Steel Industry's Innovative Use of Co-Products Supports Marine Regeneration

worldsteel ASSOCIATION

The World Steel Association (worldsteel), headquartered in Brussels, Belgium, is one of the largest industry associations in the world, with members in every major steel-producing country. Its members represent around 85% of global steel production.

This monthly column features "Our Stories" from worldsteel, covering automotive, construction and building, infrastructure, and innovation.

Editor

Desmond Hinton-Beales
Commissioning Editor,
FleishmanHillard, London, U.K.
desmond.hinton-beales@fleishman.com

Artificial reefs made of steel slag have been used to create sea forests off the coast of South Korea, providing a new habitat and breeding ground for fish populations.

The sea floor environment around South Korea's coastline has been degrading steadily due to desertification, a process that destroys ocean life and has been linked to climate change and pollution.

The situation has led to the destruction of more than 60% of marine plants along a 220-km stretch of the country's eastern coast. The desertification of sea forest algae, including seaweed and kelp, is devastating to ecosystems and impacts heavily on fish populations.

In 2009 South Korea's Ministry of Oceans and Fisheries began a process of planting new sea forests, with a target of creating 54,000 hectares of sea forest by 2030.

A Co-Product of Necessity

In 2000, the research unit of POSCO, South Korea's largest steel company, was working with the Research Institute of Industrial Science & Technology on an artificial reef based on steel slag, a co-product of the steel manufacturing process.

Produced during the separation of molten steel from impurities, slag is a dense, rock-like material that has traditionally been used as ballast, or as a construction aggregate or addition to agricultural soil.

POSCO's research team realized that steel slag's high mineral content, including calcium and iron, made it highly supportive for the growth of marine plant life. This led to the creation of the Triton®, an artificial reef that has since been installed in 30 different sea forests across South Korea.

Made up of 85% slag aggregates, 15% slag cement and water, more than 29,000 Triton blocks have been installed in over 7,500 reefs since 2007. The blocks, which are heavy enough to resist being moved by typhoon or tsunami activity, are planted with marine algae before they are installed on the sea floor, helping regenerate previously barren stretches of coastline.

POSCO is committed to sustainability, so local reef manufacturers are provided with steel slag entirely free of charge so that costs can be kept low. The steel company can process 13,500 metric tons of slag every year, ensuring a steady supply of new reefs for coastal areas in need.

A Range of Benefits

In addition to being a sustainable reuse of a steelmaking co-product and providing an environment for marine algae to thrive, Triton sea forests also sequestrate and store carbon from the ocean and atmosphere.

A single hectare of Triton sea forest captures around 16 metric tons of CO_2 annually. With the 29,000 blocks covering nearly 38 hectares, this totals more than 600 metric tons of CO_2 uptake per year.

The sea forests' increased seaweed and kelp also helps boost fish populations, with increased fish catches seen in areas with Triton reefs. It is estimated that the total economic value of existing sea forests to local communities is over US$1 million.

POSCO Triton blocks are planted with marine algae ahead of being installed on the sea bed.

Steel slag's high mineral content makes it highly supportive for the growth of marine plant life.

The steel industry is continuing to improve the sustainability of its processes. Its research teams are reducing emissions and discovering innovative new ways to use steel manufacturing co-products.

The Triton Sea Forestation Project is just one of these and the benefits are already being felt.

This and other stories are available at stories.worldsteel.org. ✦