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The Negative Impact of the Cruising Industry on the Environment

Abstract

Tourism and travel make a vital contribution to the global economy and are considered particularly important for developing countries. The cruise industry, as part of the tourist offer, created in the beginning by demand from North America, had a dynamic growth for over nearly 40 years. Many studies show that today there is still an increased demand for a form of vacation spent on a cruise ship. For this reason, new cruise destinations are increasingly being developed and cruise ships are getting bigger, which has an increasing impact on the environment. The paper explores the causes and consequences of dynamic cruise industry growth on environment. The aim of the research is to identify the challenges facing the cruising industry when it comes to environmental impact. The research was conducted on the basis of available secondary data sources.

Keywords: cruise industry, tourism, greenhouse gas emissions, environmental pollution

1. Introduction

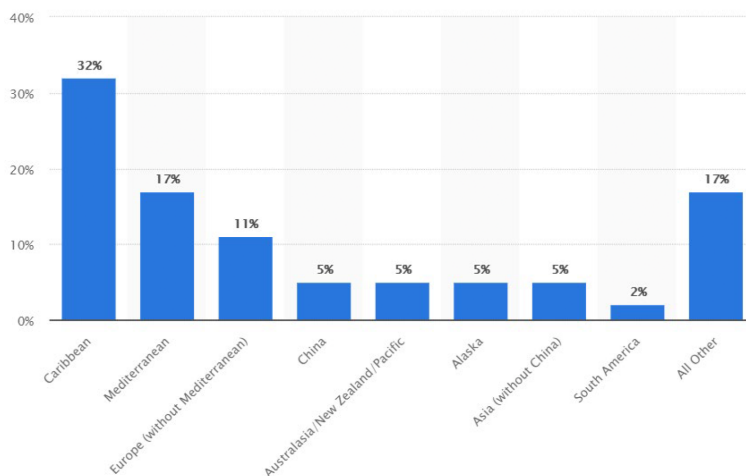
Under the influence of the additional funds growth, living standards, increasing leisure time intended for rest and recreation and with the constant growth of environmental awareness, in recent years there have been significant changes in the tourist demand characteristics. Modern tourists are increasingly turning to sustainability.

Sustainable development is a harmonious relationship between the state of the environment and human activity in order to preserve the natural wealth for future generations. Globally, the common goal is to strike a balance between the requirements for improving the quality of life (economic component), for achieving social welfare and peace (social component) and requires the preservation of natural resources and the ecosystem (environmental component), on which both present and future generations depend [1].

However, the negative impacts of tourism can occur, for example, when the level of visitor use is higher than the ability of the environment to cope with that use, acting outside the acceptable limits of change or the possibility of regeneration of a particular territory [2]. One such example is the Mediterranean coast. In marine areas, tourist activities such as diving or cruising can cause damage to sensitive ecosystems such as coral reefs, which are also affected by greenhouse gas emissions due to changes in the pH of seawater (coral bleaching) [3].

A cruiser is a ship intended for cruising tourist trips, most often in tropical or closed seas, where passengers are offered the possibility of various pastimes and attractions on board during the voyage [1]. The offer is extremely rich and diverse, and almost all types of consumers can find a cruise to their liking. Consumers are provided with a wide selection of itineraries, which include a large number of destinations around the world, but also a selection of the most modernly equipped and designed ships, which in recent history became the destination itself.

In the early 80s, there were just under two million cruise passengers, in the late 80s, there were four million, in the late 90s nine million, in 2010 there were 19 million and in 2018 there were over 28 million cruise passengers [4]. The demand for cruises, which recently has been recorded in all world markets, confirms that the cruise industry is still in the growth phase and will continue to be an increasing part of European and Mediterranean tourism as well as for the rest of the world from year to year.



Source: Statista Research Department. (2020) Global cruise industry deployment market share 2019, by region. Available from: <https://www.statista.com/statistics/294260/global-cruise-industry-deployment-market-share-by-region/> [Accessed 21.10.2020].

Figure 1 – Market share of the global cruise industry by regions in 2019

The statistics from Figure 1 show the share of the global cruise industry in 2019 by regions among which the Caribbean lead with 32%, while Mediterranean follows with 17%.

Cruising encompasses all four features of tourism - transport, accommodation, attractions and tour operators - and it is therefore a major competitor to stationary tourism. However, precisely because it offers a wide range of its services, the cruising industry leaves strong consequences for the environment.

The rapid growth of the cruise industry and the growing number of ports / destinations in itineraries represent an opportunity to contribute to the economic development of visited places and countries, but it also raises the question of sustainable development, carrying capacity of destination and environmental impact. Some of the negative effects of the cruising industry are high greenhouse gas emissions, air pollution, as well as sea and ocean pollution by wastewater. These examples are discussed in more detail later in this paper.

2. Pollution by greenhouse gas emissions from cruisers

Travel by passenger ships, i.e. cruising tourism is already transformed into a serious socio-economic activity. With the help of this tourism, natural attractions and other available tourist resources are included and charged.

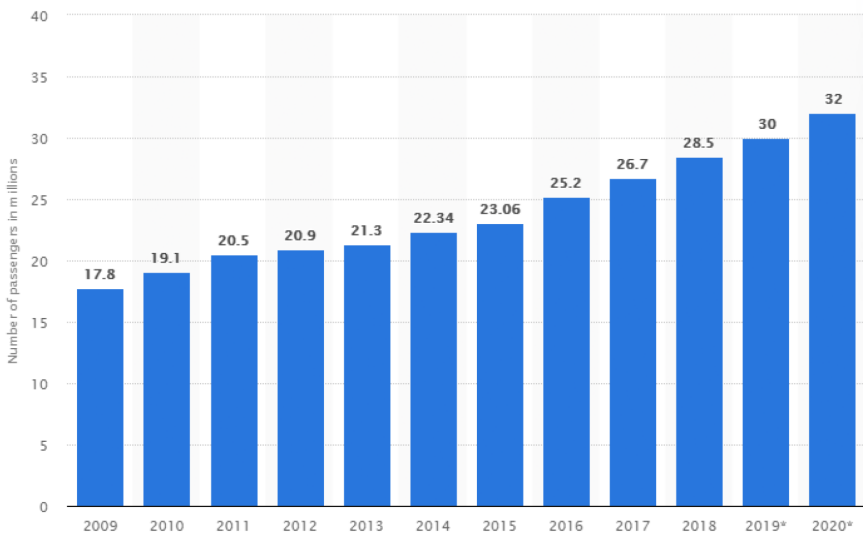


Figure 2 – Number of cruise passengers by year (2009-2020)

The cruise industry is the fastest growing travel industry and in 2018 transported over 28 million tourists, which is 6.7% more than in 2017. Estimates made for 2019, show that cruisers transported about 30 million passengers, which is an additional increase of 5.2% compared to the previous 2018. All market projections show that the industry will continue to grow as operators continue to build new modern ships with the latest leisure opportunities.

With the development of cruising tourism, the negative effects on the environment increase. It's known that tourism has a negative effect on the climate with greenhouse gas emissions, especially carbon dioxide (CO₂). In terms of climate, tourism negatively reflects through accommodation and transport as well as through other tourist activities.

The interconnectedness of transport and tourism is still perhaps one of the most important relationships within the wider tourism system. It is a fundamental fact that people travel to different destinations for individual reasons, and the provision of transport is at the heart of this movement [6]. Among the carriers used for tourism are cruise ships, which can transport and accommodate several thousand people. Cruises are the ultimate all-encompassing holiday experience for its passengers while the benefits to the locals when the cruiser docks in port are minimal and they have to deal with the waste that the cruiser leaves behind.

Except the aviation, the world's cruising industry has also met with growing criticism for environmental pollution. It is natural to assume that a ship emits less carbon dioxide than a long-distance flight, but this is not the case.

Cruise ships that can carry up to 5,000 tourists are not only known for generating huge amounts of waste and sewage, but also largely contribute to greenhouse gas emissions in the tourism industry. Ship chimneys release toxic emissions that lead to acid rain, global climate change and adverse effects on the health of communities located near ports. Despite the fact that cruise ships are more energy efficient than other forms of commercial transport, marine engines run on extremely dirty fuels, known as 'bunker oil'. To make the problem more complex, the engines on these ocean-going ships currently do not have to meet the same strict air pollution controls as cars and trucks do.

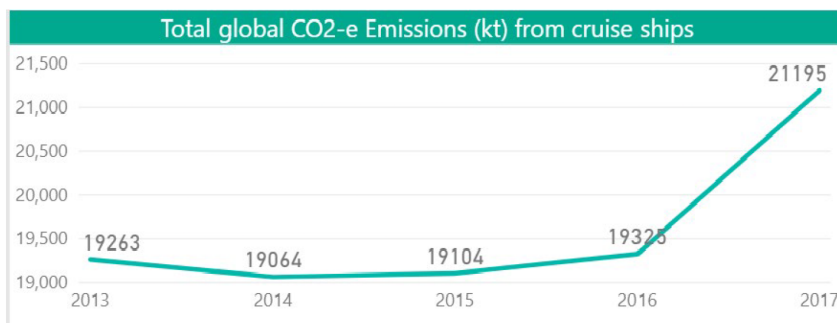


Figure 3 – Global CO₂ emissions from cruise ships

Figure 3. shows that greenhouse gas emissions from cruisers are growing over the years. A smaller decline is visible in 2014, but since 2015, the increase in emissions has been continuous.

Referring to fuel consumption per individual passenger and distance traveled, the specific consumption and associated CO₂ emissions were found to be higher than aircraft emissions. Rough estimates indicate that emissions from cruise ships amount to about 0.27 kg CO₂ per passenger and mileage, compared to 0.16 kg for long-haul flights [3]. By comparison, a car emits about 0.118 kg of CO₂ when driving one kilometer [8]. The ship burns 433 tons of fuel a day and takes six days to travel from Southampton (England) to New York (USA). If the ship is full, each passenger with a return ticket consumes 2.9 tons of fuel. A ton of shipping fuel contains 0.85 tons of carbon, which produces 3.1 tons of carbon dioxide when burned. Each passenger is responsible for 9.1 tons of emissions. In other words, a trip to New York and back uses almost 7.6 times more carbon than an aircraft would use for the same trip.

Cruise ships are often described as ‘floating cities’, and environmental groups point out that cruisers pollute the same or even more than cities. In the United Kingdom, local environmental groups have shown that a single cruiser can emit as much pollution and particles as 700 trucks or a million cars. It is estimated that between 40,000 and 100,000 Britons die prematurely each year as a result of emissions from the shipping and cruising industries, and major port cities such as Southampton, Grimsby and Liverpool are particularly affected. The biggest problems with emissions from cruise ships are nitric oxide levels, which are associated with acid rain, higher cancer rates and other forms of respiratory diseases. However, as states seek to reduce CO₂ emissions and companies are under pressure to reduce their carbon footprint¹, the maritime industry is under increasing scrutiny. Some of the cruising carriers have been invited to switch to cleaner alternatives to lower sulfur fuels by the end of 2020, but few have heeded these calls [11].

3. Other pollution caused by cruisers

As the cruise industry expands, so does its negative influence on the environment. Some of these negative impacts are ballast water, gray water, black water, chemical pollution, solid waste and oil, with which the industry further pollutes the air and sea [12].

On a typical one-week voyage, a cruise ship generates more than 50 tons of garbage and one million tons of gray (waste) water, 210,000 liters of sewage, and 25,000 liters of oil-contaminated water.

¹ The carbon footprint is the total amount of greenhouse gases (including carbon dioxide and methane) generated by human activity.

Table 1 shows the average daily environmental pollution from a cruiser with 3,000 passengers.

Table 1 – Total pollution in a day of the cruiser carrying 3,000 passengers

Type of pollution	Quantity / equivalent
Air pollution	1 cruise ship = 12.000 cars
Waste	10,5 – 12 tons
Hazardous waste	55 – 85 liters
Black waters	60.000 – 120.000 liters
Gray water	1.020.000 liters
Ship's bilge	25.000 liters

From the previous table it can be seen that a 3,000-passenger cruiser using sulfur-rich fuels can pollute the air of more than 12,240 cars [3]. In cities like Vancouver, air pollution coming from a ship contributes to the greenhouse effect with 58% and participates in sulfur gas emissions with about 95% [1]. In France, 10% of air pollution in the port city of Marseilles can be directly attributed to the shipping industry. This has a negative impact on the local population through various health problems. It is estimated that over 50,000 Europeans die prematurely each year from the pollution effects from ships [11].

The daily waste accumulation on a cruise ship is estimated at about 3 to 4 kg per passenger. About one million tons of waste is generated annually on ships, of which 24% is from cruisers and this waste is mostly incinerated (75 - 85%) which releases harmful gases while the ash is thrown into the sea.

Hazardous waste on cruise ships is generated as a result of the operation of photo laboratories, dry cleaners, photocopiers, printing apparatus, etc. As can be seen from Table 1, cruise ships produce 55 to 85 liters of liquid hazardous waste per day. Although the amount does not seem large, the impact of such substances on the environment is significant. Bilge water (if it has a high content of oil and petroleum) and residues from the filtration and incineration process are also considered hazardous waste.

Wastewater from ships is potentially hazardous to ecosystems and to man who depends on those ecosystems. There are three main groups of wastewater: black (fecal water), gray (showers, washing machines and dishwashers, washing and rinsing ship surfaces, saunas, swimming pools, etc.) and ship bilge. Each passenger on a cruiser produces 20 to 40 liters of black water per day and approximately 120 to 340 liters of gray water. Heavy metals, bacteria and pathogens of wastewater (black and gray) are deposited on the seabed and are a potential danger to people who consume food from living organisms from the seabed. The ship's bilge contains condensates from the engine room, petroleum, oil and grease and detergent residues. It accumulates in cruisers 25,000 liters per day.

Ships intended for cruising tourism already have a capacity of several thousand visitors, and the trend of building larger ships is still present. The harmful effects of large cruisers may also apply to hull anti-corrosion protection systems and coatings that prevent the formation of algae. Such coatings also improve the maneuverability of the ship, reduce fuel consumption and reduce emissions of gases from fuel combustion, but on the other hand, such chemical coatings have a detrimental effect on human health and other living organisms. In addition, with the arrival of large cruisers and ports, they adapt by digging the bottom, which changes the appearance and composition of the seabed in the ports, which further disrupts the natural habitats of the species that inhabit these places.

The limitation of the cruise tourism expansion is related to its negative impact on the environment and ecological systems that are very sensitive to the increase in cruise traffic. Despite the initiatives of world organizations and the increased awareness of citizens about sustainability, there is still a relatively small number of regulatory bodies and regulations that would carry out stricter controls and lead cruising companies to socially conscious action, especially those who have tried to ignore them.

4. Pollution reduction guidelines

Environmental protection is a set of appropriate activities and measures aimed at preventing environmental hazards, preventing the occurrence of damage or environmental pollution, reducing or eliminating damage to the environment and restoring the environment to the pre-damage state [14].

The first set of activities in the conception of a long-term protection policy must be focused on a comprehensive analysis of the current state of existing problems and projected trends in the protection of the human environment in the areas of nautical and cruising tourism. The second assumption and starting point of a long-term protection policy is contained in the necessity of organizing special longer researches and monitoring of sources, forms and degrees of endangerment and pollution of water areas where the most frequent traffic and the highest concentration of vessels stay. The third set of previous activities in the creation of a long-term protection policy consists in the development of a special project with operational programs of measures, actions and tasks [15].

The Marpol Convention as the most important convention related to environmental protection and marine conservation, ISO standards for the field of ecological balance in tourism and the awarding of the Blue Flag for marinas are just some of the measures to reduce marine and ocean pollution. Despite constant innovation and the development of new technologies, pollution is still present, but in smaller quantities.

For example, a route management system allows cruisers to reduce fuel consumption by up to 5% on individual routes by analyzing data on energy consumption, temperature, ship and wind speed, and engine capacity and efficiency [16]. Despite

the fact that technology is increasingly available today, not everyone opts for such an approach. Another such area where there is significant room for improvement is safe and environmentally friendly ship recycling. In addition to ship dismantling, their construction and design are an even more significant factor, especially when it comes to ship dynamics and stability.

There is also the option of powering the ship's generators via solar panels and using natural gas, which is cleaner in terms of exhaust emissions, thus reducing sulfur and nitrogen oxide concentrations by up to 85%. However, the introduction of such changes implies changes in the construction of ships, but also the ports that receive them, which could prolong the application of these principles [16].

Moreover, it is necessary to introduce the principle of "polluter pays", which would allow quick and effective sanctioning of violators of laws and international conventions. The ultimate goal of this recommendation is to raise funds from the fee so that such funds are spent only to support the services of monitoring and development activities of waste collection from such ships. The most similar examples of this are seen in the US state of Alaska and the Caribbean. Alaska has introduced a \$ 50 tax per passenger, and from that money, it pays the "ocean rangers" who control the implementation of regulations. Ships consequently use electricity supply from ports to reduce emissions and air pollution. A similar tax is paid in the Caribbean, the so-called environmental tax per passenger and amounts to 90c per passenger for both the inpatient and the disembarked passenger from the cruiser [17].

Based on the above, cruisers can have a strong negative impact on the environment and therefore it is necessary to provide equipment for possible pollution and create scenarios of defense against the same. Control measures should be continuously implemented, both for the arrival of ships in the port and for departures from the port, to pay attention to air pollution and to adjust the regulations of air pollution to the adopted laws. All these opportunities and innovations entail the need to introduce appropriate regulations that would monitor the compliance of companies with the new rules of the game.

5. Conclusion

Cruising tourism is one of the fastest growing sectors of the tourism industry and has a significant impact on the environment, economy and society of target destinations. The economic, social, cultural and environmental impact of cruising tourism has not been studied so much. For this reason, many destinations do not have the tools to establish strategies and policies for effective cruise tourism management. Although cruise companies cannot be blamed for the lack of domestic or international regulations, they do use system imperfections to make use of resources that are not owned by them or participate in their maintenance. The lack of effective payment provisions for environmental pollution and other control mechanisms in the cruising industry leads to

a situation where most users use the available funds free of charge. In such an absence of clear rules for the management and implementation of environmental legislation, this way of managing nautical tourism can lead to a significant social problem at the global level. For this reason, cruise tourism destinations are looking for strategic opportunities to match demand growth with sustainable development. Sustainable destination development is possible only with a responsible approach to cruising tourism.

This paper shows that increasing research efforts must be focused on responsible cruising tourism and that the further development of this type of tourism requires the implementation of measures. Some of those measures can be measures for sustainable growth and development, proper resource management, moderate capacity building, system establishment supervision, harmonization of legal infrastructure, modernization of devices and equipment for protection of the sea from pollution, integration of management systems and application of new environmental standards.

Economic activities that do not have a greater or lesser negative impact on the environment are rare. This, of course, cannot stop economic growth, but for the sake of sustainability, all actions must be taken to reduce the consequences for the environment.

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