

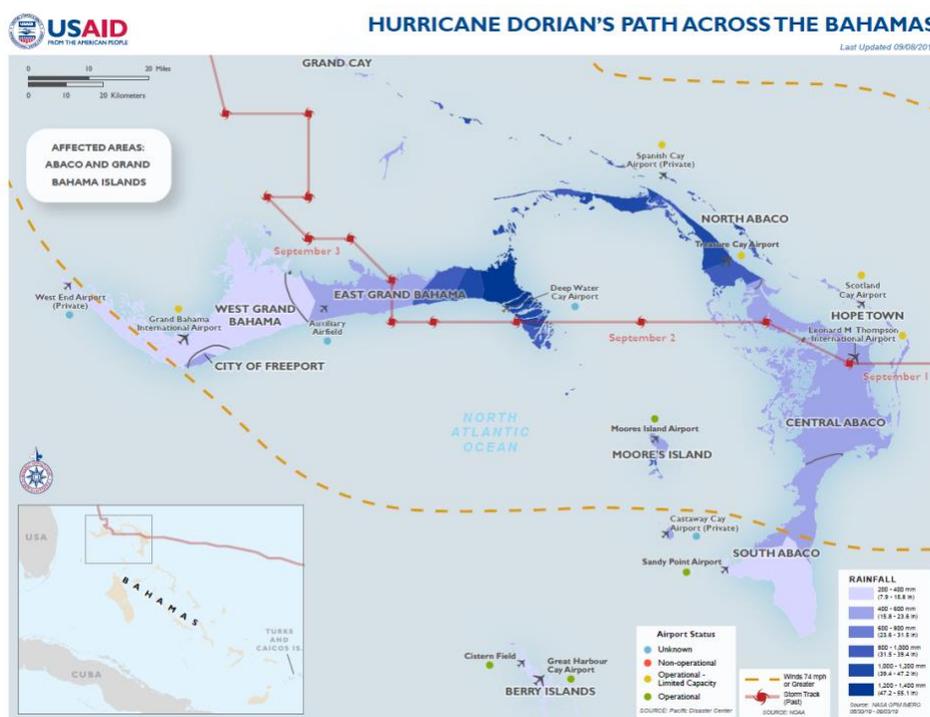
Hurricane Dorian – The Bahamas Summary of Environmental Issues

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WWF Environment and Disaster Management Program

Overview

This document provides a summary of key environmental issues in the Bahamas relevant to Hurricane Dorian recovery and reconstruction. The focus is the Grand Bahama and Abaco Islands (GBAI), which received the most significant precipitation and high winds from Dorian during the slow movement of the storm between 1 and 3 September 2019 (see map).

The most affected area was estimated to have a population of about 70,000 residents. While the Bahamas as a whole is an upper-income country, poverty rates are reported to be higher in the Abaco Islands, including the local Haitian community. (Haitians represent 7.8% of the Bahamas' population. The majority are reported to be concentrated in settlements around Marsh Harbor on the Abaco Islands.)



Tourism and related services are a significant part of the Bahamian economy, with numerous hotels, resorts and cruise ship destinations across the GBAI. Freeport also contains a port involved in ship repair and refitting work. That port is reported to be operational. An oil storage facility at South Riding Point, however, suffered significant damage with ground and possible sea contamination.

The latest details on the response can be found at <https://reliefweb.int/country/bhs>. Field assessments are underway, including by the Ministry of Environment and Housing, which is assessing hazards material risk in Abaco.

Climate Risk Informed Rebuilding: The GBAI experience multiple hazards, including hurricanes, high winds, flooding and drought. The response to Dorian needs to reduce the impact of these hazards by, for instance, ensuring roofs include roof water harvesting and are correctly attached to withstand category 5+ storms. Given that most of GBAI is close to sea level, projections of the impact of a changing climate on safe land use, including housing, services and critical infrastructure, need to be incorporated into recovery plans. Additionally, public engagement regarding the nature of changing risk is essential for a resilient recovery.

Anticipated Environmental Issues: 0-6 months

Based on operational reports and a review of current information, the following key environmental issues can be anticipated in relief and recovery operations. That said, this report is subject to revision based on further analysis and field-based assessments. It does not cover environmental review or permitting procedures, nor does it cover natural resource/land management procedures that may be relevant to the rebuilding process.

- 1) Disaster Debris Issues:** Media reports and remote sensing imagery indicate winds from Dorian did significant damage to buildings, generating large volumes of debris. Studies using satellite and ground assessments are underway by the government, donors, the Caribbean Disaster Emergency Management Agency (CDEMA) and others to quantify the volume of debris generated.

Debris clearance is a government priority and is necessary to allow search and rescue (SAR) operations, reestablish services and begin rebuilding. But the following points need to be considered as part of an extended debris management effort:

Private Property: Clearing debris from private property will likely require meeting specific legal requirements for entry onto that property and consideration of the value of materials removed, e.g., should private property owners be compensated for any value received from reusing or recycling debris. In addition, removing large personal property, such as cars, trucks, trailers, containers and boats, will require different approaches than those used to remove building materials. There are technical complexities involved in removing vehicles and sunken boats from water and avoiding potential pollution. There is also greater potential for items to be repaired or sold. As with hazardous chemicals, specific management capacities will be needed for this class of debris.

Hazardous Chemicals: Household and commercial buildings likely contained varying quantities of hazardous chemicals (e.g., cleaners, pesticides, paints, etc.) which need special handling when removed. A similar situation likely applies to electronics and refrigerators. Debris management teams need to be trained in safe removal requirements, and plans must be made for the safe processing and disposal of hazardous chemicals. Improper hazardous chemical disposal could increase the risk of groundwater pollution.

Asbestos: Asbestos does not appear to have been widely used in the GBAI, but this needs to be confirmed; specific management capacities will be necessary for this class of debris.

Near-shore Areas: Debris management requirements are expected to extend to near-shore areas (lagoons, bays and wetlands) where winds deposited various types of debris. Clearing this debris, including clearing reefs and tidal wetlands, will be physically difficult and can be expected to take a considerable amount of time when compared to land-based debris management. Specific management capacities and training will be needed for near-shore area debris clearing.

Debris Disposal: Disposal will likely be a challenge. Reports suggest the volume of debris will be significant, with limitations on what can be reused locally for shelter and other purposes. The GBAI are not expected to have large-scale sanitary landfill sites for permanent or temporary use. As a result, debris may need to be transported to the U.S. or elsewhere for processing. Such an effort would likely involve following the [Basel Convention](#), for which the Bahamas have [clear procedures](#). Organic debris can be composted—reducing the waste that needs to be exported from GBAI—and used in recovery to improve ecological conditions.

- 2) **Liquid Waste:** Current information on the coverage and operational status of sewage management systems in GBAI is limited. Damage to the electricity network is likely to have impacted sewage processing and reticulate sewage collection systems, with heavy rains flooding septic and similar systems. More detailed damage assessments should be available shortly.

Reports indicate that portable toilets are used in the Bahamas and are being sent to GBAI. Portable toilets may be a reasonable short-term way to collect sewage, but their use needs to be tied to an effective collection and blackwater treatment system, with a temporary processing facility established if normal sewage treatment plants are not functioning. Chemical deodorizers or other products should not be added to liquid waste storage tanks of latrines. These chemicals may not be removed through normal sewage processing and can lead to additional negative impacts on the environment.

- 3) **Vector Control:** Standing water, the presence of food waste, and damaged water and sanitation systems may lead to an increase in the number of disease vectors and pests. The Bahamas government has used fogging against flying vectors. The use of chemicals to control vectors may be necessary immediately after the hurricane. Integrated pest management options, however, are more cost effective over the long term, avoid the loss of beneficial insects associated with the use of pesticides, and should be implemented as quickly as possible and in conjunction with debris management operations.

- 4) **Water Supplies:** The GBAI appear to rely primarily on groundwater from a freshwater lens on top of salty water found underneath most islands in the Bahamas. Rains from Dorian likely resulted in a significant increase on the freshwater lenses (rains are the normal way the lenses recharge) but also possibly flushed contaminants into the lenses. In addition, saltwater flooding may have increased the levels of salt in the lens.

Water testing is needed to assess the level of any contamination of the lenses and define the need for water treatment, with some treatment of groundwater possible through low-cost in-home filters. Pumping the freshwater lens to remove contaminants is likely to be ineffective over the short term. Freshwater for the lens comes from rainfall. Pumping would raise the level of saltwater under the freshwater lens and reduce freshwater supplies.

The Bahamas government uses reverse osmosis to meet local water needs and ships water from islands where groundwater is available to water-deficit areas. These local approaches may be used to meet GBAI needs if the current freshwater lens has significant contamination.

The GBAI experience a dryer, but not rainfall-absent, season from November to April. As a result, rainwater collection (e.g., using plastic tarps and roofs) may address some immediate water needs, particularly for non-potable uses (e.g., cleaning and washing).

5) Population Changes: Outmigration due to the damage from Dorian has likely reduced demand on natural and other resources in the GBAI. However, the influx of individuals providing relief or working to recover damaged property or as contracted workers to repair hotels and other facilities will put demands on resources.

The demands created by people coming onto the GBAI need to be evaluated. Where possible, these demands, including water and waste disposal, should be covered without reliance on local resources if overall demand is in excess of sustainable delivery levels based on the damage done as a result of Dorian.

6) Transport and Relief Supplies: Transport of relief and recovery supplies should transition to sea craft (barges, cargo ships) as quickly as possible to reduce the environmental impacts from operations. Given the potential for large-scale donation of relief commodities and the risk of overloading distribution systems in the GBAI, these commodities should be stockpiled outside the GBAI and only shipped (by sea) when they can be used to respond to a specific requirement.

Anticipated Environmental Issues: 6-12 months

Natural Resource-Based Livelihoods: Tourism is the primary industry in the Bahamas, followed by banking and financial services. By comparison, fisheries and agriculture combined account for a nominal percentage of gross domestic product. Fish, however, is an important source of protein for tourists and residents, and both groups place demand on fish stocks (<http://www.seaaroundus.org/doc/publications/wp/2013/Smith-and-Zeller-Bahamas.pdf>). Fisheries are also critical to the Bahamian economy, particularly in the form of exports and jobs. For example, the Bahamas has the fourth largest spiny lobster (*Panulirus argus*) fishery in the world.

Some reports indicate that in Grand Bahama, most of the lobster vessels were destroyed or pushed up on land. In the Abaco Islands, only a few vessels in the south survived, and at least one processing plant was destroyed. Many fishermen and smaller processors in Grand Bahama also lost thousands of pounds of lobster tails stored in freezers.

The Marine Stewardship Council recently certified the local spiny lobster industry (<https://fisheries.msc.org/en/fisheries/the-bahamas-spiny-lobster-fishery/about/>). Further Information is available regarding opportunities to support the recovery of the fishers involved in certified lobster harvesting.

Vegetation: Native vegetation can be expected to regrow after Dorian as a natural response to damage from the storm. A die-off of some exotic vegetation can be expected, but it is also possible that hurricane winds have spread seeds from exotic vegetation and attention will be needed to ensure an unplanned expansion of exotics does not lead to a reduction of native vegetation.

Parks and Protected Areas: Several national parks support the tourism industry in the GBAI. [Abaco National Park](#) is located on the southeastern portion of Abaco, between Hole-in-the-Wall and Crossing Rocks. The Park encompasses 20,500 acres to protect the northern habitat and breeding area of the endangered Bahama Parrot. Abaco has the best birding of any island in the Bahamas. In Grand Bahamas, [Lucayan National Park](#), located between Freeport and Freetown at Gold Rock Creek, consists of 40 acres of land. The park contains one of the longest charted underwater cave systems in the world and a unique system of elevated walkways through an intact mangrove wetland. [Peterson Cay National Park](#) is a one-and-a-half-acre geological wonder. This park is the only cay on Grand Bahama's leeward shore. Peterson Cay is a low-lying aeolian limestone cay of Pleistocene origin. There is a back-reef lagoon, which is less than five meters deep. Coral reefs occur 1-2 kilometers offshore. The [Rand Nature Centre](#) comprises 100 acres of natural beauty near the heart of downtown Freeport, Grand Bahama. The center's foot trails wind through pine barrens, native and exotic coppice, and lead out to a freshwater watchable wildlife pond and a native plant arboretum.

The status of the parks is not yet available, but restoration efforts, if needed, will support local livelihoods related to the tourism industry.

Authors: Charles Kelly, havedisastercallkelly@gmail.com
Anita van Breda, anita.vanbreda@wwfus.org

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Information Sources for environmental and disaster management guidance:

- *Environment and Disaster Management* @ WWF - <http://envirodm.org/about>
- *EHA Connect - Connecting Environment and Humanitarian Action* - <https://ehaconnect.org/>

The WWF Environment and Disaster Management [Help Desk](#) is available to respond to requests for information or guidance on the environment and the response to Hurricane Dorian.

Bahamian Environmental Organizations:

1. Bahamas National Trust: <https://bnt.bs/>
P.O. Box N 4105
Nassau, The Bahamas
www.bnt.bs
242- 393-1317
Attn: Lynn Gape, lgape@bnt.bs
Falon Cartwright, fcartwright@bnt.bs