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An assessment of nutrients and sedimentation in the St. Thomas East End Reserves, US Virgin Islands

Anthony S. Pait · Francis R. Galdo Jr · S. Ian Hartwell · Dennis A. Apeti · Andrew L. Mason

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Abstract Nutrients and sedimentation were monitored for approximately 2 years at six sites in the St. Thomas East End Reserves (STEER), St. Thomas, USVI, as part of a NOAA project to develop an integrated environmental assessment. Concentrations of ammonium (NH_4^+) and dissolved inorganic nitrogen (DIN) were higher in Mangrove Lagoon and Benner Bay in the western portion of STEER than in the other sites further east (i.e., Cowpet Bay, Rotto Cay, St. James, and Little St. James). There was no correlation between rainfall and nutrient concentrations. Using a set of suggested nutrient thresholds that have been developed to indicate the potential for the overgrowth of algae on reefs, approximately 60% of the samples collected in STEER were above the threshold for orthophosphate ($HPO_4^=$), while 55% of samples were above the DIN threshold. Benner Bay had the highest sedimentation rate of any site monitored in STEER, including Mangrove Lagoon. There was also an east to west and a north to south gradient in sedimentation, indicative of higher sedimentation rates in the western, more populated areas surrounding STEER, and sites closer to the shore of the main island of St. Thomas. Although none of the sites had a mean or average sedimentation rate above a suggested sedimentation threshold, the mean sedimentation rate in Benner Bay was just below the threshold.

Keywords St. Thomas · US Virgin Islands · Nutrients · Sedimentation · STEER

A. S. Pait (✉) · S. Ian Hartwell · D. A. Apeti · A. L. Mason
NOAA/NOS/National Centers for Coastal Ocean Science, 1305 East/West Highway, Silver Spring, MD 20910, USA
e-mail: tony.pait@noaa.gov

F. R. Galdo Jr,
The University of the Virgin Islands, 2 John Brewers Bay, St Thomas, Charlotte Amalie, US Virgin Islands 00802, USA

Introduction

Located on the southeastern end of the island of St. Thomas, US Virgin Islands, the St. Thomas East End Reserves or STEER (Fig. 1), is a collection of Marine Reserves and Wildlife Sanctuaries (MRWS) containing extensive mangroves and seagrass beds, along with coral reefs, lagoons, and cays. STEER comprises an area of 9.6 km^2, with approximately 34 km of coastline, and is thought to be one of the most valuable fisheries nursery areas remaining around St. Thomas (STEER 2011). There is a large active landfill along with numerous marinas and boatyards, various commercial and industrial activities, an EPA Superfund Site, a horse racetrack, and residential areas served primarily by individual septic systems (IRF 1993) in the western portion of STEER, and towards the east a number of resorts, all of which can contribute a variety of pollutants including nutrients, to STEER.

As part of a project by NOAA's National Centers for Coastal Ocean Science (NCCOS) to characterize chemical contaminants, bioeffects, and the biological communities within STEER, nutrients were monitored for