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NOTA BREVE

BLOOMS OF EPHEMERAL GREEN ALGAE IN SAN ANDRES ISLAND, INTERNATIONAL BIOSPHERE RESERVE *SEAFLOWER*, SOUTHWESTERN CARIBBEAN

Florecimientos de algas verdes efimeras en la isla de San Andrés, Reserva Internacional de Biosfera *Seaflower*, Caribe suroccidental

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ABSTRACT

We report the presence of persistent blooms of *Chaetomorpha linum* in San Andres island, Southwestern Caribbean, during the year 2013.

Keywords: blooms, *Chaetomorpha linum*, Colombia.

RESUMEN

Reportamos la presencia de florecimientos persistentes del alga verde *Chaetomorpha linum* en la isla de San Andrés, Caribe suroccidental.

Palabras clave: *Chaetomorpha linum*, Colombia, florecimientos.

Excessive biomass of macroalgae is a common symptom of nutrient enrichment in seagrass and coral reef ecosystems, and their frequency has increased over the last decades (Lapointe *et al.,* 2004; Smith *et al.,* 2005). Macroalgal blooms can physically overgrow seagrasses and adult corals, inhibit recruitment of juvenile corals, reduce light availability, lead to hypoxia and/or anoxia, and result in greatly diminished fisheries and biological diversity (Lapointe *et al.,* 2004, Thomsen and Wernberg 2009; Rasmussen *et al*., 2012).

Because of these detrimental effects, excessive biomass of macroalgae is considered Harmful Algal Blooms (ECOHAB, 1995).

These ephemeral blooms usually involve one or more species of early successional, opportunistic green algae, belonging to the genera *Ulva*, *Chaetomorpha* or *Cladophora* (Smith *et al.,* 2005).

In the Caribbean, recurrent blooms of the green algal species *Chaetomorpha linum* have been reported in Jamaica, overgrowing the fore reef communities on fringing reefs in the Negril Marine Park, and on seagrass beds in the Florida Keys (Lapointe *et al*., 2004). These blooms have been attributed to nitrogen enrichment of the coastal waters, due to land inputs from sewage or agricultural runoff (Linton and Warner 2003; Lapointe *et al*., 2004; Thomsen and Wernberg, 2009). In Jamaica, blooms of *Chaetomorpha linum* normally occur during the summer months, and Lapointe *et al*., (1999) attribute these blooms to groundwater NO_3^- enrichment of the fore reef.

San Andres island is part of the International Biosphere Reserve *Seaflower* in the Southwestern Caribbean, and, with a resident population of 70069 habitants (DANE, 2011), equivalent to 2802.76 hab/km^2, it is one of the most populated island in the Caribbean (Díaz *et al*., 1996); furthermore, the tourist affluence is high and constant throughout the year, increasing the anthropogenic pressure on the coastal ecosystems nearshore. The sewage system covers only 8% of the resident population (SIGAM/CORALINA, 2004), without any treatment prior to its disposal into the ocean. The great majority of the population wastewater is disposed in septic tanks, but its leaking is impacting heavily its nearshore waters and ecosystems (Marín and Cadavid, 2001).

From February to May 2013, and again from September to October of the same year, San Andres experienced unusual blooms of a filamentous green alga, identified as *Chaetomorpha linum* (Fig. 1). The alga presented the typical appearance of the species (Littler and Littler, 2000) with filaments up to 50 cm long. *Chaetomorpha* smothered seagrass beds (Fig. 2) before being washed ashore (Fig. 3). The alga formed large mats or "pillows" with sediment trapped in it (Fig. 2, arrows), which attached and moved upon seagrass for days, before ending on the beaches. The sediment-coated mats (Fig. 2) may have a scouring effect on

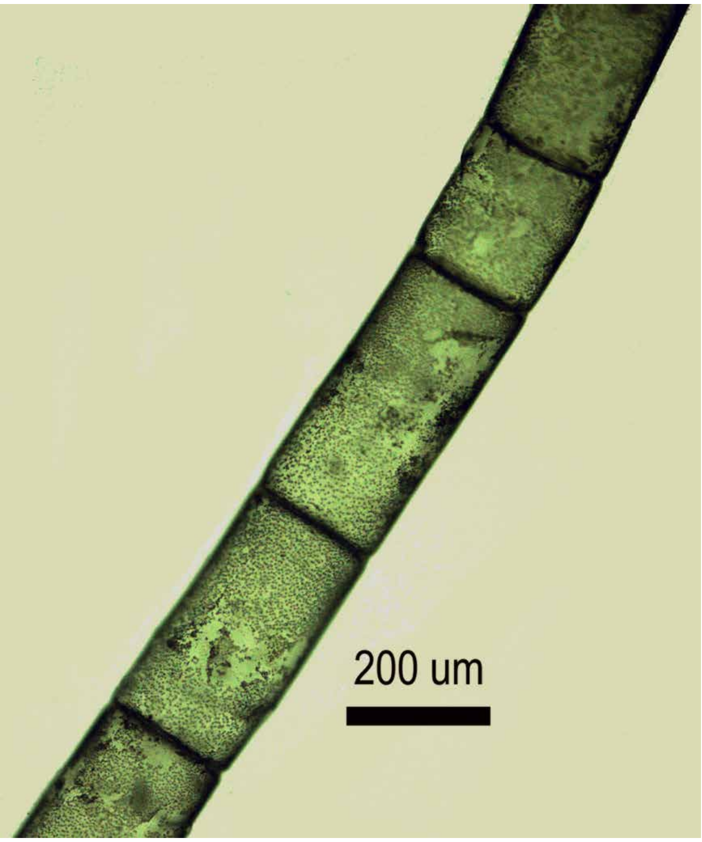

Figure 1. Filament of *Chaetomorpha linum*. Scale bar: 200 mm

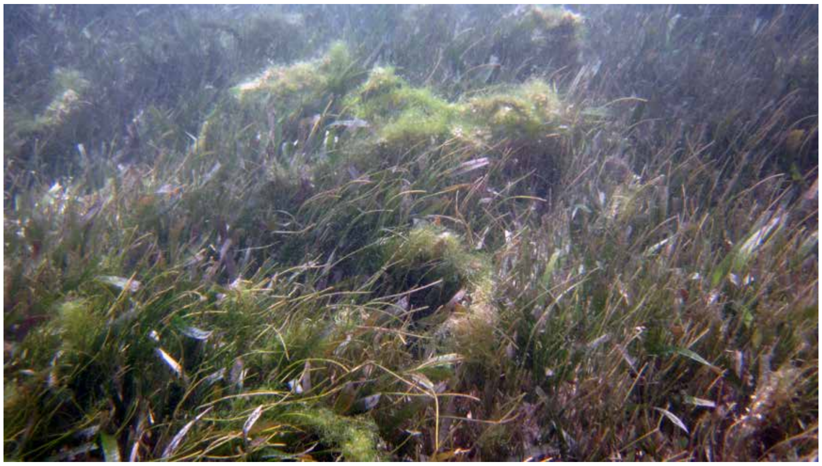

Figure 2. Mats of *Chaetomorpha linum* smothering seagrass leaves.

Figure 3 *Chaetomorpha linum* washed ashore. Spratt Bight, San Andres island, Colombia, May 10th 2013.

seagrass leaves. The algae were not floating on the surface, but they were always found tumbling along the substrate, sometimes attaching to seagrass leaves and shoots; this behavior has already been reported, for the species, in other locations (Flindt *et al.,* 2007). These mats, beside the scouring effect, reduce light availability for seagrass shoots (Krause-Jensen *et al*., 1996; McGlathery, 2001), increase the sediment organic matter load, inducing the risk of anoxia and sulfide intrusion into meristematic areas of segrasses, therefore restricting seagrass growth (Nelson and Lee, 2001; Thomsen and Wernberg, 2009; Han and Liu, 2014). On the adjacent coral reefs, the presence of the mats was not observed.

In Jamaica, the first observed macroalgal blooms in shallow coastal waters were mainly due to *Chaetomorpha linum*, which smothered coral reefs and seagrass beds (Lapointe and Thacker, 2002). According to Lapointe *et al*., (2011) green tides composed of *Chaetomorpha linum* expanded in areas most influenced by sewage discharge.

Although we did not pursue water analysis on nutrient content, it is probable that the progressive nutriphication of the coastal waters of the island, which has been in act for at least the past 15 years (Gavio *et al*., 2010) is responsible for these conspicuous blooms. Eutrophication of shallow coastal bays typically causes a shift in dominance from seagrasses and perennial macroalgae to ephemeral, bloom-forming algae (McGlathery *et al*., 2007).

In order to avoid the appearance of these blooms in the future and its negative effects on the nearshore ecosystems, it is urgent to improve the management of wastewater discharge and reduce the nutrient input on the coastal waters.

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