researcher at the Japan Society for the Promotion of Science, a scientist at Aichi Fisheries Institute, and an assistant professor of the School of Applied Biological Science at Hiroshima University. He specializes in conservation, restoration, and remediation of aquatic ecosystems. He has been working to improve the sediment quality of the basin system, consisting of forests, rivers, communities, and oceans. He is dedicated to developing concrete measures to restore once polluted areas to their original states, which can be inhabited by living organisms.

In general, my research focuses on the basin system, in which water flows from mountains to the ocean. Now, I am working to improve products and technologies that are used to restore coastal areas. The basin system refers to areas where water flows from mountains through our communities and rivers, and into the ocean. River water contains a variety of substances, which are carried and accumulated into the ocean in the end. The Ministry of the Environment of Japan has been regulating the total pollutant loads for around 40 years. This made a significant contribution to mitigating generation of red tides caused by water pollution and eutrophication, which helped seawater become clean, although the coastal seabed is still contaminated with organically enriched sediments. However, a new issue has emerged. As the seawater has become clean, the amount of food available for marine organisms has decreased. Indeed, oysters farmed in Hiroshima Bay are suffering from lack of food, which hinders their growth.

Oceans need to contain well-balanced nutrients to be inhabited by fish and shellfish, including oysters. Organically enriched sediments with fine-sized silt accumulated on the seabed prevent water containing oxygen to penetrate in, and they generate highly toxic hydrogen sulfide. This has resulted in eliminating sea organisms, such as lugworms and clams, which can be eaten by fish. Thus, the number of fish keeps decreasing. In response, I decided to start working on improving the quality of coastal sea sediments. I have developed materials that can suppress the generation of hydrogen sulfide, using oyster shells and iron slag. Both are readily available because Hiroshima is the top producer of oysters and also iron slag which is a by-product yielded in the steel making processes.

Another material I developed for sediment improvement was made by granulating coal ash yielded from coal electric power plants. The granulated coal ash, which was developed through repeated studies and experiments over 15 years, is porous and capable of absorbing hydrogen sulfide, as well as providing nitrogen and phosphorus, essential nutrients for organisms in the ocean. Scattering these recycled materials on the seabed results in reducing the generation of hydrogen sulfide and helps maintain the balance of nutrients in seawater. I was awarded the Prize for Science and Technology (category "Research") by the Minister of Education, Culture, Sports, Science and Technology of Japan for this research in 2018.

Materials like oyster shells, steel slag, and coal ash have several common characteristics. They were originally industrial wastes. One major characteristic of my research is recycling wastes to make functional materials that can improve deteriorated environments. This technology can turn wastes into valuable resources, and lead to economic activities. I was honored to receive the prize as it means my work was recognized in society, and I am also confident that my receiving it can change how people think of wastes.

I want to contribute to forming a recycling-based society through my environmental improvement studies. I have a dream to create a pure white beach, as seen in tropical countries, by spreading crushed oyster shells on the foreshore in the coastal areas in Hiroshima Prefecture. The main element of oyster shell is calcium carbonate, the same constituent of coral. I will keep working on improving the quality of seawater so that people can enjoy clear water.



Field investigation for sediment improvement work in the Seto Inland Sea



Sediment core sample collected from seabed after the improvement work



Granulated coal ash used to improve the sediment quality contaminated with organic matter



力キ殻を敷きつめ
真白な海岸を造りたい。
I want to create a pure white beach
with oyster shells.