

Article

Perceptions Environmental and Health Impacts of Cruise Activity in the Roatan Ports

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Abstract: The purpose of this study was to investigate the perception of different stakeholders on the environmental impacts of cruise ship activity in the port of Roatan, Honduras, as an activity that has an impact on the region's blue economy. A descriptive qualitative research design was applied, with 30 people directly related to the cruise ship activity participating in the study. Data collection was carried out through structured interviews with pre-codes based on Green Marine Management performance indicators. Conventional content analysis was used to analyze the verbal data. From the analysis of the data, conclusions were drawn that there is a generalized perception of the fundamental role in the control and assurance of the environmental impact of the maritime authorities; however, there is evidence of a lack of specialization in the areas of traceability, which could have an impact on the ecosystem and the health of the population, showing a lack of leadership in the articulation of stakeholders.

Keywords: blue economy; tourism; cruiser; stakeholders



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1. Introduction

We can understand the blue economy as a “platform for the strategic, integrated and participatory development and protection of coasts and oceans that incorporates a low-carbon economy, the ecosystem approach and human well-being through the promotion of sustainable industries, services and regional productive activities” [1].

In this sense, the tourism sector is intended to strengthen coastal and marine tourism activities to promote the conservation of nature and the societies that depend on it, through mitigation measures, without forgetting the strengthening of governance and human capital related to the activity [2–4]. The cruise travel industry is considered under the subdivision of leisure travel and tourism; it entails numerous types of entertainment and is becoming rapidly popular among vacationers. The demand for cruising has developed progressively during the last century, changing the physiognomy of the tourist activity and the surrounding coastal areas [5].

The study of cruise tourism can be approached from three perspectives: from the economic point of view, which contemplates the analysis of the hotel, leisure and entertainment industry; from the administration and management perspective of the shipping companies and the environmental impact they generate in the surroundings and ports of destination [6–8]; and from the psychological behavior perspective, which includes cognitive, affective and ethical aspects of the purchasing position in the face of environmentally

responsible cruises, in addition to considering the quality of the physical environment, the interaction and the results as characteristics that affect the purchase by passengers and the work carried out by the crew members of the vessels [9–11].

Finally, environmental sustainability is also a factor with the increase in flow and size of vessels, and its effect on nations seeking progress in economic activities [12–15].

1.1. The Cruise Ship Tourism Market

In the last two decades, the cruise tourism industry has grown exponentially [2]. Representing 1.6% of the total number of tourists in the world, with a rapid growth in recent years in the Asian market, China is the second country in the world with the second largest number of cruise tourists (2.1 million people), after the United States [16–18]. This industry generates \$126 billion in total goods and services to the global economy, which generates a total of 1,021,681 jobs, considering the different jobs performed by the crew and the services requested by passengers and crew in the ports of destination, many of which are in the developing world [19,20]. However, little is known about the effects on urban planning following the eruption of this type of tourism in port cities [2,21]. For example, in cruise ports in the Mediterranean, the pressure is related to the number of disembarking passengers and ultimately affects the local population, as well as the existing port infrastructure [22–24]. Therefore, the development of a recreational tourism industry should include the culture of the community, a strengthening of the local gastronomic offer and environmentally responsible recreational tourism activities, to develop and improve the economic prosperity of the place, considering the care, sustainability, and conditions of the city [25–27].

1.2. Environmental Sustainability of Oceans

Currently, the capacity of cruise ships is over 3000 passengers, generating a significant amount of organic waste, destruction and burning of waste, producing emissions of carbon dioxide and particulate matter through sulfur which comes directly from the fuel used, in addition to polluting coastal waters with high levels of oil, detergents, plastic waste, and bacteria [3,4,28,29]. Another effect on ports is cross-contamination, both from spillage of pollutants, waste on passengers' shoes and transfer of accompanying wildlife [30–32]. This has generated concern among civil society, port users and owners, the scientific community and government authorities, who seek to overcome inconveniences and mitigate environmental impacts through biosecurity measures, environmental protection standards and the development of ecotourism for the conservation of ecosystems and carbon reduction [1,30,33,34].

In the case of shipping companies, they have introduced systems and procedures to reduce the environmental impact and developed plans and projects for the reduction of emissions into the atmosphere, advertising care for the environment as a means of marketing to reinforce the repurchase intentions of passengers in the green cruise business [7,35–38].

1.3. Impact on Local Communities

Developing countries with tourism interests are becoming the new destinations offered by cruise companies with the aim of expanding their current offer within a regulatory framework of growth [39–41]. However, there is little preparation for the massive arrival of thousands of tourists, causing logistical problems, as well as not respecting the traditional customs and beliefs of the destinations [42–45]. In addition, these potential benefits do not reach the local population because of the agreements signed with agencies and operators that manage the prices [46–49].

1.4. Trends in Cruise Tourism Services

Therefore, the challenge is to explore new market alternatives, seeking new service options associated with new destination ports involving the exoticism of these places,

with new themes both inside the ship and activities on land for younger customer segments, in addition to the incorporation of better accommodations and new information technologies [39,45,50–57].

For this reason, the measurement of service experiences in cruise tourism should consider dimensions such as new routes, cruise hotel management and local tourism as differentiating activities in the cultural and emotional enrichment of customers [12,13,58,59]. Finally, the evaluations should also integrate the aspects of education, entertainment, aesthetics, and adventure, which positively affect the prestige of the brand within this industry [60–63].

1.5. Port of Roatan

Honduras, Central American country with direct access to the Atlantic Ocean–Caribbean Sea and the Pacific Ocean. Its territory extends into the Caribbean Sea through the archipelago of the Bay Islands, one of the eighteen departments of the country. The Bay Islands are made up of three major islands which are Utila, Roatan and Guanaja, plus the three small islands of Barbareta, Morat and Santa Elena, the Swan Islands. In the Bay Islands, specifically in Roatán, cruise tourism has developed strongly, with two cruise ports: Port of Roatán and Mahogany Bay. The Port of Roatan can hold three cruise ships at any given time, one alongside and two at anchorage. An estimated 580,000 passengers visit Roatan through the Port of Roatan each year. These passengers arrive on some 170 cruise ships that use Roatan as a port of call. The water depth at the port is approximately 12 m (39 feet).

According to information from the Secretariat for Central American Integration, SCAI, Honduras continues to lead Central America in the arrival of cruise ships to the country.

The average consumption per cruiser in Roatán ranges between USD\$51.6 and USD\$56.7, despite the fact that Roatán receives the largest number of cruisers in the region, the average expenditure is among the lowest in the region, locals believe that this has to do with the fact that “Roatán is the last visit of the cruise route and tourists have already spent their budget in other countries”.

2. Materials and Methods

A descriptive qualitative design with a conventional content analysis approach was used for the research. This design was chosen because they are especially useful when little is known about a phenomenon and when researchers seek to answer questions about participants’ opinions, perspectives, and experiences. These designs help to identify key concepts and constructs and to gain a deeper understanding of the phenomenon under study within its real social context [64]. More specifically, the qualitative and descriptive design is used to provide direct descriptions of experiences and perceptions in areas where little is known about a research topic. It employs a factual perspective, in the sense that the data produced from such a design convey the reality of the phenomenon or topic under investigation [65]. In this type of design, the analysis and interpretation of the findings foreground what actually happens in the research field. It is most appropriate when the researcher intends to probe the subjective nature of the problem and the different experiences of the participants and to present the results in a way that directly reflects the terms used in the research question [66].

Data collection was conducted through semi structured in-depth interviews (Appendix A). The interview was based on following an interview script, where all the topics that were to be addressed during the meetings were set out, so that prior to the session, a structured guide was prepared containing the topics to be discussed, in order to control the time, distinguish the topics by importance and avoid extra-violations and dispersion on the part of the interviewee. The questions of the structured guide were formulated taking into consideration the information of the Green Marine Management performance indicators for the year 2021, mainly focused ports and seaways, terminals and shipyards [67]. The performance indicators for terminals and shipyards of the 2021 Green Marine Management performance indicator guide included: a review of greenhouse gas and air pollutant issues; Spill Prevention and Stormwater

Management; Dry Bulk Handling and Storage; Community Impacts; Environmental Leadership; Waste Management; Community Relations. The corporate performance indicators for the St. Lawrence Seaway port included: Aquatic Invasive Species; Greenhouse Gases and Air Pollutants; Spill Prevention and Stormwater Management; Dry Bulk Handling and Storage; Community Impacts; Environmental Leadership; Waste Management; Underwater Noise; Community Relations. Table 1 shows details by indicator.

Table 1. Performance Indicators.

Green Marine Environmental Program 2021	
Performance indicators for terminals and shipyards—2021	Performance indicators for St. Lawrence Seaway ports and corporations—2021
Greenhouse Gases and Air Pollutants	Aquatic Invasive Species (Port Authorities Only)
Spill Prevention and Stormwater Management	Greenhouse Gases and Air Pollutants
Dry Bulk Handling & Storage	Spill Prevention and Stormwater Management
Community Impacts	Dry Bulk Handling & Storage
Environmental Leadership	Community Impacts
Waste Management	Environmental Leadership
Community Relations—Optional By 2021	Waste Management
	Underwater Noise
	Community Relations—Optional By 2021

Therefore, the above dimensions were used as pre-codes and led to the following questions in Table 2.

Table 2. Dimensions and questions.

Dimensions	Questions
Aquatic Invasive Species	What are the aquatic invasive species that have been identified in the surroundings of Roatan?
Community Impacts	What are the positive and negative impacts for the Roatan community with the arrival of Cruise Ships?
Community Relations	How are the relationships between the port administration of the Ports of Roatan and Mahogany Bay, the Cruise Ships, the environmental community and the community in general managed?
Dry Bulk Handling & Storage	What processes are followed for the handling and storage of dry bulk cargo?
Environmental Leadership	Who leads the environmental activities on the island? What activities do they perform? How do they perform them?
Greenhouse Gases and Air Pollutants	Who controls greenhouse gas emissions? How do they control them?
Spill Prevention	How are the activities necessary to control oily secretions in the ports and their surroundings managed?
Atmospheric pollutant emission controls	How are the activities necessary to control oily secretions in the ports and their surroundings managed?
Atmospheric pollutant emission controls	How are NOX (nitric oxide (NO) and nitrogen dioxide (NO ₂)) air pollutant emissions controlled? What measures have been taken?
Atmospheric pollutant emission controls	How are SOx (sulfur oxides) and PM (mineral particles (asbestos and asbestos) air pollutant emissions controlled? How is recycling from cruise ships handled?

Table 2. Cont.

Dimensions	Questions
Spill Prevention and Stormwater Management	What is being done in the Ports/Roatan to prevent spills and manage water storage?
Underwater Noise	What activities are being carried out to strengthen underwater noise control management and prevent impacts on biodiversity?
Waste Management	What is the waste management policy for cruise ships? Who supervises and monitors it?
Community Impacts	In your opinion, what are the benefits of cruise ships and cruise ship passengers arriving in Roatan? Disadvantages?

Data collection was conducted from August 2021 to February 2022. One member of the research team conducted all interviews. The interviewer used interview techniques, so closed-ended and/or leading questions were avoided and participants were encouraged to provide as detailed data as possible. Interviews were conducted by telephone and were scheduled in advance, ensuring the day and time chosen by the participants. The interview guide consisted of open-ended questions that invited participants to describe their meaning. When necessary, additional questions were used to further explore participants' views on (1) greenhouse gases, (2) spill prevention, (3) dry bulk handling and storage, (4) community impacts, and (5) environmental leadership. Finally, the way of reporting the results was based on the structure proposed by several qualitative research and based on their main postulates of rigor and transparency [64]. Thirty people from different sectors were interviewed to obtain holistic information on cruise ship tourism in Roatan. Among the people interviewed were personnel from Bay Islands Conservation Association, BICA; Roatan Marine Park, RMP; Alcaldía Municipal de Roatán—Unidad Medio Ambiental, UMU; Dirección General de La Marina Mercante (DGMM), Islas De La Bahía; La Dirección General de Pesca y Acuicultura, DIGEPESCA; Comité Permanente de Contingencias, COPECO; Estación de Bomberos Roatán; Mi ambiente; Ana Caribe-Agencia Aduanera; Instituto de Conservación Forestal, ICF; Comisión Administradora Zona Libre Turística de Islas de la Bahía, ZOLITUR; Arrecifes Saludables; Coral Ref. Alliance; Centro de Estudios Marinos; Secretaría de Estado en el Despacho de Turismo, SETUR; Dirección General de Biodiversidad, DiBio; Grand Roatán Resort, GRR; Mar-Alliance and independent suppliers.

2.1. Data Analysis

A conventional content analysis was used to analyze the textual data. This research technique has the characteristic of not being intrusive, is very sensitive to context and, therefore, is able to process symbolic meanings and can handle a large volume of information, as much as necessary [68].

In turn, the coding categories are derived directly from the data and are also known as inductive category development. A three-stage process was used to analyze the data based on Elo and Helvi [69] data analysis process. These stages involved preparation, organization, and presentation of reports. In the first stage, a process of reading the data repeatedly was applied to achieve immersion and overall understanding of the participants' statements. Words and phrases constituted the units of analysis. In the second stage, rereading the participants' narratives allowed the analyst to proceed to open coding using broad headings (e.g., organizational aspects), reflecting an explicit concept or meaning. Then, codes involving relative concepts were grouped under higher-order headings (e.g., confidence in leadership), resulting in the generation of categories and subcategories. In the third stage, the analysis process and findings were reported through the categories and subcategories formed.

To ensure the reliability of the analysis process, the development of categories and subcategories was independently reviewed by a second analyst, a member of the writing

team, and consensus was reached regarding the presentation of the final categories and subcategories [70].

2.2. Research Credibility

To ensure the credibility of the findings, the “member checking” method was used, which is considered one of the most important techniques used by qualitative researchers to enhance the credibility of a study [71]. In the interview process, member checking was carried out, as well as at the end of the interview. Thus, participants had several opportunities to confirm that their opinions were accurately captured. In addition, peer review or “referee” testing was applied during all steps of this study. This allowed for rigorous feedback, refinement of research methods, and elimination of possible researcher biases or assumptions throughout the data analysis phase [70]. Analyst triangulation was an additional technique, which was used to enhance the credibility of the study. This involved a second analyst, who reviewed the study findings, to provide a different perspective, to uncover possible hidden concepts and thus strengthen the integrity of the study results. This technique also ensured that possible discrepancies in terms of coding and category formulation were resolved and a consensus was reached between the two analysts regarding the presentation of the study findings. Consolidated criteria for reporting qualitative research (COREQ) guidelines were considered to ensure that all issues relevant to qualitative reporting were addressed [72].

Although the anonymity of the participants will be maintained, some information on their characterization will be provided in Table 3.

Table 3. Some information about the participants.

Participant	Age	Work Years	Organization	Education
P1	37	17	Bay Islands Conservation Association, BICA	Biologist
P2	35	15	Roatan Marine Park,	Professor
P3	29	9	Roatan Marine Park,	Biologist
P4	29	10	Alcaldía Municipal de Roatán-UMA	Degree in Natural Resources and Environment
P5	33	13	Dirección General De La Marina Mercante Islas De La Bahía	Biologist
P6	32	12	Dirección General De La Marina Mercante Islas De La Bahía	Degree in Ecotourism
P7	65	40	DIGEPESCA	Commercial Expert and Public Accountant
P8	40	21	COPECO	Business Management
P9	57	38	Dirección General de La Marina Mercante Islas De La Bahía	Captain Merchant
P10	50	32	Estación de Bomberos Roatán	Bachelor in Business Management
P11	32	13	Mi Ambiente	Master’s in Project Management and Environmental Engineering
P12	37	20	Ana Caribe-Agencia Aduanera	Bachelor’s Degree in Customs Administration
P13	36	17	Instituto De Conservación Forestal ICF	Biologist
P14	33	8	Zolitur	Lawyer
P15	52	25	Zolitur	Doctor

Table 3. Cont.

Participant	Age	Work Years	Organization	Education
P16	45	21	Arrecifes Saludables	Master in Sustainable Development
P17	41	20	Coral Reef Alliance	Master in Sustainable Development
P18	32	12	Coral Reef Alliance	Environmental Science Engineer
P19	31	7	Coral Reef Alliance	Master in Geo-Environmental Technology
P20	40	20	Centro De Estudios Marinos	Biologist
P21	31	11	SETUR (IHT)	Environmental Science Engineer
P22	29	7	Secretaría De Recursos Naturales Y Ambiente/Mi Ambiente+,	Degree in Biology
P23	42	25	GRR	Technician
P24	39	20	Maralliance	Technician
P25	38	18	Construcción	Architect
P26	48	20	Fundación Pequeños Amigos	Doctor
P27	51	31	Zolitur	Graduate
P28	38	20	Vendedora De Artesanías	Secondary
P29	32	16	Independiente	Primary
P30	36	20	Erwin's Excursions	Secondary

3. Results

Thirty people were interviewed individually by telephone, including environmentalists, personnel working with government institutions, port authorities, the Merchant Marine, the Roatán Municipal Mayor's Office, the Permanent Contingency Committee (COPECO), leaders of different NGOs, hotel managers, and other members of the community in general.

Study participants were asked to define what cruise tourism means to them. They defined cruise tourism as an economic spillover for the island's inhabitants, which involves a symbiotic coordination of the different sectors, as well as better job and business opportunities for the inhabitants.

At the time of preparing the interview guide, the list of indicators selected and extracted from Puig et al. [73] and Klopott [74] (alphabetical order) was taken into consideration, and their approach to a study in Canadian ports emphasized: (1) greenhouse gases, (2) spill prevention, (3) dry bulk handling and storage, (4) community impacts, and (5) environmental leadership. Based on the above, categories and subcategories were assimilated, respectively, into each appropriate category (Table 4).

Table 4. Categories and Subcategories.

Category	Subcategory
A. Atmospheric pollutant emission controls	A.1 Control of greenhouse gas emissions Controls and measures for: A.2 NOX (nitric oxide (NO) and nitrogen dioxide (NO ₂)) A.3 SOx (sulfur oxides), and PM (particulate matter).
B. Spill Prevention	B.1 Spill prevention B.2 Control of oily secretions
C. Dry bulk handling and storage	C.1 Handling of Cross-Bulk Cargo Residues C.2 Dry bulk storage and handling process

Table 4. Cont.

Category	Subcategory
D. Community impact	D.1 Positive Impacts D.2 Negative Impacts
E. Environmental Leadership	E.1 Invasive Species and how they control themselves. E.2 Environmental Relations and Communications. E.3 Activities carried out to control underwater noise and prevent impacts on biodiversity. E.4 Recycling from cruise ships. E.5 Waste management policy. E.6 Environmental leadership.

3.1. Category A: Controls on Atmospheric Pollutant Emissions

3.1.1. A.1: Control of Greenhouse Gas Emissions

93.33% of those interviewed did not know the answer. p5 indicated that, “atmospheric pollution from ships is an issue exclusive to the Directorate General of the Merchant Marine, but they handle very little information about it. It is a relatively new issue; there are regulations that apply to vessels over 5000 tons. In the case of Honduras, the nationality is given to those who request it and those above 5 thousand tons must give it once a year where fuel consumption is requested. The fuel delivery note is reviewed, it cannot have more than 0.5% sulfur, all the fuel content must be below this percentage. Those that are under 5 thousand tons are not known what type of fuel they are using. He does not believe that a prompt regulation will be authorized for these cases”. In turn, p6 said that, “The Merchant Marine supervises and controls compliance with international regulations on gas emissions from ships, inspecting ships, reviewing logs and other documentation. But in the rest of the island at the moment there is no one supervising and controlling it. It should be my Environment and there is no representation in the Islands”.

3.1.2. A.2: Controls and Measures for: NO_x (Nitric Oxide (NO) and Nitrogen Dioxide (NO₂))

As in the previous statement, only 6.66% of those interviewed were familiar with the subject, as indicated by p5 and p6 “At the island level, these emissions are not measured, but in the case of ports they are handled by international regulations. In the case of cruise ports, it is handled through annex 6 of the MARPOL Convention and more emphasis is given. Fuel volume regulations, prohibiting more than 0.5% sulfur. Verification of technical reviews on the ship by the Port Authority. It is handled through a strict protocol. The DGMM has these records, follow-up and reviews”.

3.1.3. A.3: Controls and Measures for: SO_x (Sulfur Oxides), and PM (Particulate Matter)

Since it is a very technical subject, only 6.66% of the interviewees knew some information on the subject. p6 indicates that, “For sulfur oxides: The merchant marine supervises and controls compliance with international regulations on gas emissions from ships, inspecting ships, reviewing logs and other documentation. But in the rest of the island at this moment there is no one supervising and controlling it. It should be my Environment and there is no representation in the Islands”. In the case of the PM, p6 does not know the procedure. Like the previous statement, p5 states that, “This is handled through Annex 6 of the MARPOL Convention and more emphasis is given. Fuel volume regulations, prohibiting more than 0.5% sulfur. Verification of the port control officers technical reviews on ship. It is handled through a strict protocol. DGMM has these records, follow-up and reviews”.

3.2. Category B: Spill Prevention

3.2.1. B.1: Spill Prevention

Spills can be classified into two types, including spills by cruise ships where: p8 is of the opinion that, "For spills, there are following regulations and they are very strict to follow for cargo ships. And cruise ships are not allowed to put fuel on them, it is part of the legislation". p6 indicates that there is a "Contingency Plan where the details are detailed, as well as the people involved in the plan". p4 adds that, "for cruise ships, according to international measures, they must ensure that there are no spills in the area. in addition, they have the necessary equipment to counteract any type of spill".

For p5, "Oil spills are an inherent problem of maritime activity. The government must ensure that port activities (Local Contingency Plan) and oil transportation vessels (SOPEP Plan, Oil Spill Prevention Certificate, Annex 1 MARPOL Agreement, Hydrocarbon logbook) have a contingency protocol with a minimum of what equipment, materials, and procedures to do. Cruise ship must comply with the requirements since they weigh more than 400 tons. From 3 (Mahogany, Puerto Roatan, and the Terminal de hidrocarburos) to 6 (2 Pto Cortes, OPC, Muelle de Cobotaje de la Ceiba) companies are endorsed by DGMM". p1 is of the position that, "in the case of the ports there is a space for maintenance, and it is properly roofed, and Puerto Roatan does not do any maintenance work". Additionally, p1 goes on to add that "in the case of the island, it is not managed in an orderly manner", for example, "in the case of the workshops there is no monitoring of spills and people are located in ravines. there have been complaints of this contamination in ravines".

In the case of (b) Rainwater, p8 indicates, "the road axes are being expanded and are being tested. There have been no problems so far". p5 and p25 indicate that, "rainwater management is monitored through environmental licenses given to construction companies to ensure that sediments do not flow into the sea".

P1 adds that in the case of rainwater, "there is a high level of deforestation in the medium and high basins because there are invasions by people, and there have been too many growing communities. the community of Sandy Bay has become 4 colonies, it is so big that it has invaded the mountain". "They don't have septic tanks, and the sediment in the winter goes into the sea. There are docks that are no longer in the sea because of the amount of sediment. During the rainy season, the creeks recover their flow and there are floods". "There are communities that are built on wetlands that have been receding and the rainwater does not flow naturally. Plus, the solid waste and the culture of throwing waste out the window. All this causes a big problem".

3.2.2. B.2: Control of Oily Secretions

For the control of oily secretions, p9 indicates that "We maintain surveillance, as DGMM has a person from the marine environment, captains and others who review and inspect docks to ensure that there is no spill. In the event of a spill, support is requested from other agencies to eradicate the problem".

From the p1's point of view, he states that, "this is followed through the environmental license and the ports must provide all the documents that they are complying with, and the DGMM is the one that follows up on this activity. In the case of cruise ports there are no spills, but there are in the other ports and docks of the island. for example, boats confiscated by OABI for drug trafficking issues, over time the vessels have deteriorated, several have sunk and caused spills, as well as on the part of the private sector".

P4 is of the opinion that, "each port has the obligation to be prepared to counteract spills in the areas. The DGMM requires a contingency plan against spills. They must have a barrier, anti-adherent cloths (to retain hydrocarbon)". p10 cites, "the municipality carries out the respective inspection and Roatan Marine Park makes a tour before, during and after to ensure that the ships do not make any type of spill". p6's perception is that "it is done through the contingency plan for oil spills. Containment and recovery are done. Investigation is carried out to detect the source of contamination. Small vessels are the main cause of contamination due to the type of engine (2T to 4T)".

p8 and p21 indicate that in the cases of the vessels/cruise ships, “they control it, they do it through Joyce (detergent) to encapsulate the grease and this goes to the bottom of the sea. A few months ago, there was a case of a seized vessel, it sank and there was a spill and COPECO activated its protocol, it was effectively controlled, and it was the first spill that occurred on the island”.

3.3. C: Dry Bulk Handling and Storage

3.3.1. C.1: Management of Cruise Ship Cargo Waste

All tourist activities cause environmental disturbance, for p3, “Environmental education is provided, tourist guides are required to give environmental talks and tourists are required to behave in a friendly manner with the environment. We try not to have an irreversible disturbance by educating tourists to have a respectful attitude. Acute disturbance is when tourists trample or cause mechanical damage to the reefs”. For p8, “Solid waste cannot be disposed of on Roatan. What is allowed is the washing of the ship and the painting of the ship. There is a protocol by the ship and employees following the guidelines. They cannot use soap or detergent. Where they paint there is a barrier and protection so as not to damage the environment. They are small fractions. It does not consider that there is spillage since there is technology, equipment, and knowledge. Each vessel has a shipping agency within the port that oversees that the protocols are complied with”.

As above, p6 states, “In Islas de la Bahía, the discharge of waste and sewage generated by international vessels is prohibited. Donations may be unloaded with prior authorization from the port captaincy. There are established logistics for donations, and it is a very rare discharge. They must come in their cargo manifests. Vessels do not move cargo. They are prohibited from discharging any residual solid, liquid and bilge water pollutants (mixed with hydrocarbons). It is regulated by executive agreement 002-2004”. p2 and p23 add that, “There are municipal decrees and ordinances. In Mahogany they have a waste collection system, waste separation station, composting system. Personnel from the Port of Roatan are involved in cleaning the beach. Waste from the extension of the terminal has been left floating around the ports (‘not under their jurisdiction’ according to port administrators)”. p5 states that “In the Caribbean Sea area, it is completely prohibited to dispose of any type of waste according to Annex 5 of the MARPOL agreement; therefore, in Roatán, no one can dump their garbage/waste in either of the two cruise ship port facilities according to the internal regulations of the protected area”.

For p1, “according to the contracts for ports and cruise ships, they cannot leave waste on the island. It is important to mention that with the arrival of cruise ships there is an increase in the population, therefore there is an increase in waste generation. In the case of Roatan, which is composed of two municipalities, there is no properly managed sanitary registry on the island, there is an open dump and waste collection has improved, but there is a need for a sanitary landfill and an incineration plant”.

3.3.2. C.2: Process for Dry Bulk Storage and Handling

100% of those interviewed indicated that, “Dry bulk is not handled in the Cruise Ports. They do not have the capacity or logistics for dry bulk handling”.

3.4. D: Community Impact

3.4.1. D.1: Positive Impacts

All of those interviewed agreed that among the positive impacts of cruise ship tourism on the island of Roatan are the activation and increase of the economy in the different sectors, as well as the generation of employment, which they called “the economic spillover that activates public transportation services such as private transportation, sale of souvenirs, consumption of local products and miscellaneous items”. At the same time, they have valued as positive, the different investments that have flown into the community and “that have improved the quality of basic services”. Some interviewees also indicated that, “the

only benefits are for medium and large companies. However, microenterprises are not directly benefited”.

3.4.2. D.2: Negative Impacts

For example, p27, p28, p29 and p30 indicated that, “In times of the COVID pandemic it is very risky, since there have been cases of COVID among cruise ship passengers that expose and increase the risk of contagion among the locals”. On the other hand, 50% of those interviewed said that, “It generates the same negative aspects as in any other tourism sector, such as drug use and prostitution”; Also, p1 and p16 indicate that, “the carrying capacity of people on the island is exceeded, there is overloading in snorkeling and diving sites, physical and mechanical damage to the reefs, since people without good buoyancy affect the coral; a greater generation of waste on land”; For p27 and p28, “At the level of the tourist area there is enough land traffic, maritime tourists”.

Other interviewees mention the fact that the government mechanism for collecting taxes does not allow them to remain for the direct use and benefit of the island, but rather, as mentioned by p4, p20 and p21, “they go to the coffers of the central government of Honduras”. In turn, p24 and p30 point out that, “although the need for qualified and bilingual personnel is required due to the increase in tourism, there is a good percentage of citizens who only speak English and not Spanish”.

From another point of view, p28 and p29 indicate, “not all tourists get off the cruise ships because Roatan is the last place on the cruise route and in some cases, tourists do not have enough cash”.

Regarding the environmental issue and the expansion of infrastructure to accommodate more cruise ships, for p1, p15 and p17, “the two issues do not go hand in hand, because the greater the investment in infrastructure, the greater the damage to seagrass, corals, subsoil, among others, the environmental impact due to sedimentation can be mentioned. Infrastructure construction generates a lot of sedimentation”.

Regarding the environmental issue, two of the interviewees, p1 and p16 indicated that, “the increase in cruise ship passengers causes an increase in waste and sewage, especially on an island where there are only two sewage treatment plants”, for example, “the large resorts have their own treatment plant, but the rest of the lodgings do not, which is very negative since the reefs are very close to the island. Some efforts have been made in this area, funds have been invested in improving the treatment plant in Coxen-Hole, but most of the medium and small hotels do not have a treatment plant”.

The State of Honduras approved the cruise ship projects and they were catalogued as a “national priority”, says p1, therefore, “they do not follow all the environmental guidelines”. “In the port of Mahogany Bay, there was reef removal for construction (2010–2011), they did get the permits”.

“As an environmentalist”, says p1: “these projects must have a balance with the environment, and unfortunately, the environment is not a priority, only money. They are thinking of creating other ports in the Bay Islands and priority should be given to not destroying the coral reefs”.

It is evident that cruise tourism has improved the local economy, but it is no less true that, “the locals should benefit more from these operations, not only companies managed by foreigners”. The employees of these intermediate companies should be encouraged to hire local people, and “the government should strengthen and create a local labor force”.

P1 specifies that “we should consider as a country whether to promote this type of ‘irresponsible’ tourism of 5 h per boat or to promote responsible tourism per week to tourists who are committed to the environment”.

3.5. Environmental Leadership

3.5.1. E.1: Invasive Species and How They Are Controlled

The interviewees consider that, among the invasive species in the Bay Islands area, is the lionfish. They believe that they have arrived in the area as a result of “ballast

water from cruise ships". Some non-governmental organizations (NGOs), such as the Bay Islands Ecological Conservation Association (BICA), which is part of the Mexican–American connectivity network, together with other organizations from Mexico, Belize, Guatemala and Honduras, have developed a plan to manage the lionfish species and reduce the population in Caribbean waters. In the particular case of Honduras, for example, among the activities carried out in conjunction with the General Directorate of Fisheries and Aquaculture, DIGEPESCA, in Roatán, to eradicate lionfish, p1, p16–p21 indicates that spear fishing has been authorized, therefore, fishermen and the community have been permitted to fish lionfish for consumption, "in fact, culinary competitions are held between the community and restaurants". "Harpooning is not allowed in the parks, but the exception has been made, in view of the plan to eliminate the lionfish". This certification began around 2015.

Following up on the above, p3 also mentioned that, "At the micro level we have the coral disease, where there is a loss of tissue in hard corals, the disease is known by its acronym in English, SCTLTD. It was presented for the first time in the region, in Florida in 2012, then it reached Mexico and spread to the rest of the Mesoamerican area. It can be transmitted through diving equipment (BCD). It was detected in Roatan as of September 2020. The disease is being fought in a palliative way, through antibiotics such as amoxicillin. It could be said that the cause is the poor quality of the water. There is no wastewater treatment in Honduras".

3.5.2. E.2: Environmental Relations and Communications

For all interviewees in the environmental area and especially for p2, "Everything is managed through the protected areas, there are 14 co-managers: municipalities, NGO's, semi-official, Central Government (ICF, Mi ambiente DGMM). Communication is excellent and if there is any pronouncement from this committee, the 14 representatives (members) join together and facilitate logistics. We issue opinions in order to reduce environmental impacts".

p5 indicates that, "the question is very important. In Roatan it is quite particular. There are two lines of communication, one to the ship and the other to the port terminal. There are protocols for both. SAL Agreement: those arriving at international ports must give 48 hours' notice to the port captaincy. A paper check is made and then an official visit (on-site verification). DGMM, migration, health, SE-NASA OIRSA, the national port company. It is an administrative operational review. On the other hand, there is the official port state, technical reviews must be performed for example ballast water management, fire protocols, and it is done depending on which port it comes from (by warning signal). The port terminal, communication is less and is due to the Dirección General de la Marina Mercante (DGMM) and port administration (there is not much relationship with the environmental part). Empresa Nacional Portuaria (ENP), (port authority does not have an office in Roatan). For example, an ENP pilot must take control of the ship before it embarks, before it arrives".

For p1, "as for communications regarding cruise ship arrivals, in the case of MA-HOGANY, they post cruise ship arrival dates on their web page and coordinate with the port captaincy of the DGMM. in the case of tourism, tour operators are in communication with the cruise ships. NGOs meet periodically and are informed through the national environmental impact assessment system. when someone wants an environmental license, they call SINEIA and are given the pertinent recommendations and must be evaluated annually. as part of the environmental licensing the ports must send the documentation based on the measures".

3.5.3. E.3: Activities Carried out to Control Underwater Noise and Prevent Impacts on Biodiversity

At the time of the interview, 100% of the respondents were unaware of the existence of activities to control underwater noise and prevent impacts on biodiversity.

3.5.4. E.4: Recycling from Cruise Ships

100% of those interviewed agreed that it is completely prohibited for cruise ships to unload any type of product or recycling waste.

3.5.5. E.5 Waste Management Policy

All of those interviewed agreed that cruise ships are not allowed to unload waste at the Bay Islands cruise ship ports.

At Table 5, there is a detailed description of the most representative's findings.

Table 5. Most representative findings.

Category	Subcategory	Most Representative Findings
A. Atmospheric pollutant emission controls	A.1 Control of greenhouse gas emissions Controls and measures	Air pollution from ships is an exclusive area of the Directorate General of the Merchant Marine.
	A.2 NOX (nitric oxide (NO) and nitrogen dioxide (NO ₂))	In the case of cruise ports, it is handled through Annex 6 of the MARPOL Convention and greater emphasis is given to it. There is an awareness of their effect
	A.3 SOx (sulfur oxides), and PM (particulate matter).	This is handled through Annex 6 of the MARPOL Convention and more emphasis is given to it than to other contaminate products. There is no absolute agreement within the interviewees.
B. Spill Prevention	B.1 Spill prevention	In the case of the island, the workshops are not managed in an orderly manner, there is no monitoring of spills and the people are located in streams. there have been complaints of pollution in streams.
	B.2 Control of oily secretions	Small boats are the main cause of pollution due to the type of engine.
C. Dry bulk handling and storage	C.1 Cruise ship cargo waste management	In the Caribbean Sea area, it is completely forbidden to dispose of any type of waste according to Annex 5 of the MARPOL Convention, therefore, in Roatan no one can unload their garbage/waste in any of the two cruise port facilities according to the internal regulations of the protected area.
	C.2 Dry bulk storage and handling process	No dry bulk is handled at the cruise ship ports.
D. Community impact	D.1 Positive Impacts	the activation and increase of the economy in the different sectors, as well as the generation of employment, which has been called "the economic spillover that activates public and private transportation services, souvenir sales, consumption of local products and miscellaneous items".
	D.2 Negative Impacts	In times of pandemic COVID-19 is very risky, since there have been alleged cases of COVID-19 among the cruisers, who expose and increase the risk of contagion among the locals.

Table 5. Cont.

Category	Subcategory	Most Representative Findings
E. Environmental Leadership	E.1 Invasive Species and how they control themselves.	All of those interviewed consider that the lionfish is one of the invasive species in the Bay Islands area.
	E.2 Environmental Relations and Communications.	Everything is managed through the protected areas There are 14 co-managers, including the municipalities, NGOs, semi-official organizations, central government (ICF, Mi ambiente DGMM). The communication is excellent and if there is any pronouncement from this committee, the 14 representatives (members) unite and facilitate logistics. The committee issues opinions in order to reduce environmental impacts.
	E.3 Activities carried out to control underwater noise and prevent impacts on biodiversity.	All interviewees were unaware at the time of the interview whether there are activities to control underwater noise and prevent impacts on biodiversity.
	E.4 Recycling from cruise ships.	All interviewees agreed that it is completely prohibited for cruise ships to unload any type of product or recycling waste.
	E.5 Waste management policy.	All interviewees agreed that cruise ships are not allowed to unload waste at the Bay Islands cruise ship ports.

4. Discussion

As the research by Papathanassis, 2017, points out, there is no doubt that the issue of the environmental impact inflicted by cruise ships in the different port areas is a topic of growing interest for researchers. Cruisers with ecological loyalty have been studied but limiting their behavior mainly to their activities on board [37]. On the other hand, research carried out in Roatan has pointed out problems more oriented to the interaction of local communities with tourists, as pointed out by [42], but has not been able to reveal the relationship between the environmental and cultural tensions generated by cruise ships and cruise passengers [75].

Cruise ships cause a great impact on cities, due to their effects of pollution, noise, smoke, alteration of heritage and the environment, endangering the citizenship, the architectural and cultural heritage, and the environment. This generates a sacrifice for the population, so it is hoped that public awareness will lead to greater regulation of tourism, which would be a key step in achieving livable cities that are respectful of tourism [76]. This negative effect of cruise passengers on port cities can be related to the complex phenomenon of overtourism, the nature of which has multiple dimensions that make it difficult to determine adequate and acceptable numbers of visitors [75].

In particular, cruise ship tourism has a special relevance in this context because of its spatial and temporal concentration in cities, affecting the proper functioning of networked urban infrastructure systems (considered critical infrastructure) whose failure can become problematic, endangering the health of the population given the pressure on the infrastructure. The similarity of cruise ship schedules, the length of a cruise ship's stay in a port, and the seasonality of cruise ship tourism can be considered the main reasons for the temporary concentration of cruise ship tourists in a city, affecting the local quality of life and negatively impacting the tourist experience given the perception of the available infrastructure [77]. This situation is evident in Roatan.

5. Conclusions

We can point out that there is a generalized perception of the fundamental role of maritime authorities in the control and assurance of the environmental impact, however, there is a lack of specialization in the areas of traceability, which could have an impact on the ecosystem and the health of the population. Although the spill-based operations are ascribed to international treaties for the treatment of accidents, the lack of governmental works to prevent and mitigate different accidents stands out as one of the most critical points. There is a consensus among those interviewed about the strict management of cruise ship waste at Roatan's terminals, even highlighting the educational efforts of companies and government agencies. It is concluded that among the positive impacts of cruise ship activity the one most highlighted by the community is the economic spillover and investment that is clearly capitalized by the community. However, the negative impacts include the exposure of the local community to viruses and diseases amplified by the pandemic, and the ecological damage caused by tourist activities on reefs and protected areas. At the same time, investments in infrastructure are out of balance with environmental care. Finally, although there is compliance with international protocols and treaties, there is a need for leadership with greater presence that articulates the different stakeholders to ensure more rigorous public works and control of tourist behavior in favor of greater environmental care.

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Appendix A

Semistructured Questions

What are the aquatic invasive species that have been identified in the surroundings of Roatan?

What are the positive and negative impacts for the Roatan community with the arrival of Cruise Ships?

How are the relationships between the port administration of the Ports of Roatan and Mahogany Bay, the Cruise Ships, the environmental community and the community in general managed?

What processes are followed for the handling and storage of dry bulk cargo?

Who leads the environmental activities on the island? What activities do they perform? How do they perform them?

Who controls greenhouse gas emissions? How do they control them?

How are the activities necessary to control oily secretions in the ports and their surroundings managed?

How are the activities necessary to control oily secretions in the ports and their surroundings managed?

How are NOX (nitric oxide (NO) and nitrogen dioxide (NO₂)) air pollutant emissions controlled? What measures have been taken?

How are SO_x (sulfur oxides) and PM (particulate matter) air pollutant emissions controlled?

How is recycling from cruise ships handled?

What is being done in the Ports/Roatan to prevent spills and manage water storage?

What activities are being carried out to strengthen underwater noise control management and prevent impacts on biodiversity?

What is the waste management policy for cruise ships? Who supervises and monitors it?

In your opinion, what are the benefits of cruise ships and cruise ship passengers arriving in Roatan? Disadvantages?

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