

Blue is the new Green: Ecological Enhancement of Urban Waterfronts & Coastal Infrastructure

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Abstract

Following the growing interest in living shorelines and nature-based solutions for coastal protection, in recent years a complementary approach of eco-engineering coastal and marine infrastructure (CMI) has emerged. The latter aims to provide an environmentally sensitive solution in areas that do not allow for living shoreline solutions due to heavy urbanization or the lack of horizontal width that they typically require. Eco-engineering solutions strive to enhance the biological performance and ecological value of engineered solutions, without compromising their functional and operational capabilities.

Here we present a more advanced approach, in which eco-engineering aims not only to enhance biological performance for the sake of the environment, but to harness natural processes for increasing the sustainability and resilience of the infrastructure itself. By implementing science based, cost effective design enhancements it is possible to modify the design of CMI to encourage increased growth of native organisms, as well as greater species richness (Perkol-Finkel and Sella, 2014). These design approaches have been proven not only to provide significant ecological advantages over traditionally engineered CMI, but also valuable structural advantages; contributing to a structures' strength, stability and lifespan (Perkol-Finkel and Sella, 2015).

ECOncrete®'s innovative solutions reduce the ecological footprint CMI while adding to their structural integrity. Using several case studies of ECOncrete's bio-enhanced concrete elements being implemented around the world, we provide quantitative data of biocalcification processes and compare them to those developing on standard "gray" CMI. The case studies will include bio-enhanced seawalls, ecological tide pools, armoring units, and ecologically enhanced marine mattresses. All findings are based off of comprehensive, multi-year monitoring programs whose results clearly show the ability of bio-enhanced structures to enhance growth of calcifying organisms thus enhancing natural growth of habitat forming species and ecosystem engineers that have the potential to increase the resilience and adaptivity of the structure.

Biography(100-150 words)

Andrew Rella is the global director of Engineering for ECOncrete Tech, a company based in Israel, with operations around the world; offering innovative concrete ecological solutions for marine infrastructure. Andrew's work focuses around Coastal, Riverine and Environmental Engineering. Previously, Andrew worked as a postdoctoral researcher and lecturer at Stevens Institute of Technology, in Hoboken, NJ. Andrew's experience includes being a member of the Coordinating Team of the Hudson River Sustainable Shorelines Project since 2009, consulting on pilot projects for the NJ USACE and American Littoral Society, developing workshops for the Departments of Remediation and Environmental Protection, as well as co-authoring the NJDEP Living Shorelines Engineering Guidelines. Andrew has a Ph.D. in Ocean Engineering from the Center of Maritime Systems at Stevens Institute. He holds a B.E. in Environmental Engineering and a M.E. in Ocean Engineering, with a concentration in Coastal Engineering.

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