

Impacts of cruise ship anchoring during COVID-19: Lessons worth sharing

Impacts de l'ancrage des navires de croisière pendant COVID-19 : des leçons à partager

Impactos del fondeo de cruceros durante COVID-19: lecciones que vale la pena compartir

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EXTENDED ABSTRACT

The Government of Barbados welcomed cruise ships during the early COVID-19 period of 2020, offering them safe harbour and use of the island's port facilities, at a time when many other countries were turning them away. As a consequence, an unprecedented 28 cruise ships were allowed to anchor along the west and southwest coasts of the island during this period (1 March – 1 September 2020). This study examines the 132 anchoring events by these cruise ships, assesses their impacts on coastal marine habitats and reveals weaknesses in coral conservation policy. The leading economic sector in Barbados is tourism, and for over four decades, it has been the major foreign exchange earner (HLA Consultants 2014). Marine-based tourism is the main focus of the sector which uses the “sun, sand and sea” model to attract tourists. Barbados also uses the appeal of the coral reefs and depends heavily on the ecosystem services they provide to support the tourism industry and national economy. Cruise ship tourism plays a major role in the tourism sector of Barbados, with the number of cruise ship tourists continuing to increase on an annual basis. Barbados also depends on coral reefs for the fisheries industry which is a significant source of economic income although it is primarily focused on offshore pelagic species. However, the reef fishery is important as a source of income and employment for Barbadian fishers who target reef fishes during the off-season of the pelagic fishery (Peterson et al. 2014).

When cruise ships anchor, they can cause significant damage to coral reefs due to the size of the vessels and weight of the chain and anchors needed to hold them. A large cruise ship anchor alone can weigh in excess of 4.5 metric tonnes, but despite this weight, it is still insufficient to hold such a large vessel without a significant amount of heavy chain on the bottom. When anchors are dropped and dragged backwards to set them in coral habitats, they cause enormous damage to coral reefs. The extent of this damage can be increased manifold as the ship swings with the wind, dragging the heavy chain across the bottom. Previous studies have reported that even when the sea is calm, reckless anchoring by relatively small vessels can cause up to 200 m² of damage to the ocean bottom (Burke and Maidens 2004). Research in the British Virgin Islands found that areas with high anchoring frequency had a reduction in hard corals by a factor of approximately 1.7 and the coral colonies were 40 percent smaller in surface area (Flynn and Forrester 2019). Additionally, they reported that only 60 percent of the species richness of low anchoring frequency sites was found on the high anchoring frequency sites.

In this study SCUBA dives were undertaken to examine benthic habitat damage first-hand at several cruise ship anchoring sites, and one dive was undertaken whilst the ship was still at anchor to record the length of anchor chain deployed and to observe the direct impacts of the chain and anchor itself. Archived automatic identification system (AIS) data for cruise ships in Barbados waters covering the period 1 March to 1 June 2020 were purchased from the global ship tracking service provider ‘MarineTraffic’ and real-time cruise ship positions from 1 June to 1 September 2020 were downloaded directly from the MarineTraffic web-based application. Maps were created using ArcGIS to show the mean positions of cruise ships during each anchoring event and the presumed locations where they dropped anchor in relation to benthic habitats.

The 28 cruise ships made a total of 132 anchor drops. Most anchor drops occurred in March 2020 (n=39) with the number of anchoring events declining over time to just three in August 2020 (Figure 1). The cruise ships anchored on the west and southwest coasts of Barbados in relatively shallow water (< 50 m) on sandy areas, hard coral patch reefs and hard coral reef framework (see example in Figure 2). The 132 anchoring events are estimated to have caused thousands of square metres of damage to coral reefs in Barbados. Damage to bank reef coral communities was visually confirmed as being extensive (1000s m²) at several west coast locations. This damage has negative implications for the island's nearshore fisheries and tourism that rely heavily on healthy reef ecosystem services. It is now clear that the huge anchors and hundreds of metres of chain (> 250 m) required to secure these mega-vessels, and the wide arc (up to 180° swing) covered by the vessels as they swing at anchor were poorly understood when anchoring locations were assigned by authorities.

The study highlights important lessons learned regarding the extent of critical coral habitat that can be damaged by cruise ship anchoring and the lack of suitable anchoring grounds for cruise ships in the coral rich waters of Barbados. As a response to this study, the Barbados Government has committed to implementing a new policy to prevent cruise ships from anchoring in the island's waters. This will be particularly important as Barbados continues to focus on further developing the cruise ship industry as a component of the emerging blue economy, to avoid further unnecessary destruction of the island's coral reefs that underpin the tourism industry. These important lessons are also relevant to other Caribbean islands that may be considering permitting cruise ships to anchor in their waters and deserve to be shared with them to prevent

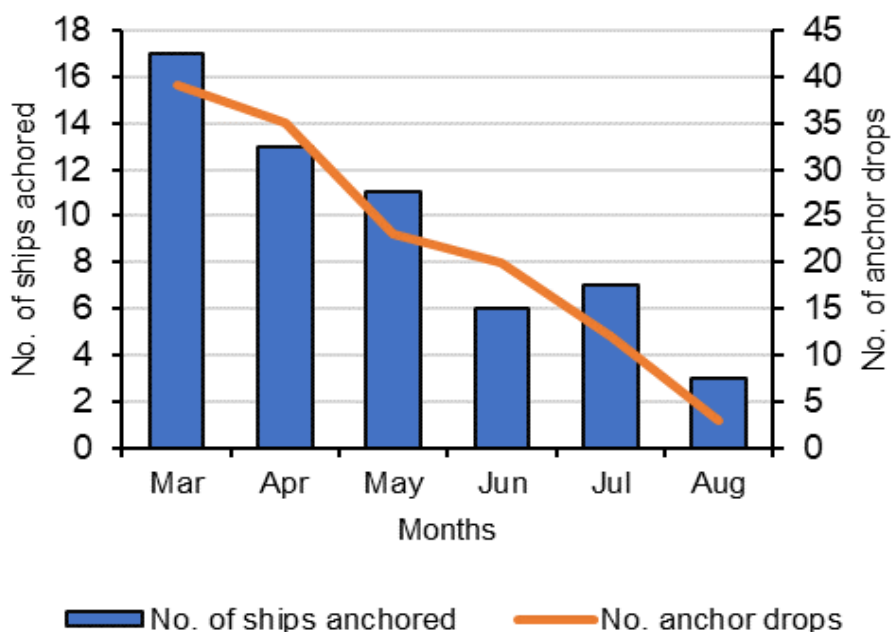


Figure 1. The monthly number of anchored cruise ships and the number of anchor drops that happened along the west coast and southwest coast of Barbados between 1 March and 31 August 2020.

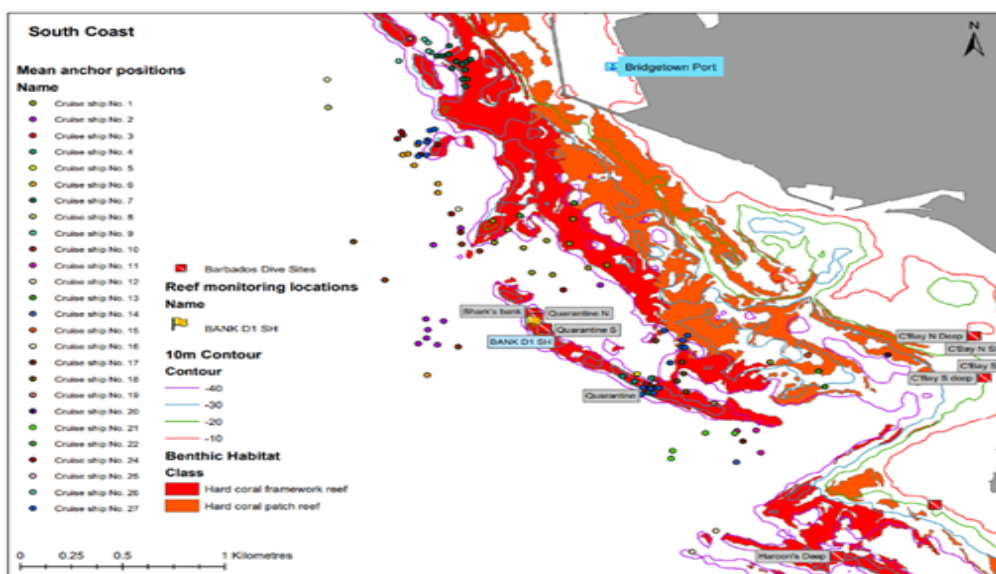


Figure 2. Map of Carlisle Bay on the southwest coast of Barbados showing: The mean positions of each ship for every time anchored between 1 March and 1 September 2020; coral reef habitats; recreational dive sites; and permanent reef monitoring sites. Coloured dots indicate the mean position of the ship over each anchored period. Different colours indicate individual cruise ships.

similar unnecessary loses to the region’s coral reefs on which many national economies depend for fisheries and tourism.

KEYWORDS: cruise ships; coral reefs; anchor damage; Barbados

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