CAL POLY

Building Artificial Reefs from Recycled Construction Materials: A Feasibility Study

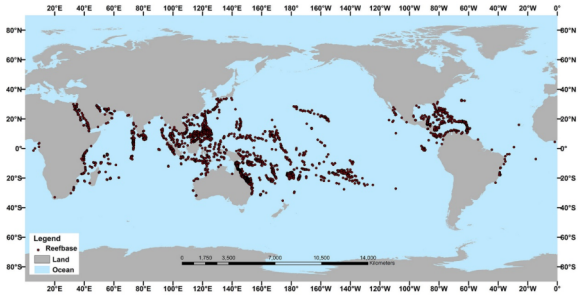

Figure 1. Coral Reef World Map

Figure 2. Sunken Vessel Coral Reef

ABSTRACT

Naturally occurring reefs are some of the world's most biologically diverse ecosystems formed by jagged rocks tucked slightly below sea level. In recent years global warming began to pose a major threat to many reef habitats. Most relevant is the increase in surface seawater temperatures that cause coral to bleach, taking away major food sources for larger marine species. Researchers have combated this by deploying artificial reefs in substitution for naturally formed limestone rock formations in order to promote the expansion of coastal habitats. This project specifically aims to utilize construction waste towards the production of artificial reefs, effectively upcycling waste from one of the world's largest waste-generating industries and providing proper habitat for marine organisms. Construction is one of the world's major contributors to waste and carbon production, so this project aims to find creative solutions to utilize material that would otherwise end up in landfills and contribute to global warning. Furthermore, the elements of an effective habitat must also be outlined in order to ensure that the end product serves its intended purpose. Material properties and previous designs will need to be referenced in order to ensure that the reef is both non-toxic and effective at providing shelter and nurturing coral growth. A conceptual design will be developed as a result of the findings. Materials used in the fabrication of this design will include recycled cement, reused concrete base rock, and miscellaneous piping.

<u>Commonly Recycled Materials best used for reef purposes</u>

- **Metal Pipe**
- **Cement**
- **Base Rock**
- **Structural Steel**
- **EMT Conduit**

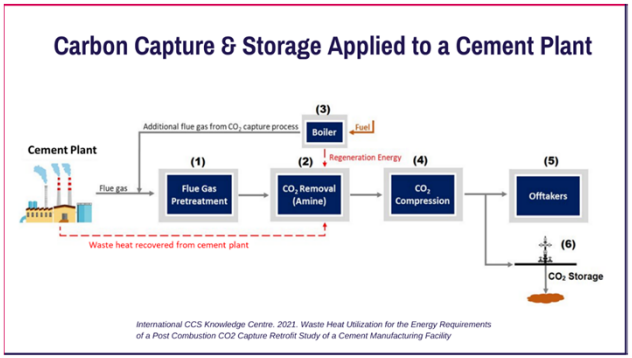

Figure 3. Carbon Capture process map

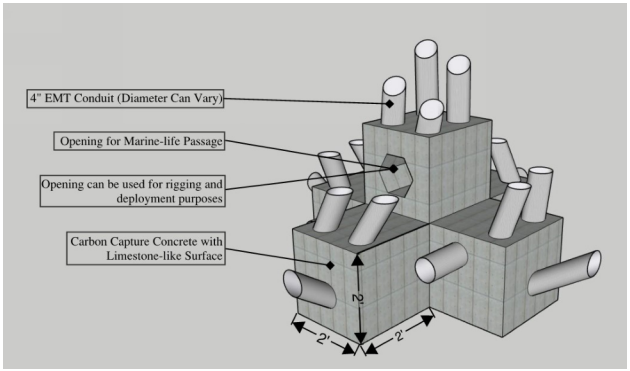

Figure 4. Resulting Reef Design

Nicholas Lew
California Polytechnic State University
nhlew@calpoly.edu