Living in a Material World: Support for the Use of Natural and Alternative Materials in Coastal Restoration using Life Cycle Analysis - Adrian Sakr

Coastal restoration efforts are rapidly increasing in size and expenditure to meet the challenges of mitigating anthropogenic impacts and meeting international conservation goals. However, the frequent use of conventional materials including plastic, metal, and concrete in project implementation for functions including breakwaters, settling substrates, vegetation stabilization, and sediment retention questions the sustainability of these efforts given the introduction of those materials into the environment. While conventional construction materials are the primary choice for restoration designers and managers because they are readily available, have an inexpensive purchase price, and exhibit predictable properties, we suggest that the adverse environmental impacts from the life cycle process of each material, including production, transportation, installation, and degradation should be accounted for in material selection criteria. Natural and reduced-impact alternative materials, such as rock, plant fibers, and biodegradable plastics can serve as viable alternatives with comparable availability and functionality while incurring reduced carbon, chemical, and particulate impacts. Here, we compare conventional and alternative coastal restoration materials by reviewing their function and life cycle environmental impacts and present case studies which illustrate the value of appropriate material selection. Our study reveals where there is a need for more detailed and standardized information on the life cycle of various materials in the coastal environment owing in part to the high variation in material performance. Nonetheless, there are clear benefits to choosing alternatives over conventional materials, and our findings support the development of a new paradigm where material life cycle impacts are given more weight in the design process.

Case study of a new remediation approach to pre-production plastic pellet spills using innovative on-site treatment technology - Jean-David Lantagne

Pre-production plastic pellets are the feeding stock of any plastic product. Spills of pellets (nurdles) throughout the supply chain commonly occur because of transport accidents or during the transfer of this material from production sites to different means of transportation (trains, boats, trucks). The impact of this emerging contaminant on wildlife and on public safety has been documented in numerous scientific studies and is becoming increasingly alarming. Incentives for the industry to clean up these spills were previously non-existent. However, a growing awareness of this issue as well as internal (Operation Clean Sweep) and external (e.g. Clean Waters Act) regulations will now drive the plastic industry to act in order to contain these spills. However, one of the main challenges when it comes to remediation effort is that plastic pellets get mixed with other types of material such as rocks, sand, dirt and other organics forcing operators to excavate the entire contaminated soil and dispose of it in landfills. This approach represents a significant cost both financially and environmentally. Thus, to address this issue, a new remediation strategy has been tested on high-risk spill environments (shoreline and petrochemical plant) and will be presented in the form of two case studies. This approach essentially consists of treating contaminated soil directly on site, using a novel technology that collects only the plastic and returns the rest of the matter to the ground. The results presented will therefore focus on the cleanup performance, the reduction in

remediation costs (transport, landfill) and the level of plastic purity obtained in these case studies for recyclability purposes.

Reel it in: Preventing Fishing Line from Entering the Tampa Bay Watershed - Sara Brehm

Wildlife entanglements from fishing line and tackle have become a growing public concern in the Tampa Bay area, especially at local fishing piers. While fishing line has great fishing utility, it can remain in our environment for up to 600 years before it breaks down, potentially causing countless impacts to our ecosystems. To address the negative effects of improperly discarded fishing gear, Tampa Bay Watch started implementing monofilament cleanups in 1994 and established a Fishing Line Recycling Program in 2004. Since Tampa Bay Watch's mission is focused on public involvement to restore and protect the Tampa Bay watershed, the program offers a variety of opportunities to partner with the local community. The multifaceted approach to collect and recycle used fishing gear includes monofilament recycling tubes, "Mono Clean-a-thons", bird island cleanups and bridge cleanups. With the help of over 60 volunteers, Tampa Bay Watch manages 225 monofilament recycling tubes across four counties. To date, the program has recycled 4,340 pounds of monofilament and has additionally prevented thousands of pieces of tackle and miles of braided line from entering the Tampa Bay watershed. This presentation will review the different aspects of managing a fishing line recycling program, successes, challenges and lessons learned.

Adaptation of gross solids capture device for plastic resin pellets (nurdles) - Henry Hunt

Gross solids capture devices have been in use for over 25 years to capture trash, organics and other debris that gets carried with stormwater flows to prevent their discharge to public waters. The design of these devices has been modified to facilitate the capture of small plastic resin pellets (nurdles) in the microplastics size range. These devices can be used at sites where the plastic pellets are manufactured, where plastic pellets are used to manufacture plastic objects and where plastics pellets are handled, transported or re-packaged for industrial use. These devices are typically installed as a retrofit into existing infrastructure to simplify their applicability. The design process will be presented, maintenance procedures discussed and typical installations will be illustrated, including specific adaptions to capture plastic pellets in use today. Stormwater is directed through these passive-screen devices to retain debris within a design particle size and can be easily cleaned out using standard vacuum truck equipment already in use by many public works agencies for street and drain cleaning.