Accumulation of Marine Debris on Ulithi Atoll, Federated States of Micronesia

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Introduction

-The first multi-site marine debris survey in Ulithi.
-Plastic debris does not biodegrade in nature, it only photograde (Barnes et al. 2009, Gregory, 2013).
-Nearly 300 species are affected worldwide by marine debris.
-86% of sea turtle species and nearly half of all marine mammal and seabird species (Laist,1997).
-We can identify debris accumulation hotspots, the types of debris that are most common and problematic.
-Windward Sites: A survey site located on the prevailing wind side of an island
-Leeward Sites: A survey site located on the opposite side of the island of the prevailing wind, typically facing inside the lagoon of the atoll.

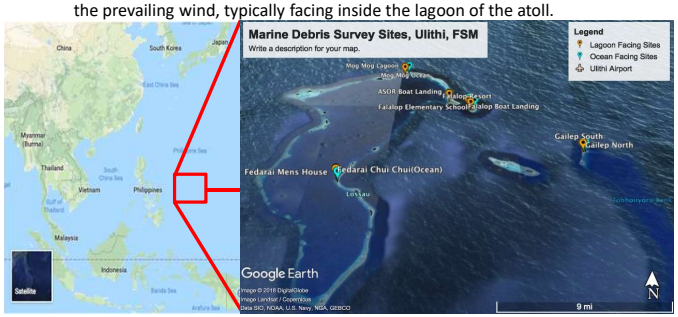

Figure 1: View of Ulithi from South East Asia

Figure 2: Sites Surveyed Within Ulithi

Methods

-Measured berm(highest point separating vegetation and shoreline at low-tide) with 100m transect tape.

-Took GPS coordinates with Trimble GPS Unit at four corners of each site.

-Collected and recorded marine debris within transect.

-Analyzed data using normality test, Shapiro-Wilks test and chi-square test.

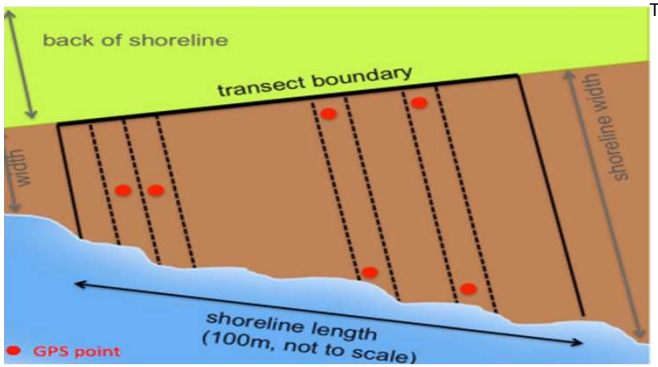

Figure 3: Left- NOAA Standing-Stock Methods

Results

-The data were analyzed and an alarming amount of debris has accumulated on the beaches located within the Ulithi Atoll, Federated States of Micronesia.
-Windward sites have highest average density of plastic per km2.

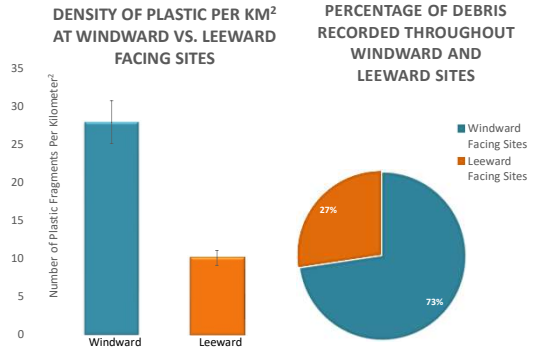

Figure 4: Number of Plastic Debris on per km² Windward (Blue) and Leeward (Orange) Facing Sites.

Figure 5: Percentage of Total Plastic Debris on Windward (Blue) and Leeward (Orange) Facing Sites.

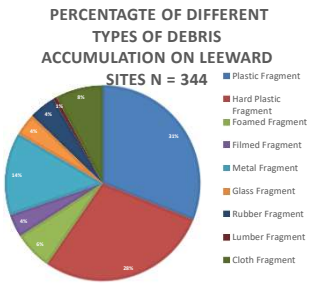

Figure 6: Percentage of Different Types of Debris Accumulation on Leeward Facing Sites n = 344

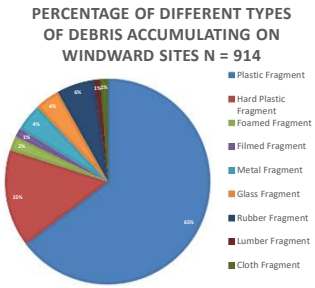

Figure 7: Percentage of Different Types of Debris Accumulation on Windward Facing Sites n = 914

Figure 8: Surveying at Mog Mog Open Ocean (Windward) Site.

Discussion

-It is uncertain whether current, or wind patterns are the prevailing cause of marine debris accumulation in Ulithi.
-Detailed information is necessary for better waste management and possible solutions for areas accumulating plastic debris.
-This is a major concern to the communities that live within the atoll of Ulithi in the Federated States of Micronesia.
-Monitoring marine debris can have beneficial implications for fisheries management in the self-governed autonomous government within Ulithi.

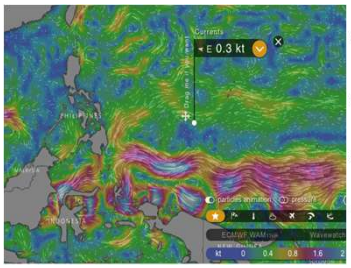

Figure 9. Oceanographic Currents in the South West Pacific.

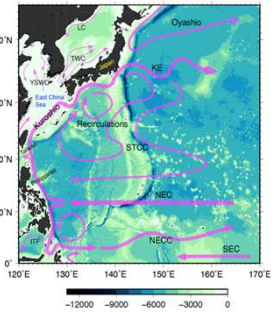

Figure 10: Diagram of Major Ocean Currents in the Western Pacific Facing the Eastern Philippines near Ulithi Atoll .

Future Work

-The survey has been implemented into the local high school and two local elementary school to continue and retrieve data on a quarterly basis over the year.
-A non-profit is being formed from the project (ODMI).
-Education and Outreach to schools and organizations around Central California.
-Raising awareness from more research could ultimately lead to funding a waste management plan in Ulithi atoll, Federated States of Micronesia.

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Acknowledgments

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-Bluecology http://bluecology.org/
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