

2023-2028 Puerto Rico Strategic Plan to Reduce Aquatic Debris

October 2023

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Acknowledgements

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Several actions contained herein reference potential legislative changes. These actions will be carried out by interested partner organizations and are not affiliated with NOAA, the NOAA Marine Debris Program, U.S. EPA, or the U.S. EPA Trash Free Waters Program.

Table of Contents

Overview	4
Environmental Justice	7
Goal 1: Prevention	8
Goal 2: Removal and Disposal	9
Goal 3: Emergency Response	10
Goal 4: Coordination	11
References	12
Appendix 1: List of Contributors	13
Appendix 2: Previous Strategic Planning Efforts from U.S. EPA	15
Appendix 3: Challenges	16

Overview

What Is the Plan About?

Aquatic debris¹ comes from many different sources and takes many different shapes and sizes. From microplastics and microfibers to oversized abandoned barges, this debris is detrimental to Puerto Rico's ecology, economy, and public health. Despite trying to contain our trash through waste management systems, aquatic debris may end up polluting water resources as a result of littering, unintentional spills, or other causes. These are challenges that have generated widespread interest and commitment from partners across different sectors to create a plan that can strategically address aquatic debris in Puerto Rico.

Puerto Rico's Strategic Plan to Reduce Aquatic Debris (Plan) is the result of the collaborative efforts of partners involved in aquatic debris prevention, research, and removal. With the vision of reducing debris in aquatic environments in Puerto Rico, the Plan will help to guide the implementation of key actions by these various partners and will enhance cross sectoral coordination, public awareness, and behavior change. Environmental justice is also a crucial component of this plan and will be further discussed.

Why Do We Need a Plan?

The Plan is a tool that can promote active and measurable multisectoral coordination and wider collaboration. It will also help to frame the challenges associated with resource limitations and will help identify effective activities, projects, or initiatives.

Through the implementation of this plan, the following results are expected:

- Knowledge of impacts, causes, and pathways of aquatic trash and of the effectiveness of solutions;
- Strong education and outreach efforts focused on anti-littering, behavior change, and source reduction;
- Better understanding of the quantity, hotspots, and causes of illegal dumpsites;
- Strong collaboration across academia, municipalities, nongovernmental organizations, and the private sector to stop illegal dumping and to develop region-specific anti-littering solutions;
- Efforts to support enforcement of the 2015 ban on plastic bags and the 2022 ban on single use plastic in restaurants and retail;
- Awareness among the fishing community on the dangers of derelict fishing gear and on the proper techniques for removing it;
- Incorporation of best management practices in all removal efforts, from beach cleanups to removal of abandoned fishing gear and vessels;

¹ Marine debris is legally defined as "any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or Great Lakes." (33 U.S.C. § 1956). EPA's Trash Free Waters (TFW) program refers to the garbage polluting U.S. rivers, lakes, streams, and creeks as "aquatic trash." Trash is not defined by statute but is commonly used in water management programs to mean any persistent solid material that is manufactured or processed and that has been disposed of or abandoned in the environment. For this Plan, the term aquatic debris will refer to the "any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into rivers, streams, creeks and the marine environment."

- Efforts to quantify and categorize escaped trash in Puerto Rico;
- Incorporation of aquatic trash prevention in solid waste management planning efforts;
- Improved trash interception technology in stormwater;
- First responders trained in the [Puerto Rico Marine Debris Emergency Response Guide](#) and in additional resources; and
- Coastal communities have emergency preparedness and immediate response plans to prevent debris from impacting their property and daily activities.

How was the Plan Developed?

Process

This document was developed through interviews and workshops involving stakeholders from different sectors that have experience or interest in aquatic debris issues. The first workshop was led by the U.S. Environmental Protection Agency (U.S. EPA) in May 2021. Additional workshops in June and December 2022 were hosted as a collaborative effort between the National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program, U.S. EPA, and other participants (see [Appendix 1](#)).

Structure

The plan structure includes Goals and Objectives. Goals are the broader outcomes desired based on the priorities and challenges highlighted by the aquatic debris community. Objectives provide an overview of how the Goals will be achieved.

During the implementation of this Plan, partners will develop, track, and report on the progress of specific Actions. These Actions are defined as the measurable and time-bound activities conducted to achieve an Objective. The Actions will be updated annually and progress towards each action will be reviewed twice a year with the contributors. Actions are not included in this Plan in order to allow the implementation to be an evolving, living effort.

Federal Agencies Roles and Responsibilities

The [NOAA Marine Debris Program](#) and the [U.S. EPA Trash Free Waters Program](#) collaborated with stakeholders on the development of this Plan to tackle coastal and waterway debris in Puerto Rico. Both agencies have previously supported efforts to address aquatic debris in Puerto Rico.

NOAA Marine Debris Program

In 2006, Congress authorized the NOAA Marine Debris Program as the U.S. Federal government's lead for addressing marine debris. The NOAA Marine Debris Program achieves its mission through six main pillars: Prevention, Removal, Research, Monitoring and Detection, Response, and Coordination. With the vision of the global ocean and its coasts free from the impacts of marine debris, the NOAA Marine Debris Program leads the development of marine debris action plans and marine debris emergency response guides for specific states, territories, or regions.

The NOAA Marine Debris Program provides competitive grant funding and technical assistance to partner organizations for marine debris removal, prevention, and research projects. During the implementation of the Plan, the NOAA Marine Debris Program will record and help track the progress of the Actions that will

help achieve the Plan Goals and will lead some Actions as well. The NOAA Marine Debris Program will also publish a newsletter about marine debris for the Caribbean.

Learn about current and previous NOAA efforts in Puerto Rico on the NOAA Marine Debris Program [website](#) and the [Marine Debris Clearinghouse](#).

U.S. EPA Trash Free Waters Program

U.S. EPA Trash Free Waters Program is a non-regulatory partnership program within U.S. EPA Office of Water, specifically in the Office of Wetlands, Oceans and Watersheds, that works with federal, tribal, state, and local governments, businesses, nongovernmental organizations, and other stakeholders to prevent land-based sources of trash from entering U.S. waters and the ocean or to remove trash already in waterways.

The Trash Free Waters Program has provided technical assistance and/or financial support for trash pollution prevention projects in all 10 U.S. EPA regions. Most projects are implemented at the state, regional, or local level and are tailored to the unique needs, challenges, and opportunities in a particular location. At the national level, the Trash Free Waters Program supports research activities and outreach efforts, and develops informational tools and resources to help communities across the country address the problem of trash pollution.

U.S. EPA Office of Land and Emergency Management provides oversight to states and territories, including Puerto Rico, to ensure compliance with the [Resource Conservation and Recovery Act](#) (RCRA). RCRA Subtitle D deals with solid waste management and encourages states to develop comprehensive plans to: 1) manage nonhazardous industrial solid waste and municipal solid waste, 2) set criteria for municipal solid waste landfills and other solid waste disposal facilities, and 3) prohibit the open dumping of solid waste. U.S. EPA Region 2's Caribbean Environmental Protection Division serves as the Federal government's primary liaison on environmental issues within Puerto Rico.

Learn more about U.S. EPA efforts in Puerto Rico in the 2015 U.S. EPA Strategic Plan of Proposed Actions in Puerto Rico summarized in the [Appendix 2](#).

Environmental Justice

U.S. EPA defines environmental justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies...Fair treatment means no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.” (U.S. EPA, 2022). It is important that efforts to address Puerto Rico’s aquatic debris and solid waste management challenges be informed by an understanding of relevant environmental justice concerns. Puerto Rico’s poverty rate is 43.5%, which is more than two times the poverty rate of the poorest U.S. state, Mississippi (19.6%). In 2019, Puerto Rico’s average income was approximately one-third of the U.S. average (U.S. Census, 2020). For these reasons, environmental issues that disproportionately harm the residents of Puerto Rico relative to the rest of the United States, (e.g., water contamination; Natural Resources Defense Council, 2017) and climate change impacts (García-López, 2018), have occasionally been referred to as environmental justice concerns affecting all of Puerto Rico (Lloréns & Stanchich, 2019).

Puerto Rico’s residents are disproportionately exposed to trash in their communities and waterways, which constitutes an environmental injustice. This is caused by inadequate solid waste management infrastructure and insufficient or misused public funding for aquatic debris prevention and solid waste management services. The lack of public funding, which inhibits efforts to improve solid waste management infrastructure and services, stems in part from Puerto Rico’s political status as an unincorporated territory of the United States and the legacy of federal policies that have shaped Puerto Rico’s development (Council on Foreign Relations, 2020). Furthermore, scientists predict that climate change will cause more frequent and severe extreme weather events in Puerto Rico (U.S. EPA, 2016). The increasingly devastating effects of climate change will continue to exacerbate Puerto Rico’s solid waste management infrastructure and operations challenges.

Environmental justice concerns, including those related to trash pollution and solid waste management, also exist at the local level in Puerto Rico. For example, in an environmental justice study focusing on eight communities adjacent to the Caño Martín Peña, researchers found that narrow roads in some of the most disadvantaged communities prevented garbage trucks from carrying out domestic waste collection, resulting in a high concentration of illegal dumps along the communities’ waterways (Proyecto ENLACE del Caño Martín Peña, 2011). This example is in line with studies from other U.S. cities that suggest that low-income and minority communities are disproportionately affected by illegal dumping (Brandt, 2017; Pellow, 2004).

Additional research is needed in order to identify the communities with the most significant environmental justice concerns related to trash pollution and solid waste management in Puerto Rico. This analysis will help to ensure that U.S. EPA, NOAA and other stakeholders can design projects and plans and allocate resources in a way that best advances environmental justice.



Goal 1: Prevention

Prevent debris from reaching aquatic ecosystems and the surrounding communities through education and outreach, promoting engagement, and providing solutions.

Cigarette butts found on the beach (Photo: San Juan Bay Estuary Program).

Objectives

- 1.1 Research debris sources and prevention solutions.
- 1.2 Implement solutions to prevent debris from entering marine, aquatic, and coastal environments through educational outreach and prevention techniques.
- 1.3 Report on the success of research, education, and source reduction projects in preventing aquatic debris and generating behavior change.



Goal 2: Removal and Disposal

Increase knowledge of and make information accessible on the removal of debris from coastal and aquatic environments and on the improvement of solid waste management and accessibility of debris disposal alternatives.

Derelict traps removed from coastal Puerto Rico by fishers from Naguabo in partnership with Conservación ConCiencia (Photo: NOAA).

Objectives

- 2.1 Gather information on debris locations and types, recovery methods, and disposal alternatives.
- 2.2 Remove and responsibly dispose of aquatic debris.
- 2.3 Analyze aquatic debris removal and disposal data and make data accessible to participating partners.



Goal 3: Emergency Response

Increase preparedness to respond to and recover from aquatic debris emergencies.

Structures damaged by storm surge (Photo: U.S. Coast Guard Sector San Juan).

Objectives

- 3.1 Facilitate preparedness in communities to mitigate the potential impacts of debris related to disasters.
- 3.2 Ensure readiness of local, state, and federal governments to respond to aquatic debris incidents.
- 3.3 Create a network to improve coordination between responders to aquatic debris emergencies.



Goal 4: Coordination

Coordinate Plan-related actions effectively throughout Puerto Rico by sharing funding and collaboration opportunities. This goal is also intended to establish relationships with foreign partners.

Volunteers participating in marine debris monitoring on the coast of San Juan Bay in Cataño (Photo: NOAA).

Objectives

- 4.1 Identify funding and capacity building opportunities to address aquatic debris.
- 4.2 Promote networking and relationship building amongst the debris management community in Puerto Rico.
- 4.3 Facilitate connections with U.S. and international groups working towards aquatic debris prevention, removal, research, and coordination.

References

- Brandt, A.A. (2017). Illegal dumping as an indicator for community social disorganization and crime. Master's Theses. 4835. DOI: <https://doi.org/10.31979/etd.9hq7-yrq7> Retrieved from: https://scholarworks.sjsu.edu/etd_theses/4835/
- Council on Foreign Relations (2020). Puerto Rico: A U.S. Territory in Crisis. Retrieved from: <https://www.cfr.org/backgrounder/puerto-rico-us-territory-crisis>
- García-López, G.A. (2018). The multiple layers of environmental injustice in contexts of (un) natural disasters: The case of Puerto Rico post-Hurricane Maria. *Environmental Justice*, 11(3), pp. 101-108.
- Lloréns, H., & Stanchich, M. (2019). Water is life, but the colony is a necropolis: Environmental terrains of struggle in Puerto Rico. *Cultural Dynamics*, 31(1-2), pp. 81-101.
- Natural Resources Defense Council (2017). Threats on Tap: Drinking Water Violations in Puerto Rico. Retrieved from: <https://www.nrdc.org/sites/default/files/threats-on-tap-drinking-water-puerto-rico-ip.pdf>
- Pellow, D.N. (2004). The politics of illegal dumping: An environmental justice framework. *Qualitative Sociology*, 27(4), pp. 511-525.
- Proyecto ENLACE del Caño Martín Peña (2011). Draft Environmental Justice Study Caño Martín Peña Ecosystem Restoration Project San Juan, Puerto Rico. Retrieved from: https://www.epa.gov/sites/default/files/2015-10/documents/doc-110036-enlace-environ-justice-2-24-2011-ej_study.pdf
- U.S. Census (2020). Quick Facts: Puerto Rico. Retrieved from: <https://www.census.gov/quickfacts/fact/table/PR/AGE295219#AGE295219>
- U.S. EPA (2016). What Climate Change Means for Puerto Rico. Retrieved from: <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-pr.pdf>
- U.S. EPA (2021). FY 2022-2026 EPA Strategic Plan Draft. Retrieved from: <https://www.epa.gov/system/files/documents/2022-03/fy-2022-2026-epa-strategic-plan.pdf>
- U.S. EPA (2022). Learn About Environmental Justice. Retrieved from: <https://www.epa.gov/environmentaljustice/learn-about-environmental-justice>

Appendix 1: List of Contributors

Academic Institutions, Nongovernmental Organizations, Partnership Organizations, and Private Sector

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AmandOcéano
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Basura Cero Puerto Rico / Zero Waste Puerto Rico
Caribbean Coral Reef Institute
Coalición Restauración Ecosistemas Santurcinos
Closed Loop Foundation
Conservación ConCiencia
Conservación Costera
Conservation Opportunity, Inc.
Cuatro Costas
Effective Environmental Restoration, Inc.
Generación Circular
Hacienda Las Malcriá
HJR Reefscaping
Institute for Socio-Ecological Research
Leatherback Restoration Project
Marea, estilo playero
Mayagüezanos Pro Salud y Ambiente
Mi Playa Limpia
The Ocean Foundation
Para la Naturaleza
Pew Charitable Trusts
Pontificia Universidad Católica de Puerto Rico
Protectores de Cuencas, Inc.
Puerto Rico Recycling Partnership
Puerto Rico Science Trust
RCAP Solutions
Red de Investigación de Microplásticos del Caribe
Red Tortuguera de Puerto Rico
Roots & Shoots Ponce, P.R.
Salvemos Playuela

San Juan Bay Estuary Program
Sea Grant Puerto Rico
Scuba Dogs Society
Sierra Club
Sociedad Ambiente Marino
Surfrider Rincón
Syracuse University Environmental Finance Center
Taller Ecológico de Puerto Rico
Tetra Tech
The Nature Conservancy
Universidad Ana G. Méndez
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Puerto Rico Central Government Offices

Caribbean Fishery Management Council
Compañía de Turismo de Puerto Rico
Departamento de Asuntos del Consumidor
Departamento de Recursos Naturales y Ambientales
Municipios de Puerto Rico
Reserva Nacional de Investigación Estuarina Bahía de Jobos
Office of the Legislator Joel Franqui Aquiles

Federal Agencies

Federal Emergency Management Agency
National Oceanic and Atmospheric Administration
U.S. Coast Guard
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

Appendix 2: Previous Strategic Planning Efforts from U.S. EPA

Recognizing the need for a strategic and region-specific approach to addressing aquatic trash problems in Puerto Rico, in 2014-2015, U.S. EPA Region 2 and Trash Free Waters Program convened stakeholders to develop and launch two related plans. First, on September 9, 2014, U.S. EPA worked with the San Juan Bay Estuary Program to convene over 60 stakeholders to develop a watershed-level strategy for the San Juan Bay Estuary. Second, in 2015, U.S. EPA engaged stakeholders throughout Puerto Rico in a series of meetings that resulted in the Strategic Plan of Proposed Actions in Puerto Rico ("2015 Plan"). These stakeholder meetings took place on November 13, 2014; March 26, 2015; and June 4, 2015. Both plans focused on data collection and information sharing, cigarette butt litter prevention, eradication of single use plastic bags, anti-litter education and outreach, aquatic trash prevention through stormwater management, and reducing single use plastic bottles and packaging. The watershed-level strategy led by San Juan Bay Estuary Program also included the elimination of illegal dumps, the creation of citizen science initiatives to better understand various aspects of the aquatic trash issue (including microplastics), and the development of a media campaign. Thanks to the National Estuary Program (NEP) created under Section 320 of the Clean Water Act, U.S. EPA, the San Juan Bay Estuary Program was able to contract a full time Trash Free Waters Coordinator to oversee the implementation of these plans.

Some of the accomplishments stemming from the two strategic planning efforts include:

- **The passage of new laws banning single use plastic bags:** To cut back on plastic pollution from shopping bags, in December 2015, Puerto Rico passed Law 247-2015, which promotes the use of reusable bags and prohibits retail stores and other commercial establishments from providing single use plastic bags to customers.
- **Trash Free Waters outreach and education campaigns:** Over \$100,000 was leveraged by the San Juan Bay Estuary Program in free media placement of public service advertisements in key newspapers and television stations to convey the messages of the Trash Free Waters Program. Trash Free Waters messages were also conveyed by placing posters in schools, restaurants, and businesses as well as a temporary interactive Trash Free Waters exhibit located in the main square of Old San Juan (Plaza de Armas). A permanent educational exhibit was also installed in Luis Muñoz Marín International Airport. Additionally, the San Juan Bay Estuary Program, with support from the University of Puerto Rico, trained volunteers to give educational talks to the public about the Trash Free Waters Program.
- **New stormwater trash prevention and monitoring efforts:** The Municipality of San Juan, with support from students at the University of Puerto Rico, installed metal grates in eight stormwater sewers that drain into the Condado Lagoon. Students and citizen scientists monitored, cleaned, and characterized the debris captured in the stormwater grates. There are also ongoing efforts to monitor trash found in stormwater pump stations.
- **Alliances with the private sector:** In 2015, Banana Boat, Energizer, and MillerCoors joined the San Juan Bay Estuary Program to support several Trash Free Waters initiatives. The companies organized cleanups and sponsored educational activities related to their packaging.
- **Scaling up litter cleanups:** Thanks to the support of over 506 volunteers, the San Juan Bay Estuary Program completed 16 cleanups in targeted areas of the San Juan Bay Estuary's watershed, collecting a total of 3,291 pounds of debris. This baseline information will be used to measure the success of its littering prevention and educational initiatives.

- **Cigarette butt removal and prevention:** As part of the San Juan Bay Estuary Program's Trash Free Waters efforts, the organization recovered 11,075 littered cigarette butts. The organization also used this information as baseline data to measure the success of a new cigarette butt pollution prevention project.

Appendix 3: Challenges

The following section outlines the challenges faced by individuals, communities, nongovernmental organizations, and federal, state, and local governments while conducting initiatives aimed at reducing aquatic debris in Puerto Rico. These were recorded through one to one conversations and workshops and may not represent a complete list of all existing challenges. The challenges are grouped into the categories numbered below. The numbers do not represent order of priority.

1. *Infrastructure for Solid Waste Management*

Official landfills

- 1.1 Inadequacy of waste management infrastructure
- 1.2 Limited landfill capacity
- 1.3 Insufficient operation practices, management, and inspection of open and closed municipal solid waste facilities
- 1.4 Unsatisfactory compliance of landfills with federal environmental standards
- 1.5 High cost of and limited funding availability for the closure or improvement of non-compliant landfills

Illegal dump sites

- 1.6 Waste disposal in unpermitted areas have increased in numbers and many are located near rivers and in coastal areas increasing the chance of being carried out into waterways
- 1.7 Increase in illegal dumping of organic material (e.g., vegetative material, dead animals) in plastic bags
- 1.8 Insufficient availability of trash cans in coastal areas

Alternative options to landfills

- 1.9 Decline in the availability of municipal recycling and organic waste material (vegetative) programs, recycling options (e.g., for electronic equipment and appliances), curbside recycling services, cost-effective markets (raw materials and end markets), and education on adequate recycling practices
- 1.10 Use of expanded polystyrene foam and plastic silverware rather than biodegradables or eco-friendly options for cups, plates, and silverware in businesses

2. *Costs and Funding*

- 2.1 High cost of aquatic debris removal and disposal (especially that of underwater and hard to access debris)

- 2.2 Limited readily available funds and other resources from the federal, Puerto Rico, and the local governments for ongoing operations (e.g., clean escaped trash), responding to natural disasters (e.g., for removal of abandoned vessels on land or coastal areas), recycling, and research
- 2.3 Opportunities of training for writing successful grant proposals are limited
- 2.4 Ineffective strategies to improve interest and capacity of individuals, communities, governmental agencies, and nongovernmental organizations in applying for grant awards when available
- 2.5 Availability of incentives for furthering a shift from single use plastic commercial consumption to biodegradable, compostable, or reusable alternatives
- 2.6 Limited resources for meeting the requirement of matching funds for federal grants²
- 2.7 Awareness and availability of training and outreach material on what can be used as a match for federal awards and on the development of economic value calculations for securing matching funds when developing proposals for federal grants

3. Public Interest and Education

Education to understand the problem

- 3.1 Unconscious consumption that results in increased waste for the already limited landfill capacity
- 3.2 General misconceptions on the aquatic debris problem (e.g., the types, causes, and impacts of debris, littering, and illegal dumping; and the available solutions, including the reduction of trash produced per person and its proper disposal)
- 3.3 Lack of awareness that litter on the ground can enter water bodies and the coastal ecosystems and how it reaches waterways
- 3.4 Misdirected prioritization of the types of actions to prevent debris introduction into aquatic environments (e.g., recycling rather than reducing its generation)
- 3.5 Limited access to outreach programs that promote awareness about trash dump impacts and “leave no trace” behavior
- 3.6 Training and law enforcement related to vessel groundings and abandonment are not prioritized

Education for behavior change

- 3.7 Individuals' lack of awareness and responsibility towards the debris that is not visibly impacting them or their communities (e.g., “Out of sight, out of mind”)
- 3.8 Current behavior of littering and illegal dumping has become normalized in some communities. (e.g., need to empower and educate communities on the benefits of anti-littering practices)
- 3.9 The belief that trash collection systems will clean up individual's litter or illegal dump sites
- 3.10 Lack of behavior change messaging (e.g., media) for encouraging using fewer single use plastics bags, packaging, and other items, purchasing products that produce less waste, and learning to reuse items
- 3.11 The use of illegal littering as a form of protest for the lack of trash collection

² Matching funds are a cost sharing portion that applicants generally need to provide when applying to federal grants. A 1:1 match, for example, means that if \$50,000 is being requested, the applicant needs to provide the same amount, though this total can be achieved in different ways (e.g., other funds, time, equipment, collaborations).

- 3.12 Inadequate strategies for engaging, recruiting, and retaining volunteers for cleanup efforts throughout Puerto Rico, including non-touristic areas (e.g., incentives, follow up trainings)
- 3.13 Minimal inclusion of debris prevention in K-12 curricula

4. *Laws and Regulations*

- 4.1 Insufficient debris laws and regulations
- 4.2 Minimal general public awareness of existing laws and regulations (including those for single use plastic bans, debris removal and for coastal construction)
- 4.3 Limited knowledge on, and enforcement of, current debris laws and regulations, and on which agency has the jurisdiction (e.g., to prevent coastal construction and reconstruction of collapsed structures on sensitive areas)
- 4.4 Need to improve legal processes to prevent and to report illegal behavior (e.g., vessel abandonment, dumping of appliances)
- 4.5 Limited use of effective strategies to prevent illegal practices (e.g., illegal mooring, derelict fishing gear, access to identifying abandoned vessel owners)
- 4.6 Lack of an enforceable process for ensuring an expedited removal of illegally dumped items including abandoned vessels, fishing gear, and derelict coastal constructions

5. *Debris Recovery and Disposal*

- 5.1 Limited resources (e.g., training, funding, specialized equipment) available for locating and removing underwater debris
- 5.2 Limited availability of personnel (on a continuous removal schedule) to collect the debris from the trash cans placed in coastal areas
- 5.3 Lack of awareness of the preferred options for disposal of trash collected after beach cleanups, and after medium and large debris removals
- 5.4 Limited access to sites for vessel storage prior to their disposal during emergency situations
- 5.5 Limited capacity and availability of local contractors for the removal and disposal of in-water vessels
- 5.6 Minimal understanding on the staging areas for temporary debris accumulation after emergencies

6. *Coordination of Efforts*

- 6.1 Lack of widespread distribution of the available volunteering opportunities
- 6.2 Partners have minimal awareness of the educational tools and educational and outreach initiatives from other organizations (e.g., governmental and nongovernmental) across Puerto Rico
- 6.3 Limited sharing of group efforts in order to prevent duplication or redundancy of efforts
- 6.4 Limited widespread resources (e.g., personnel, entities, training) to implement debris prevention and removal strategies
- 6.5 Historically low participation, coordination, and support of local agencies in removal efforts

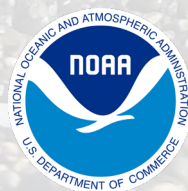
- 6.6 Absence of debris removal training and coordination within communities
- 6.7 Lack of consensus among agencies and nongovernmental organizations on prioritization of debris issues
- 6.8 There is a need to improve coordination to prevent accumulation of debris and to enforce existing laws during highly attended events
- 6.9 Lack of a coordination portal that allows the standardization of data collection, protocols and metrics within and outside Puerto Rico

7. *Wildlife and Habitat Impacts*

- 7.1 Presence of abandoned vessels in or near areas with sensitive habitats (e.g., coral reefs and seagrass)
- 7.2 Lack of public awareness of the impacts of collapsing structures on sensitive areas (e.g., turtle nesting beaches)
- 7.3 Limited broadcasting of the publicly available tools for obtaining the most current information on the location of coastal and marine areas (e.g., depth information, species present) to prevent environmental damage while conducting debris removals
- 7.4 Need to better understand available resources (e.g., personnel, funds, specialized equipment) and make best management practices accessible for removals when fouling is present on debris (e.g., corals attached to fishing traps)

8. *Environmental Justice*

- 8.1 Inadequacy of the access (e.g., narrow roads) for waste management vehicles in disadvantaged communities
- 8.2 Disadvantaged communities limited integration and participation in trash management decision making
- 8.3 Limited research for identifying the communities with the most significant environmental justice concerns related to trash pollution and solid waste management



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