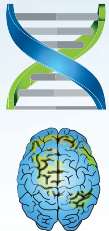


Figure 1: Steel slag marine structure

Restoring Korean Coastal Ecosystems with the Byproducts of Steelworks



The business case

Eastern and southern coastal areas of South Korea have been damaged multiple times since the early 1970s. The ocean's ecology has been threatened with declines in marine fauna, leading to a reduction in income from fishing. POSCO has been working with the Research Institute of Science and Technology (RIST) for more than 10 years to restore the marine environment using steel slag, an environmentally safe by-product of its iron and steel-making processes. A successful marine forestation project was implemented for the coast of Geomun Island, near Yeosu, the location of the 2012 EXPO in Korea. Successive projects have achieved great support from local fisheries and the government.

The issue

POSCO is a world-leading steel company. In 2011, the company achieved KRW 39.2 trillion in sales and KRW 4.2 trillion in operating income. POSCO's global workforce consists of 17,533 employees and its distribution networks support the markets on six continents. POSCO started the construction of an integrated steel mill with an annual capacity of 3 million metric tons in Indonesia, an emerging economy with great growth potential, and has been carrying out similar projects in India and Brazil as well.

Since the first occurrence of reef degradation (i.e. whitening phenomenon) off the coasts of Korea in 1970, the damage has rapidly spread to the eastern coast, southern coast and Jeju Island. Disappearing algae has led to the reduction of fish, abalone and sea

cucumber. The seawater's self-purification capability has declined, further threatening the ocean's ecology as well as fish productivity. Joining the efforts of the Korean government and the National Institute to restore the marine environment, POSCO explored the idea of using iron and steel-making slag to promote marine forestation in damaged areas. Steel slag is an environmentally safe by-product of steel-making and has been widely used in construction, civil engineering and soil fertilization.

The response

POSCO established a set of strategies and worked with the Research Institute of Industrial Science and Technology (RIST) to restore marine habitat using steel slag. After years of researching, POSCO and RIST developed a steel slag marine structure (fig. 1), Triton, which is made from material with a high proportion of the mineral elements (in particular, iron and calcium) that benefit the marine environment. The Triton fish shelter therefore provides ideal conditions for the growth of seaweed and other sea organisms. Research conducted at the site revealed a seven-fold increase in biomass 18 months after sea forestation by Triton. This was facilitated by the ionized iron, which accelerates the germination and growth of algae spores, while calcium purifies contaminated sediment and water quality.

In November 2000, 179 Triton reefs were installed in 8-13 meter deep fisheries in the coastal area of Geomun Island, to help restore the damaged local marine ecosystem. In 2007, a 0.5 hectare wide slag sea forest was formed in the coastal areas of Pyeongsan, Namhae and Chungjin, Pohang, in cooperation with the Ministry of Maritime Affairs & Fisheries.

POSCO has continued to restore the coastal area of Tongyung and Uljin as a part of a marine afforestation project with the government, and plans to help restore the coast of Jeju Island, one of the most important nature conservation areas in South Korea. In addition, in 2010, POSCO signed a Memorandum of Understanding with the Ministry for Food, Agriculture, Forestry and Fisheries to create an ocean forest to help adapt to climate change and enhance the green growth of business.

Finally, the company has been working with Bogor Agriculture University since 2011 to apply the

technologies of marine forestation to the coast of Indonesia.

The results

The company built steel-slag sea forests in over ten coastal areas in the East and South Seas that have proved to be highly effective in terms of enhancing the marine environment for biodiversity. The slag sea forest built in the coastal area of Geomun Island now supports a dense carpet of brown algae. In the coastal area of Pyeongsan, where these sea forests now stand, there has been a dramatic increase in the volume of fish caught in just 18 months, with biomass more than 10 times that in surrounding areas. The number of species of algae around the Ecklonia cava has increased 2.5 times. The area of habitat for shellfish and sea cucumbers has increased too.

A corresponding study carried out by the RIST shows that the marine forests with the Triton structure captured carbon dioxide through slag carbonization and algae photosynthesis at a rate of 0.1 to 0.5 metric tons of CO₂ per year per metric ton of Triton. Finally, the restoration of the marine ecosystem has contributed to the increase of fish productivity and therefore the local economy. Through this initiative, POSCO is showing how by-products from the steel industry can be used in a way that yields positive outcomes for the environment, for communities and for the business itself.



POSCO-Triton reef example



Geomun Island

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