



SUMMARY OF THE REPORT: THE ECONOMIC IMPACT OF PLASTIC POLLUTION IN GRENADA

Impacts on the fisheries and tourism sectors, and the benefits of reducing mismanaged waste

[Full publication](#)

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INTRODUCTION

In 2019, IUCN launched the Plastic Waste-Free Islands (PWFI) project, aiming to reduce plastic waste generation and leakage into the ocean in island nations in the Pacific and Caribbean regions. An economic assessment was conducted as part of the project in Grenada. The study examined the impacts of marine plastics on the fisheries and tourism sectors and the costs and benefits of implementing a national recycling system from a national and from a regional cooperation perspective.

Plastic waste is a global problem!

9% of plastics are recycled

22% is mismanaged

80% of marine plastics can be attributed to land-based sources

20% of marine plastic pollution originates from the fishery sector



Plastic pollution leads to contamination of the marine environment

Harms biodiversity and ecosystems

Reduces the provision of ecosystem services

Has negative impacts on the economy, such as for:

- fisheries
- tourism sectors

To address the issue, efficient policy responses and legal instruments are required at various levels. These can include waste reduction at the source, extended producer responsibility, consumer behavior changes through bans and taxes, educational campaigns, and improvements in waste management infrastructure.

The Caribbean Region heavily relies on a healthy marine ecosystem for its economy, specifically tourism and fisheries, which faces significant challenges due to plastic pollution, driven by poor waste management systems and limited recycling. Governments in the region have started implementing measures such as bans on single-use plastics, but more analysis of policy responses is needed.

IMPACT OF MARINE PLASTICS IN GRENADA (2019)

The impact of marine plastics in Grenada in 2019 was assessed through data collection and analysis. Two different plastic accumulation scenarios were considered to estimate the stock and flow of marine plastics in the region, specifically on the shoreline and the Exclusive Economic Zone of Grenada. The study focused on the impact of marine plastics on the fisheries and tourism sectors.

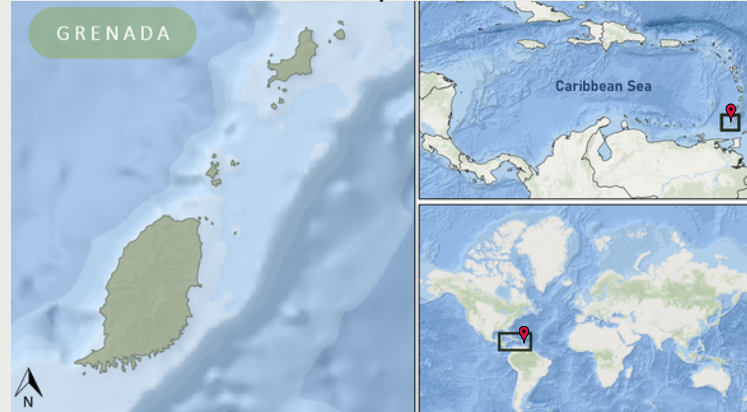
For the fisheries sector, the impact on revenue caused by marine plastics was estimated. Factors such as repair costs, lost productive time, and reduced catches were considered. The estimated impact on fisheries revenue in 2019 was 3.7% of the total revenue, equivalent to 1,270,718 East Caribbean Dollars (XCD) or 470,288 US Dollars (USD).

The study also calculated the costs of completely cleaning up all plastics ending up on the coastline to prevent further accumulation of plastics and potentially impacting the tourism sector through a reduction in visitors in the future. The estimated costs for coastal clean-ups in 2019 ranged from XCD 4,935,648 (USD 1,826,665) to XCD 14,443,281 (USD 5,345,404) depending on the plastic accumulation scenario.

CASE STUDY INTRODUCTION

Grenada is a tri-island country comprising Grenada, Carriacou, and Petite Martinique, located in the Caribbean Sea, see Map 1 below.

Map 1



In this country an estimated 3,547 tonnes of plastic waste were disposed, mainly single-use plastics.

Around 36% of all plastics disposed end up leaking into the marine environment annually.

As one of the pioneers in developing a 'blue growth' economy, Grenada has taken substantial steps to address waste management and plastic pollution. The nation has put in place regulations for waste collection and disposal and has also implemented restrictions on littering and non-biodegradable products through legislative actions.

Grenada has implemented economic instruments such as household waste management fees, environmental fees for goods importers, tourist fees, and fines to offset waste management costs. Despite these efforts, Grenada's waste management system remains costly and faces issues including a lack of waste segregation, an inadequate recycling system, and reliance on an open landfill site. Recommendations suggest introducing policies for compulsory source segregation and appropriate processing of recyclables to address these issues better.

Overall, the impact of marine plastics in Grenada in 2019 amounted to XCD 6,206,366 (USD 2,296,952) to XCD 15,713,999 (USD 5,815,691) in direct costs (impact on fisheries and total estimated costs of coastal clean-up).

These findings highlight the significant economic implications of marine plastics on Grenada's key economic sectors, emphasising the need for effective measures to mitigate plastic pollution and protect the environment and the economy of the region.

PROPOSED SOLUTIONS

The recommendations for improving waste management in Grenada include, among others, strengthening the recycling system by improving waste collection, including increasing the quantity and collection frequency of litter bins, and segregation at the source.

Through the PWF project, establishing a Regional Recycling Hub in the Caribbean has been proposed as a potential solution for Grenada and other Caribbean islands to improve waste management.

Presently, Grenada lacks a systematic recycling or recyclable materials collection, with only a minor facility on Carriacou island. Given Grenada's limited material volume, scaling recycling presents a challenge.

This study considered the costs and benefits of a recycling system when Grenada implements it alone, as well as from a regional cooperation perspective with all countries bordering the Caribbean Sea, also reducing plastic leakage into the sea.

OVERALL DIRECT COST MISMANAGED PLASTICS (2023-2040)

After estimating the impact of marine plastics in 2019, the study estimated the future impact of plastics continuing to leak into the marine environment, without measures to reduce this leakage.

The future and present values for the period 2023-2040 of the overall impact, direct cost to the fisheries sector, and clean-up costs are displayed in Table 1 and they depend on which plastic scenario is chosen; thus, four different values are presented.

Table 1		
Future and present values of the overall direct costs to fisheries and coastal clean-ups (2023-2040) (discount rate: 6.35%)		
	Plastic Accumulation Scenarios	
	Scenario 1 (XCD)	Scenario 2 (XCD)
Future Value	143,683,890	354,126,039
Present Value	79,190,547	195,386,682

COST OF IMPLEMENTING THE RECYCLING SCHEME

To understand the costs and benefits of reducing mismanaged waste and plastic leakage into the Caribbean Sea, the study estimated the costs of improving the recycling system in Grenada, considering improved collection and sorting, and transport to existing large-scale recycling infrastructure.¹

Currently, the operating cost of the general waste management system is estimated to amount to XCD 267.2 (USD 98.4) per tonne of waste. The estimated cost per tonne of recycling plastics is presented in Table 2.

Table 2			
Estimated costs of recycling per tonne of plastics (2019) ²			
Types of cost		XCD per tonne	USD per tonne
Collecting cost	Labour cost	149.8	55.4
	Investment cost	28.4	10.5
	Fixed cost	30.0	11.1
Sorting cost		356.4	131.9
Shipping cost		73.9	27.3
Total		638.5	236.2

The following figure compares the Waste Management Budget (WMB) under the BaU scenario with the WMB under the recycling scenario, which is combined with the cost of recycling. The difference between the two waste management scenarios is equal to the additional cost of the proposed solution, i.e. the recycling system as shown in Figure 1.

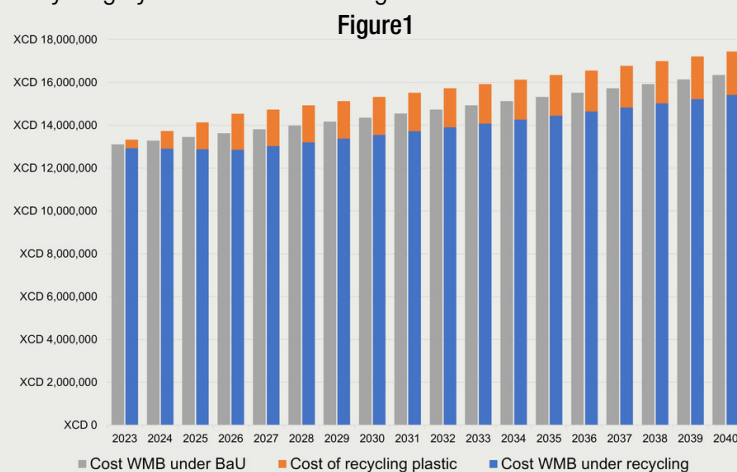


Figure 1 – Estimated costs of recycling, and the waste management budget under BaU scenario and the national recycling scenario (XCD/year)

The future value of the overall cost is estimated to be XCD 16,361,451 (USD 6,055,311). Applying the discount rate of 6.35% results in an estimated present value of XCD 8,630,517 (USD 3,194,122).

The impact in terms of the amount of plastics accumulating in Grenada's waters and coastline under the two recycling scenarios (national recycling and regional cooperation) is displayed in Figure 2 below.

¹ The study considered transport to Miami as a proxy for costs, while an exact location for the Regional Hub is not yet decided.

² Source: Searious Business, 2021; PEW, 2020.

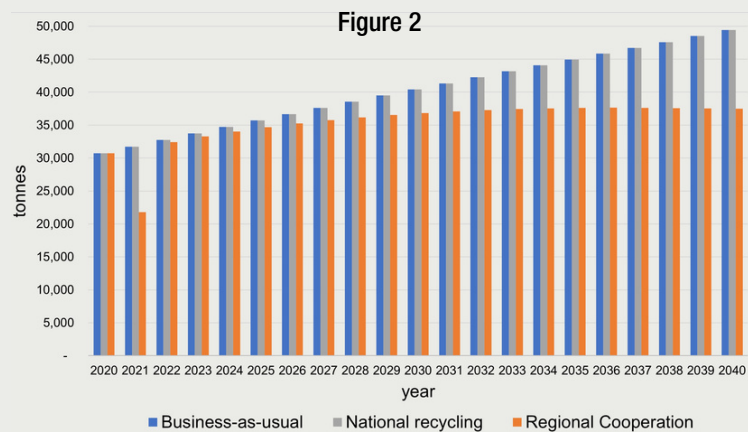


Figure 2 – Estimated tonnes of plastics in Grenada’s waters under the three future plastic management scenarios

OVERALL RESULTS NATIONAL AND REGIONAL RECYCLING SCENARIOS

The next figures show the annual benefits of both recycling scenarios (national and regional cooperation) as well as the annual costs of implementing the proposed national recycling system. Figure 3 shows the results under the first plastic accumulation scenario, while Figure 4 shows the results under a second plastic accumulation scenario. Results are displayed both in discounted and non-discounted values. Table 3 shows the net future and present values of the regional cooperation and national recycling scenario.

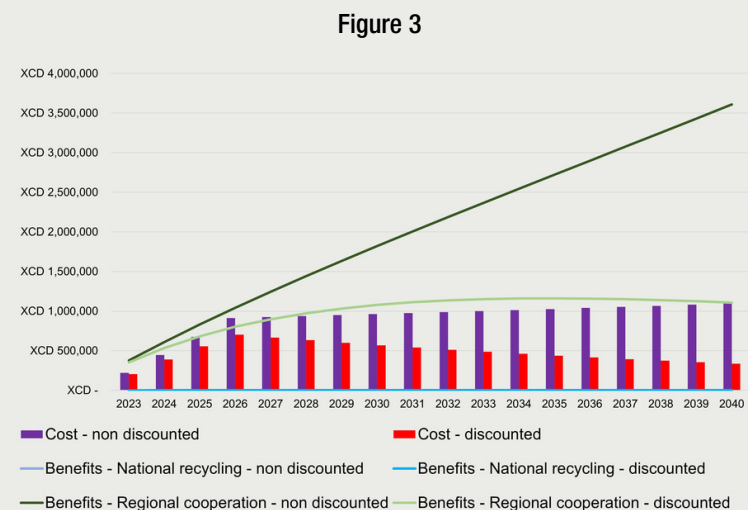


Figure 3 – Cost of recycling plastics for Grenada; benefits of the national recycling and regional cooperation scenario under plastic accumulation scenario 1 (future and present values, discount rate: 6.35%)

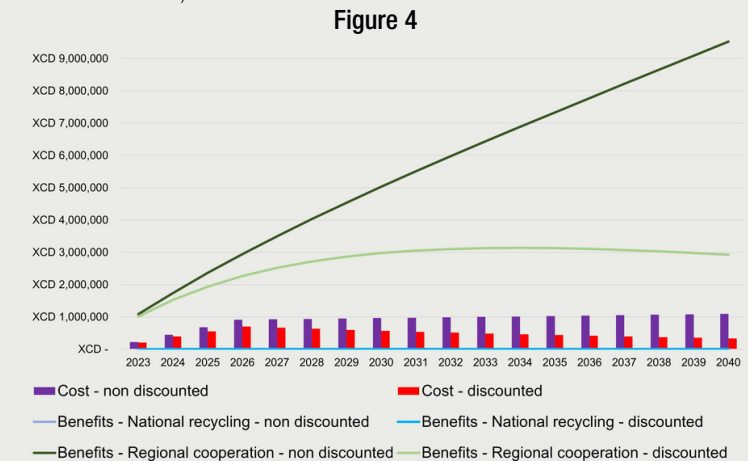


Figure 4 – Cost of recycling plastics for Grenada; benefits of the national recycling and regional cooperation scenario under plastic accumulation scenario 2 (future and present values, discount rate: 6.35%)

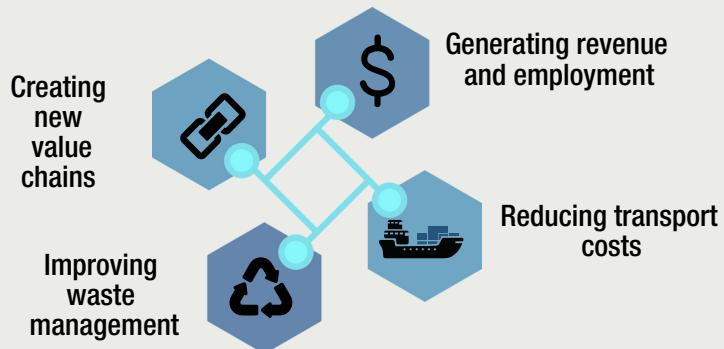
Table 3 shows that none of the national recycling scenarios are profitable based on the benefits and costs considered in this study, and without or with applying the discount rate used. However, under the regional cooperation scenario, for both plastic accumulation scenarios, the benefits of a regional reduction in MPW greatly overcome the costs of implementing recycling in Grenada.

Recycling Scenario	Plastic Accumulation Scenarios	Net Future Value		Net Present Value	
		XCD	USD	XCD	USD
National recycling	1	-16,332,482	-6,044,590	-8,615,363	-3,188,513
	2	-16,320,799	-6,040,266	-8,589,865	-3,179,077
Regional Cooperation	1	20,726,076	7,670,642	9,113,615	3,372,914
	2	84,253,409	31,181,869	39,850,514	14,748,525

Net future and present values of the national and regional cooperation scenario under both plastic accumulation scenarios (discount rate used: 6.35%)

The study highlighted the potential benefits of selling recycled plastics. To breakeven in net present value over the 18-year period considered (considering the negative net values presented in the table above), Grenada would need to resell the plastics at least at a constant price of XCD 314.5 (USD 116.4) per tonne under the least profitable scenario (national recycling under plastic accumulation scenario 1) and XCD 315.4 (USD 116.7) per tonne under the best case (national recycling under plastic accumulation scenario 2).

Additionally, there are other potential benefits of increased recycling of plastics in Grenada.



OTHER ASPECTS OF THE IMPACT OF MARINE PLASTIC POLLUTION AND INSTRUMENTS TO REDUCE IT

Marine plastic pollution threatens employment in the tourism sector, which accounted for 44.4% of all jobs (25,200) in 2019, but also the fishing industry, which employed around 3,500 individuals full-time in 2017, with another 400 indirectly employed. In addition, the fishing industry serves as a significant safety net for the populace, particularly during crisis periods such as post-hurricane recovery, and most of Grenada's rural communities are fishing communities.

Fisheries in the Caribbean are pivotal for employment, household income, and food security, with Grenada boasting a high per capita consumption of around 27.9 kilograms in 2017, one of the highest in the Caribbean and the Americas. However, marine plastic pollution poses a threat to food security, both by diminishing fish stocks and contaminating them with macro- and microplastics.

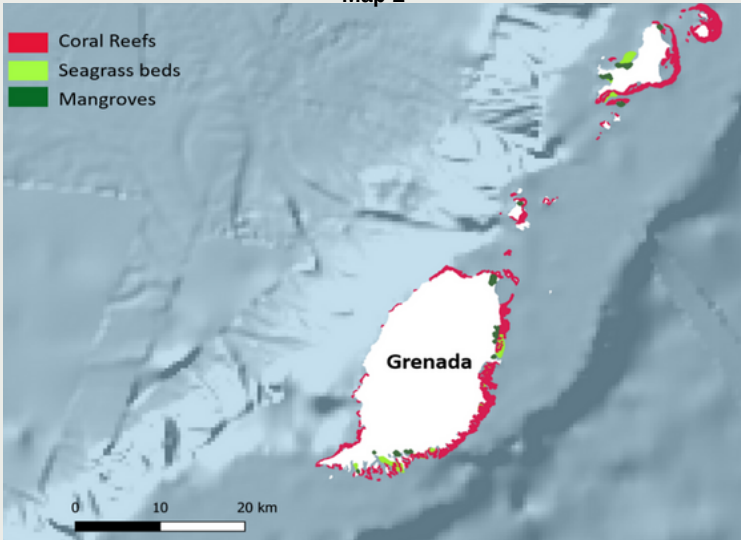
The study focused on marine plastics' cost to Grenada's fishing and tourism. However, these industries have other challenges. Grenada's tourism industry faces challenges from events like Hurricane Ivan and Covid-19 restrictions, as well as climate change impacts like sea-level rise and coastal erosion.

This study doesn't fully consider the extensive effects of climate change on fisheries, which include shifts in fish migration, changes in reproduction, and altered habitats. Caribbean fisheries are overexploited, with production declining by over 40% in the last two decades, and half of the threatened or near-threatened species in the region are directly threatened by overexploitation.

IMPACT ON MARINE AND COASTAL ECOSYSTEMS

Marine ecosystems in Grenada, including coral reefs, mangroves, and seagrass beds, are crucial for tourism, natural coastal defense, livelihoods in the fisheries sector, and various ecosystem services such as shoreline protection, breeding grounds, water purification, and carbon sequestration. The conservation and restoration of these ecosystems are essential due to their significant contribution to the island's economy, employment, and vulnerable conservation status of certain species. Map 2 below displays the locations of these ecosystems.

Map 2



Marine plastics have detrimental effects on coral reefs, seagrass beds, and mangrove forests, interfering with their ecological functions and causing population declines and increased disease. These impacts are exacerbated by other stressors such as climate change, pollution, overfishing, and invasive species, leading to the degradation of marine and coastal ecosystems, affecting tourism, fish stocks, and marine biodiversity including seabirds and marine mammals.

IMPACT ON MARINE WILDLIFE

Grenada's waters are home to 11 marine mammal species, two of which are currently listed as "vulnerable". There are also five sea turtle species out of which two species are listed as "vulnerable", one as "endangered" and another one as "critically endangered".

Marine plastics pose various dangers to marine fauna including:

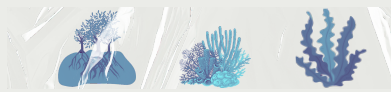
- entanglement,
- ingestion,
- colonisation by invasive species and
- contact or coverage with plastics and exposure to harmful chemicals.



Seabirds, sea turtles, marine mammals, sharks, rays, and sponges are among the species affected with:

- ingestion of plastics leading to potential mortality,
- entanglement causing suffocation or drowning, and
- plastic debris serving as vectors for the spread of pathogens and pollutants.

Plastic pollution should be considered in conjunction with other stressors when assessing its impact on the marine environment, as it may contribute to the decline of individuals, populations, or ecosystems, but not necessarily cause critical population decreases on its own. In addition to macroplastics, the presence of microplastics is a concern as they can be ingested by small organisms, bioaccumulate contaminants, and elicit toxicological effects, posing risks to marine animals throughout the food chain.



FINAL REMARKS

This study primarily focused on estimating direct costs for the fisheries and tourism sectors in Grenada, but it acknowledges that some costs and benefits were not included, such as the impact of ghost fishing, or the full costs of establishing a Regional Recycling Hub and the demand for recycled plastics under the current and future market.

The study emphasizes the need to consider the broader impacts of mismanaged plastics on blue natural capital assets, marine biodiversity, and the overall economy, recognizing the complexity of quantifying the impact on marine ecosystems. It suggests the implementation of a national recycling system and shows the positive impact of regional efforts to address the plastic waste problem while highlighting the importance of reducing plastic use, improving waste management infrastructure, and integrating local waste pickers into the system.

Further research is needed to gather data on mismanaged plastics, understand the real costs including microplastics, and develop comprehensive accounting frameworks like Ocean Accounting to assess the economic impacts of marine plastics and multiple stressors.