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Between Hammer and Anvil: Sustainable Tourism and Water Quality on Cyclades Islands Between the Greek Financial Crisis (2009) and the COVID-19 (2020)

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Abstract: The Cyclades Islands are significant to Greece's economy, and their role has grown dramatically during the two crisis periods of the Greek Financial Crisis in 2009 and the COVID-19 pandemic outbreak in 2020. The crises shaped the Cyclades Islands' tourist and water resource management due to water crisis events that took place between 2012 and 2024. The heavy dependence and emphasis on tourism revenues and less focus on water quality regulations made the situation more complex. Taking Mykonos and Santorini Islands (Greece) as a case study, this research's main aim is to analyze hospitality stakeholders' perceptions concerning water quality problems and reveal the ways of operation (modus operandi) that trigger shifting between stages in the lifespan of tourism destinations. Data are gathered through face-to-face interviews with hospitality stakeholders. The results show that the hospitality stakeholders believe that water quality issues exist in connection with short-term water resource management and tourism activity on the islands. Secondly, water quality issues and water shortages have begun to have a detrimental influence and negative cumulative impact on water availability and quality on the islands. These findings shed light on the critical points of the stage changes in the lifecycle and modus operandi of destination evolution.

Keywords: water quality; tourism destination management; COVID-19; sustainability; the Cyclades Islands

Citation: Atay, I.; Seyhan, B.; Saladié, Ò. Between Hammer and Anvil: Sustainable Tourism and Water Quality on Cyclades Islands Between the Greek Financial Crisis (2009) and the COVID-19 (2020). *Sustainability* **2024**, *16*, 10676. https://doi.org/10.3390/su162310676

Academic Editors: Maria Anunciação Mateus Ventura and Andrea Zita Costa Botelho

Received: 9 November 2024
Revised: 27 November 2024
Accepted: 3 December 2024
Published: 5 December 2024

1. Introduction

At the beginning of the second half of our journey to 2030, signs of a determined, sustained global comeback have yet to emerge. As of 2022, 2.2 billion people were without access to safely managed drinking water, and 3.5 billion lacked access to safely managed sanitation. In all world regions, many rivers, lakes, and aquifers are still in good condition—as of 2023, 56% of water bodies assessed in 120 countries have good water quality. However, countries implementing the most extensive monitoring programs show that water quality has been degrading since 2017 [1]. When the density of human mobility is considered, much of the instability in water usage and quality can be attributed to tourism, especially in small-scale destinations such as islands with delicate balance. Therefore, tourism-related frameworks, policies, and regulations play a direct role in sustainable development. The sixth Goal of the 2030 Agenda (Figure 1) refers to this relationship with a focus on sustainable tourism.

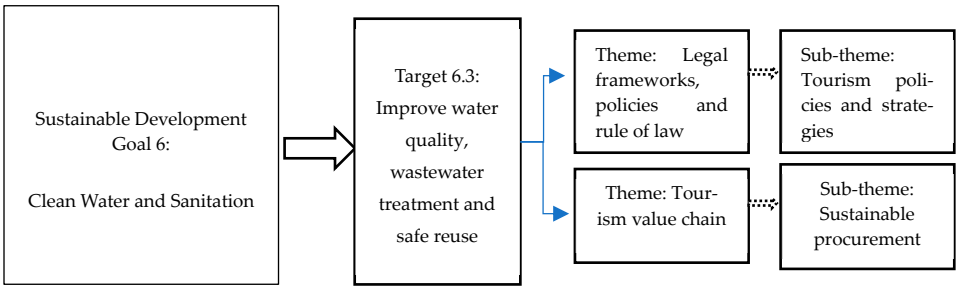

Figure 1. SDG 6 Target 6.3 and tourism-related themes/sub-themes [2].

Water management and quality are vital not only for residents and locals but also for visitors and the whole lifecycle of the place. To emphasize this, Gössling et al. [3] underlined that a tourist destination may experience a sudden decline due to a natural disaster, a war, or a pandemic. Unless decision-makers implement additional steps, the decline phase of the tourism lifecycle will conclude with the cessation of tourism activities in that specific tourist location [4]. Zimmermann [5] highlighted that external factors such as pandemics, economic crises, climate change, wars, and floods can severely disrupt tourism. European tourism products were severely disrupted during their "development" phase because of two world wars, and the development was delayed until the beginning of the 1960s. Furthermore, the Gulf War, the Yugoslavian Wars, and the economic recession of 2007–2009 were among other events that significantly negatively impacted global tourism development [6].

Environmental quality is crucial to a tourism destination's existence and market competitiveness. Therefore, improved water quality is critical for the lifespan and sustainability of a tourism destination. As Ostrom underlined, the institutions and their regulations are important for governing Common Pool Resources (CPRs), such as water resources. Therefore, environmental regulations are critical to sustaining tourism destination's sustainability and durability [7]. The Mediterranean area is one of the tourist regions where the implementation challenges of regulations have occurred since tourism growth began in the 1960s [8,9]. The European Union Water Framework Directive 2000 (EU WFD 2000) is one of Europe's most significant documents used in water resource management. Despite criticisms that the directive takes a top–down approach, the WFD 2000 has been an essential instrument for EU Member States in rallying their water resources regarding quality and volume. However, certain discrepancies exist in the implementation process between Northern European and Southern European nations [10].

As this work will discuss, specific water quality issues occur during the summer months when there is excessive tourism, particularly during the peak tourism season in Mykonos and Santorini. For that reason, the Greek Economic Crisis and the COVID-19 Pandemic Outbreak are good examples for assessing how external factors can affect the tourism lifecycle phases, as demonstrated by the examples of Mykonos and Santorini, which are among the most critical tourism revenue-bringing tourist destinations in Greece. The crises shaped the management of the Cyclades Islands' tourist and water resources since the key stakeholders did not have a holistic approach. Water quality concerns began to emerge, significantly impacting not only the everyday lives of Cyclades Island people but also those of tourists. The decisions of key stakeholders hold essential importance for tourism's sustainability and water resources' outstanding quality. Therefore, this work's first objective is to analyze hospitality stakeholders' perceptions concerning water quality problems and reveal the ways of operation (modus operandi) that trigger shifting between stages in the lifespan of a tourism destination in the examples of Mykonos and Santorini Islands, Greece. The second objective is to analyze the policies of the public and water authorities between the two crisis periods: the Greek Financial Crisis in 2009 and the COVID-19 Pandemic Outbreak in 2020.

The rest of this article is organized as follows: the second section is the literature review. The third section is dedicated to the area of this study, data, and methods; the

fourth presents the results, and the fifth discusses the main findings. Finally, the sixth section offers the conclusion, limitations, implications, and future lines of research.

2. A Literature Review

Butler [11] pointed out that tourism zones are dynamic and may grow and alter over time. Tourist sites may lose their popularity if they lose their reputation as congested areas with low environmental quality. This evolution can result in either excellent or negative changes, determining the life cycle of a tourist site. Indeed, the choices of key stakeholders regarding the future of tourist places have to be made with caution and a long-term view. On the other hand, short-term environmental repercussions may be challenging to identify for some stakeholders, such as tourist resort entrepreneurs or governmental entities involved in decision-making processes. This might have long-term effects on tourism, reducing environmental quality and jeopardizing the destination's viability.

Moreover, many actors in the tourism sector, such as tourist resort entrepreneurs, may prefer to make daily decisions to address short-term impacts, viewing long-term impact decisions as unnecessary or ineffective because they may not have estimated their environmental externalities. Furthermore, short-term decision-making among key stakeholders can be more common when significant economic issues, such as a recession, and differing perspectives can coexist among the many actors involved in tourist policies, programs, and projects. The actors' perspectives might sometimes conflict because of their diverse goals and requirements [12]. Residents may favor improved infrastructure, different cultures, and lifestyles of foreign visitors in their homeland's early stages of tourism development. However, over-tourism and tourism seasonality can disrupt residents' lives and turn positive sentiments into negative ones [13].

As Pearce [14] emphasized, seasonality in tourism might result in over-tourism and misuse of environmental assets such as water resources. At the same time, seasonal tourism may harm local inhabitants' everyday lives since an increase in the tourist population can put additional strain on things like garbage disposal, poor water quality, air pollution, and road traffic. As a result, the tourist destination's carrying capacity may be surpassed, putting additional strain on locals' social and economic activities.

Common Pool Resources (CPRs) are products made up of a natural or man-made resource system that is sufficiently massive to restrict prospective beneficiaries from benefiting from their utilization. CPRs can cover fishing areas, pastures, forests, the atmosphere, irrigation systems, and water resources. Nonetheless, it is critical to distinguish between the resource system and the flow of resource units produced by the system because resource systems are similar to stock variables, capable of producing the greatest amount of a flow variable without harming the resource system itself [7].

CPRs are easily exploited, which can lead to the complete depletion of the resource system. Garrett Hardin emphasizes that each individual is tied into a system that pushes him or her to grow his or her benefits from the resource system without limit in a finite planet, which is known as the "Tragedy of Commons". In fact, Hardin mentions that freedom in common can bring ruin to all, and he uses the example of the rational man who discovers that his share of the cost of the wastes he discharges into the commons (e.g., a lake or a river) is less than the cost of cleansing his wastes before releasing them. As a result, coercive rules or institutions must exist to prevent the conduct of the "rational man". The rational man's acts can only be halted by coercive laws or taxing devices that can impose regulations, but he adds that prohibition is simple to legislate, but temperance is more difficult, and administrative law must be used to mediate the situation. In other words, CPRs can only be properly handled if mutually coercive laws and levies are supported by the whole society [15].

Tourism is one of the world's fastest-growing business sectors, and many countries' economies rely on its profits. Tourism demands a sustainable environment, and CPRs are critical for the continuance of tourism operations in tourist sites. Tourism, on the other hand, can put a strain on CPRs if they are not handled sustainably. There are several

stakeholders involved in the tourist industry, and each stakeholder might aim to maximize their profits. As a result, the environment and ecosystems may face a range of pressures from various players participating in tourist management in a specific location. There might be mountainside deforestation, draining of coastal wetlands, over-extraction of water resources, and even pollution (water, noise, air, and aesthetic pollution caused by tourist goods or activities). Tourism management and CPR management should work together to accomplish long-term CPR and tourism management. At the same time, environmental ethics and conservation ethics are critical for accomplishing sustainability goals since they represent humans' collective behavior toward nature (by the establishment of laws or agreements) [16]. As a result, it should not be forgotten that tourism, like other economic sectors, may degrade CPRs and ecosystems unless collective action is based on norms and laws. Unsustainable tourism without controls can lead to worsening environmental circumstances, decreased economic well-being, increased social inequity, and worse visitor satisfaction [8]. Unsustainable tourism can be severe due to excessive use of CPRs and a lack of motivation among tourist stakeholders to invest in improving CPR conditions [17].

It should not be overlooked that CPRs already have individualism issues, in which individual users may act independently in their self-interest and act against the common good of all users by reducing the shared resource through mutual action [15]. As Ostrom [7] stated, CPRs have open access and unlimited resource utilization, implying a situation of Free Riding. In the tourism sector, several CPRs include air and atmosphere, water resources, seas, ecosystems, fisheries, forests, animals, grazing lands, and irrigation systems [8]. Water resources are at the heart of the tourism sector, and without water resources, tourism activity cannot continue. On the other hand, it is not easy to persuade hotels or resorts not to give enough water to their customers (holidaymakers) when they gain revenues from their customers' overnight stays on their properties. Healy [17] refers to this as an "investment incentive problem" since investors (in this example, tourist businesses) are deterred from upgrading or limiting their use of CPRs when resources are unconstrained and available for Free Riding.

The situation becomes more chaotic when tourism is included as the most critical sector in economic development. According to Briassoulis [8], the bulk of tourism complexes are built in ecologically sensitive regions, necessitating strict regulations and strong administration since there is a possibility of misuse and, finally, destruction of CPRs. Nonetheless, many tourist locations need rules, regulations, or robust administration due to various factors. In addition, tourism activities may have a negative impact on water quality. Detergents, oils, and food leftovers are common contaminants in wastewater from hotels, restaurants, and recreational facilities, and if not adequately cleaned, this effluent may wind up in nearby rivers, lakes, or the sea, creating contamination [18]. This impacts not only the local ecology but also the health of both residents and visitors who may drink or engage in recreational pursuits on the water.

In short, it is essential for a tourism destination to have institutions, and there should be regulations to use the tourism CPRs, such as water resources, properly and sustainably. The unsustainable and improper usage of the CPRs, such as water resources, can lead to the "stagnation" phase of their tourism lifecycle, which can even end the lifecycle of the tourism destination unless regulations are followed by the key stakeholders and actors that take part in the decision-making process [4].

3. Materials and Methods

3.1. Case Study Area

Mykonos and Santorini Islands are among the most touristic Greek Islands (Figure 2), and both are of specific importance to the tourism sector in Greece. Mykonos has an area of 85.5 km^2 and two municipal districts: Mykonos Town (Central) and Ano Mera, while Santorini has an area of 73 km^2 and the current municipality of Thira, which comprises all villages on the islands of Santorini and Therasia, was founded by merging the old Oia and Thira municipalities (Municipality of Mykonos, 2024; Municipality of Thira (Santorini),

2024). The permanent population of Mykonos was 10,134 individuals according to the latest census in 2011; however, it has increased in the previous ten years and reached 12,675 residents in 2021. The permanent population of Santorini was 15,550 inhabitants, but today, the permanent population is estimated to be around 25,650 [19]. It should be noted that due to the high seasonality of tourism activity, both islands have substantial populations, particularly during the summer months [20,21].

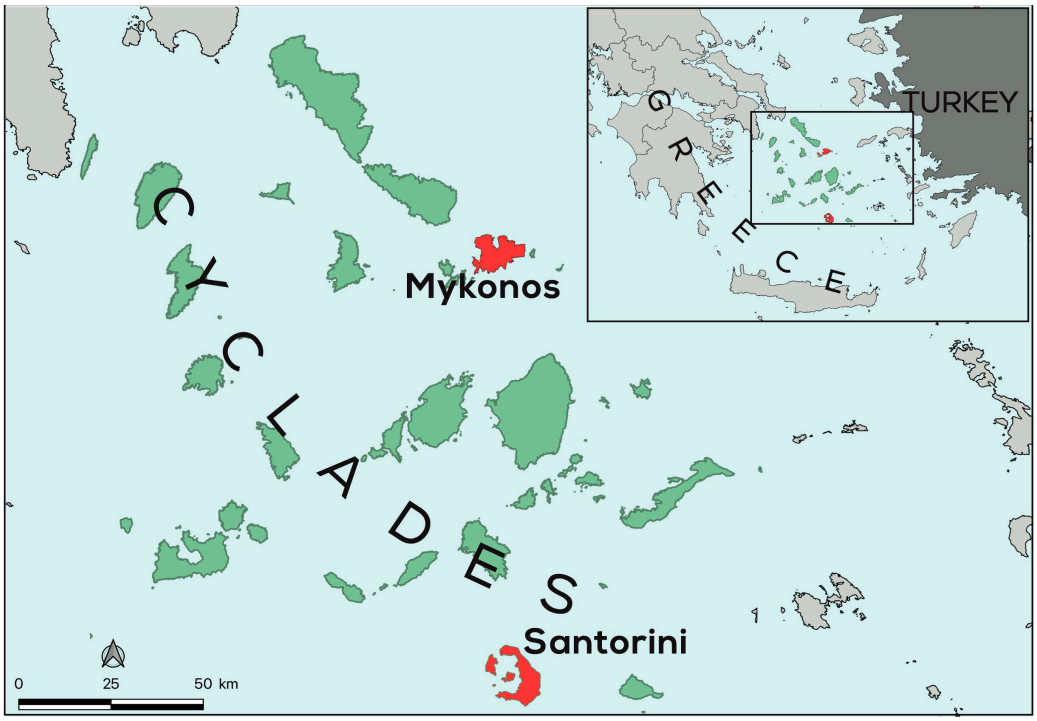

Figure 2. Location of the study area: Mykonos and Santorini Islands.

Tourism activity has been the most essential economic sector for Mykonos and Santorini, and there is limited agricultural activity on both islands [22]. Mykonos and Santorini have become two worldwide recognized destinations. Mykonos was visited by almost 1.3 million tourists in 2019, while Santorini was visited by nearly 1.6 million tourists in 2019 before the COVID-19 pandemic outbreak [19]. However, tourism intensified after the COVID-19 restrictions were lifted in Greece on both islands. Mykonos was visited by almost 2.7 million tourists in 2023, while Santorini was visited by nearly 3.4 million tourists in 2024 [23,24]. It should be highlighted that Mykonos and Santorini reached 110 overnight stays per resident, a "European" record in 2023 [25]. Mykonos has a total number of 225 accommodation units (excluding Airbnbs) with 7943 rooms and 16.157-bed capacity in 2023, while Santorini has a total number of 329 accommodation units (excluding Airbnbs) with 8468 rooms and 17.355-bed capacity in 2023 [26].

On the other hand, Mykonos and Santorini have semi-arid climates with decreasing water availability and water quality. The changing climate conditions, droughts, and rising water demands of tourists have led to water stress, water quality problems, and pollution [27,28]. The Municipal Water and Sewage Enterprise of Mykonos (DEYAM) and the Municipal Water and Sewage Enterprise of Thira (DEYATH) are the responsible authorities for providing the water supply on both islands, and they have been focusing on alternative solutions to supply the high-water demand during the summer months because of the tourism activity on both islands.

Mykonos has two dams (the Marathi and the Ano Meras) and six desalination plants built by DEYAM authorities to create water availability. At the same time, more than 1000 wells are being used to collect brackish water for additional supply; however, due to over-pumping, there are significant problems with the water quality (DEYAM, personal

communication, 11 August 2019). In Santorini, Zoodochos Pigi (life-giving spring in English) is the primary freshwater source, and there is a stone-built reservoir in Megalochori and six desalination plants which were built by DEYATH authorities to supply water for the island's residents and tourists. On the other hand, there are more than 100 wells in Santorini with brackish water; nevertheless, the wells' water quality is poor, as is in the case of Mykonos (DEYATH, personal communication, 22 August 2019). The amount of water consumption was 891.000 m^3, but it increased to almost 2.1 million m^3 in 2022 after the COVID-19 Pandemic Outbreak in Santorini, and the water quality decreased gradually with the high consumption due to tourism activity [29].

The amount of rainfall and groundwater is insufficient to supply the water demand on both islands, and the number of desalination plants has increased dramatically in both islands within the last ten years. Nevertheless, 2014 was one of the biggest water crises ever on the islands, affecting the residents' daily lives and the tourists. There were also significant problems with water pollution and poor quality on both islands [30,31]. The 2014 water crisis was a turning point for both islands, and they decided to focus on creating additional water supply through desalination plants. Nevertheless, the additional supply could not cover the water scarcity and poor water quality problems [22].

As a result, the public and water authorities in Mykonos began a water conservation campaign with several mottos, such as "Every Drop Counts", "Water Your Love for Mykonos", and "Save Water for Mykonos". The local population was very interested in the campaign, and many people began to reduce their water consumption by using low-flush toilets, showering instead of bathing, and turning off taps when not in use (DEYAM, personal communication, 11 August 2019). However, there was not enough support from the hotels or resorts for this campaign, so it could not solve the problem. For that reason, the public and water authorities in Mykonos opted to participate in the "Hydrousa" research project, which is part of the EU's circular economy initiatives for the rational management of water resources in remote island communities with acute water shortage [32].

In Santorini, there were similar water-saving campaigns; however, they were also ineffective due to a lack of support from the hotels or resorts (DEYATH, personal communication, 22 August 2019). Consequently, the public and water authorities in Santorini decided to limit the cruise arrivals to decrease the number of tourists [24]. Also, they decided to increase the water tariffs without distinguishing between small and large consumers in Santorini [29]. However, these actions could not solve the water scarcity or poor water quality problems.

3.2. Data and Methods

The primary goal of this study is to examine hospitality stakeholders' perceptions of water quality issues and to identify the modes of operation (modus operandi) that cause shifting between stages in the lifespan of tourism destinations, using Mykonos and Santorini Islands (Greece) as a case study. Tourism activity increases water demand in Mykonos and Santorini, and most key stakeholders involved in tourism and water resource management decision-making are well-versed in the concerns. As a result, when the second water crisis began in 2014, we performed questionnaires and in-depth interviews with hotel stakeholders in Mykonos and Santorini. We created a questionnaire to collect information about water resource and tourist management and stakeholders' assessments of water quality issues on both islands. We wanted to compare the perceptions of different hospitality stakeholders in two different islands among the Cyclades Islands. We followed a similar technique as Santos-Lacueva and Saladié [33] and Santos-Lacueva et al. [34] since we wanted to do both quantitative and qualitative analyses. Many of the questions were closed questions in our questionnaires. However, some of our questions required yes or no answers, while others used a Likert scale or provided a set number of possibilities. They enabled the analysis of frequencies and distributions (a quantitative approach). Nonetheless, we asked the respondents to defend their replies to the closed questions (quantitative technique), which helped us better understand water quality concerns, water resource

management, and tourism activity. Hence, we contacted a comprehensive list of hotels in Mykonos and Santorini. We submitted research information and sought interviews with the hotel manager, director, or owners. A set of 24 responses was obtained from hospitality stakeholders, which is a sufficient sample to meet the research aims. Eleven stakeholders were interviewed in the summer of 2014 (from 5 July to 10 August), and thirteen were interviewed in the summer of 2015 (12 July–15 August).

The interviews were all in-person and took place in Mykonos and Santorini (where the respondents worked), each lasting 1–1.5 h. They were conducted in English, German, and Greek, with a translator assisting with the Greek interviews. We provided each participant extensive information about our research and informed them that their responses and talks during the interviews would be kept secret. We also requested permission to audio-record the interviews; only the interviewees who permitted us were recorded.

We believe it is important to give detailed information regarding the participants' demographics. As mentioned above, we received 24 positive responses (14 Mykonos and 10 Santorini) from the hospitality stakeholders (including hotel managers, directors, and owners) on both islands. Their detailed demographics are shown in Tables 1 and 2. At the same time, Tables 1 and 2 include the codes of participants of the interviews. Hotels are spread around the island of Mykonos, with the majority on the western shore. In contrast, hotels are spread all around the island of Santorini, with the majority on the southern shore.

Table 1. Distribution of participants according to age, gender, profession, and hotel classification in Mykonos.

Index	Code of the Participant	Age	Gender	Profession	Hotel Class.
1	Mykonos Hospitality Stakeholder 1	41	Female	Hotel Manager	Five Star
2	Mykonos Hospitality Stakeholder 2	48	Female	Hotel Manager	Four Star
3	Mykonos Hospitality Stakeholder 3	46	Female	Hotel Director	Five Star
4	Mykonos Hospitality Stakeholder 4	39	Female	Hotel Manager	Three Star
5	Mykonos Hospitality Stakeholder 5	34	Male	Hotel Manager	Two Star
6	Mykonos Hospitality Stakeholder 6	49	Male	Hotel Director	Five Star
7	Mykonos Hospitality Stakeholder 7	71	Male	Hotel Owner	One Star
8	Mykonos Hospitality Stakeholder 8	39	Male	Hotel Manager	Five Star
9	Mykonos Hospitality Stakeholder 9	38	Male	Hotel Manager	Three Star
10	Mykonos Hospitality Stakeholder 10	35	Male	Hotel Manager	Two Star
11	Mykonos Hospitality Stakeholder 11	37	Male	Hotel Manager	Three Star
12	Mykonos Hospitality Stakeholder 12	40	Male	Hotel Manager	Five Star
13	Mykonos Hospitality Stakeholder 13	36	Male	Hotel Manager	Four Star
14	Mykonos Hospitality Stakeholder 14	62	Male	Hotel Owner	Four Star

Table 2. Distribution of participants according to age, gender, profession, and hotel classification in Santorini.

Index	Code of the Participant	Age	Gender	Profession	Hotel Class.
1	Santorini Hospitality Stakeholder 1	46	Female	Hotel Manager	Three Star
2	Santorini Hospitality Stakeholder 2	41	Female	Hotel Director	Three Star
3	Santorini Hospitality Stakeholder 3	37	Female	Hotel Manager	Three Star
4	Santorini Hospitality Stakeholder 4	45	Female	Hotel Manager	Four Star
5	Santorini Hospitality Stakeholder 5	66	Female	Hotel Owner	One Star
6	Santorini Hospitality Stakeholder 6	42	Male	Hotel Manager	Five Star
7	Santorini Hospitality Stakeholder 7	47	Male	Hotel Manager	Four Star
8	Santorini Hospitality Stakeholder 8	53	Male	Hotel Manager	Five Star
9	Santorini Hospitality Stakeholder 9	34	Male	Hotel Manager	Two Star
10	Santorini Hospitality Stakeholder 10	49	Male	Hotel Manager	Five Star

The questionnaire asked respondents ten closed and open-ended questions about their perceptions of tourism activities, water quality issues, and water resource management. We

wanted to learn the perceptions of the respondents as to whether they were satisfied with the water quality that was being supplied by the municipality enterprises (DEYATH (In Santorini) and DEYAM (In Mykonos)) (Q1). After this question, we asked a closed question regarding the frequency of the water quality problems on the islands (Q2). Then, we asked the hospitality stakeholders their perceptions regarding the reasons behind the water quality problems, whether they were related to tourism activity (Q3), short-term-based water resource management (Q4), agricultural activity (Q5), industrial activity (Q6), climate change (Q7), or EU regulations/policies. Two open-ended questions followed these six closed questions. We asked about the perceptions of hospitality stakeholders regarding their policies, strategies, or plans to guarantee better water quality in their hotels and resorts (Q9). After this question, we asked another open-ended question regarding the policies, strategies, or plans of the public and water authorities to guarantee better water quality on both islands (Q10). Table 3 depicts the distribution of questions that were used during the interviews with the hospitality stakeholders.

Table 3. Distribution of questions that were used during the interviews with the hospitality stakeholders.

Index	Questions
1	Please rank from 1 to 5 your satisfaction level with the water supply quality in Mykonos/Santorini (1—very dissatisfied; 5—very satisfied).
2	Please rank, from 1 to 5, the frequency of water quality problems in tourism activity in Mykonos/Santorini (1—very rare; 5—very frequent).
3	Are water quality problems due to tourism activity in Mykonos/Santorini? (1—strongly disagree; 5—strongly agree).
4	Are water quality problems due to short-term-based water resource management in Mykonos/Santorini? (1—strongly disagree; 5—strongly agree).
5	Are water quality problems due to agricultural activity in Mykonos/Santorini? (1—strongly disagree; 5—strongly agree).
6	Are water quality problems due to industrial activity in Mykonos/Santorini? (1—strongly disagree; 5—strongly agree).
7	Are water quality problems due to climate change in Mykonos/Santorini? (1—strongly disagree; 5—strongly agree).
8	Are water quality problems due to EU environmental regulations/policies (EU WFD 000) in Mykonos/Santorini? (1—strongly disagree; 5—strongly agree).
9	What policies/strategies have been or are being implemented by your hotel to guarantee a better water quality supply? (open question).
10	What policies/strategies have been or are being implemented by the public and water authorities on your island to guarantee better water quality supply? (open question).

We requested the respondents to explain their replies to the closed questions, which helped us gain a better knowledge of poor water quality challenges, water resource management, and tourism activities on the islands.

4. Results

As previously mentioned, many tourist destinations can face water quality difficulties due to water constraints, and water quality concerns can severely influence tourism sustainability, perhaps ending a tourist site's lifetime. Poor water quality and pollution might be crucial markers that a tourist attraction is losing its image and is nearing the end of its life cycle. As a result, we decided to question Mykonos and Santorini hospitality stakeholders about whether they were satisfied with the water quality or not. The perceptions of the hospitality stakeholders in both islands indicate that there are issues with the water quality that the municipal water enterprises are supplying. As seen in Table 4, more than half of the respondents in Mykonos are dissatisfied or very dissatisfied with the water quality. On the

other hand, two-thirds of the respondents in Santorini are dissatisfied or very dissatisfied with the island's water quality. These responses indicate that there are significant water quality problems on both of the islands since very few of the respondents are satisfied with the water quality.

Table 4. Respondents' perceptions: whether they are satisfied with the quality of water supply in Mykonos and Santorini (Q1).

	Mykonos Stakeholders		**Santorini Stakeholders**	
	***n* (%)**	**Values (SD)**	***n* (%)**	**Values (SD)**
Very Satisfied (5)	0	0	0	0
Satisfied (4)	3 (21%)	12	0	0
Neutral (3)	4 (28%)	12	3 (30%)	9
Dissatisfied (2)	6 (43%)	12	5 (50%)	10
Very Dissatisfied (1)	1 (8%)	1	2 (20%)	2
Total/Mean Value	14 (100%)	2.64 (0.89)	10 (100%)	2.1 (0.7)

These responses led us to ask secondary questions regarding the frequency of the water quality problems on both islands. As mentioned before, water quality concerns may be critical for a destination that draws tourists since they can harm the area's image and potentially lead to the place's tourism lifecycle coming to an end. For that reason, it is crucial to look into the frequency of water quality problems. If these problems occur very frequently, it can create a negative impact on a tourist destination's long-term viability. As seen in Table 5, 44% of the hospitality stakeholders have the perception that water quality problems are "sometimes" occurring in Mykonos. On the other hand, 40% of the hospitality stakeholders in Santorini believe that water quality problems are "frequent", and the other 40% have the perception that water quality problems are "sometimes" taking place in Santorini. Hence, we can understand that water quality problems occur more frequently in Santorini than in Mykonos.

Table 5. Respondents' perceptions: the frequency of the water quality problems on tourism activity in Mykonos and Santorini. (Q2).

	Mykonos Stakeholders	**Santorini Stakeholders**
	***n* (%)**	***n* (%)**
Very Frequent (5)	1 (7%)	0
Frequent (4)	2 (14%)	4 (40%)
Sometimes (3)	6 (44%)	4 (40%)
Rare (2)	3 (21%)	0
Very Rare (1)	2 (14%)	2 (20%)
Total	14 (100%)	10 (100%)

There might be many reasons for water quality issues in tourist destinations. Poor water resource management, agricultural activity, tourism activity, and other factors can all contribute to this. Almost every summer, Mykonos and Santorini have water shortages and some degree of water quality issues, which impact the islands' residents' everyday lives. At the same time, water shortages and water quality problems significantly affect the tourist industry, as they cannot supply good quality water for their guests to take showers, use swimming pools, spas, etc. Thus, we intended to gather the interviewees' perspectives on whether island tourism activities were the primary causes of water quality problems during the summer months. Most of Mykonos and Santorini's water quality difficulties occur during the summer, the prime tourist season. As a result, we sought to know how respondents saw the role of tourism activities in water quality problems. As a result, we contacted Mykonos and Santorini hospitality stakeholders for their perspectives on the causes of the islands' water quality issues.

As seen in Table 6, 36% of the Mykonos hospitality stakeholders strongly agree or agree that water quality problems are due to tourism activity in Mykonos. In addition, another 36% of the respondents perceive that "maybe" tourism activity is behind the water quality problems in Mykonos. On the other hand, 60% of the Santorini hospitality stakeholders perceive that "maybe" tourism activity is behind the water quality problems that occur during the summer months on the island, which is the peak season for tourism. Hence, these answers suggest that the hospitality stakeholders believe tourism activity may be responsible for some of the islands' water quality issues.

Table 6. Respondents' perceptions: whether water quality problems are due to tourism activity in Mykonos and Santorini (Q3).

	Mykonos Stakeholders		**Santorini Stakeholders**	
	***n* (%)**	**Values (SD)**	***n* (%)**	**Values (SD)**
Strongly Agree (5)	2 (14%)	10	0	0
Agree (4)	3 (22%)	12	2 (20%)	8
Maybe (3)	5 (36%)	15	6 (60%)	18
Disagree (2)	2 (14%)	4	0	10
Strongly Disagree (1)	2 (14%)	2	2 (20%)	2
Total/Mean Value	14 (100%)	3.07 (1.22)	10 (100%)	2.8 (0.98)

We decided to ask whether short-term water resource management had a role in the water quality problems on both islands. As Paskova et al. [35] underlined, short-term water resource management could lead to water quality problems and significant sustainability issues in the long run since it was based on the "saving the day principle". Therefore, we asked Mykonos and Santorini hospitality stakeholders if short-term water resource management had a role in the water quality problems on both islands.

As seen in Table 7, half of the tourism hospitality stakeholders in Mykonos strongly agree or agree that short-term-based water resource management is behind the water quality problems on the island. In addition, 21% of the hospitality stakeholders in Mykonos perceive that "maybe" short-term-based water resource management on the island is the reason behind the water quality issues. On the other hand, 40% of the hospitality stakeholders in Santorini "agree" that short-term water resource management has a role in the water quality problems. In addition, the other 40% of the hospitality stakeholders perceive that "maybe" the reason behind the water quality problems is the reason. In short, we can understand that most hospitality stakeholders on both islands believe that short-term water resource management is one of the reasons behind the water quality problems on the islands during the summer, which is the peak season in tourism.

Table 7. Respondents' perceptions: whether water quality problems are due to short-term water resource management in Mykonos and Santorini (Q4).

	Mykonos Stakeholders		**Santorini Stakeholders**	
	***n* (%)**	**Values (SD)**	***n* (%)**	**Values (SD)**
Strongly Agree (5)	2 (14%)	10	0	0
Agree (4)	5 (36%)	20	4 (40%)	16
Maybe (3)	3 (21%)	9	4 (40%)	12
Disagree (2)	2 (14%)	4	2 (20%)	4
Strongly Disagree (1)	2 (14%)	2	0	0
Total/Mean Value	14 (100%)	3.21 (1.16)	10 (100%)	3.2 (0.75)

Agriculture is the second largest economic sector in both islands after tourism [30,36]. As Evans et al. [37] underlined, agricultural activity can have negative environmental externalities on water resources, particularly water quality, unless it follows environmental regulations. Hence, we wanted to learn the perceptions of the hospitality stakeholders on

both islands regarding whether they believed that agricultural activity had a role in water quality issues. As seen in Table 8, the vast majority of the hospitality stakeholders "disagree" or "strongly disagree" that agriculture activity is responsible for the water quality problems on both islands. Hence, this indicates that they do not view the agriculture sector as one of the reasons behind the water quality problems.

Table 8. Respondents' perceptions: whether water quality problems are due to agricultural activity in Mykonos and Santorini (Q5).

	Mykonos Stakeholders		Santorini Stakeholders	
	***n* (%)**	**Values (SD)**	***n* (%)**	**Values (SD)**
Strongly Agree (5)	0	0	0	0
Agree (4)	1 (7%)	4	0	0
Maybe (3)	3 (21%)	9	2 (20%)	6
Disagree (2)	5 (36%)	10	6 (60%)	12
Strongly Disagree (1)	5 (36%)	5	2 (20%)	2
Total/Mean Value	14 (100%)	2 (0.92)	10 (100%)	2 (0.63)

Industrial activity can generally create pollution unless environmental regulations are taken into account. Therefore, we asked the hospitality stakeholders in Mykonos and Santorini whether industrial activity had a role in the water quality problems (Q6). The vast majority of the respondents "strongly disagree" that industrial activity has a role in water quality issues. Only three out of twenty-four hospitality stakeholders "disagree" that industrial activity has a role.

Climate change is usually seen as one of the reasons behind water scarcity issues and droughts in tourist destinations with arid or semi-arid climates [38]. As IPCC [39] underlined, climate change also impacts water quality since rising water temperatures and more regular floods and droughts are expected to worsen many kinds of water pollution. We wanted to learn the perceptions of the hospitality stakeholders in Mykonos and Santorini and whether they believed that climate change had a role in water quality issues. As seen in Table 9, most of the hospitality stakeholders in Mykonos and Santorini "disagree" or "strongly disagree" that water quality problems are due to climate change. In short, it can be observed that they do not view either agriculture or climate change as the main reasons behind the water quality problems on both islands.

Table 9. Respondents' perceptions: whether water quality problems are due to climate change in Mykonos and Santorini (Q7).

	Mykonos Stakeholders		Santorini Stakeholders	
	***n* (%)**	**Values (SD)**	***n* (%)**	**Values (SD)**
Strongly Agree (5)	0	0	0	0
Agree (4)	1 (7%)	4	0	0
Maybe (3)	3 (21%)	9	2 (20%)	6
Disagree (2)	6 (43%)	12	5 (50%)	10
Strongly Disagree (1)	4 (29%)	4	3 (30%)	3
Total/Mean Value	14 (100%)	2.07 (0.88)	10 (100%)	1.9 (0.7)

The Greek Financial Crisis in 2009 created public opposition to the EU policies/regulations and impacted the rise of anti-EU sentiments in Greece [40]. We wanted to know whether any hospitality stakeholders we interviewed for this study believed that water quality problems and pollution are occurring because of the EU regulations/policies (Q8). The vast majority of the respondents on both islands "strongly disagree" or "disagree" that EU regulations/policies have a role in the water quality problems and pollution. Nevertheless, two of the hospitality stakeholders in Mykonos "agree" that EU regulations/policies are

behind the water quality problems on the island. In short, the respondents do not view EU regulations/policies as responsible for Mykonos and Santorini's quality problems.

Hotels must provide good water quality since it is closely related to their customer's health and satisfaction. It should be emphasized that a hotel or resort with a poor water supply risks losing clients. Therefore, we asked Mykonos and Santorini hospitality stakeholders a particular question to determine whether they were taking steps to ensure adequate water quality at their hotels and resorts. As seen in Figure 3, the vast majority of Mykonos hospitality stakeholders (70%) clean and replace their water filters (or want to clean and replace them) to provide improved water quality to their clients. On the other hand, 15% of Mykonos hospitality stakeholders conduct tests (or intend to test) their water quality, while the other 15% replace (or intend to replace) outdated pipes and plumbing to give improved water quality to their clients.

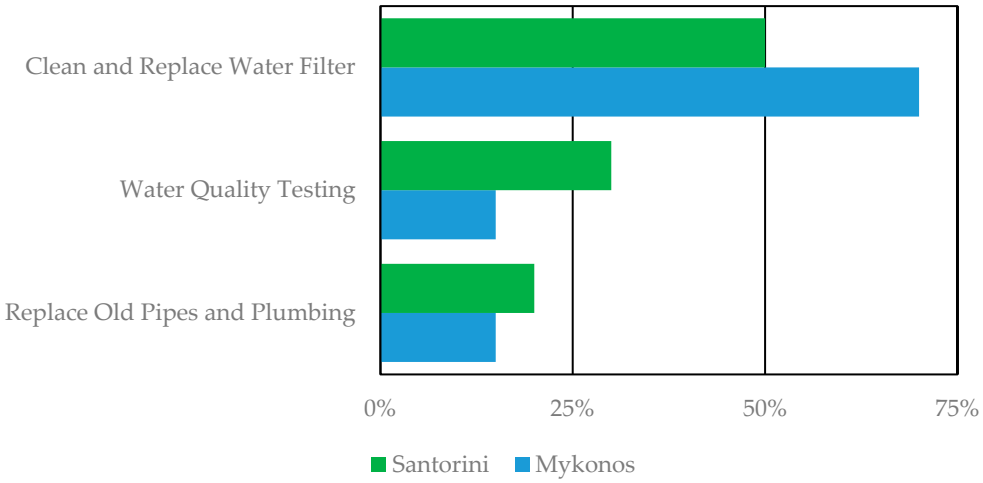

Figure 3. Respondents' perceptions: the policies, strategies, or plans to guarantee better water quality (actions by the Mykonos and Santorini Hospitality stakeholders—Q9).

On the other hand, Figure 3 also illustrates that 50% of Santorini hospitality stakeholders maintain and change water filters (or plan to do so) to improve water quality on their premises. Meanwhile, 30% of Santorini hospitality stakeholders test (or intend to test) their water quality to see whether it contains contaminants. Finally, the remaining 20% of Santorini hospitality stakeholders replace (or want to replace) aging pipes and plumbing to improve water quality. In short, maintaining and replacing water filters and water quality testing are the two most essential policies or strategies by the hospitality stakeholders on both islands.

It should be underlined that it is one of the primary responsibilities of public and water authorities to maintain improved water quality for the local population and the lodging establishments in a tourist area. As discussed above, poor water quality can erode a tourist destination's good image, possibly leading to the end of the tourism lifecycle. On the contrary, water contamination can cause significant health problems for locals and visitors to tourist sites. As a result, we asked one more question of Mykonos and Santorini hospitality stakeholders regarding the actions of public and water authorities and whether they made or intended to make any efforts to improve Mykonos' and Santorini's water quality.

As seen in Figure 4, half of the Mykonos hospitality stakeholders believe that there are no public and water authorities' policies to improve water quality on the island. These responses indicate that they perceive significant issues with the island's water resource management in relation to water quality problems. In addition, 21% of the Mykonos hospitality stakeholders believe that public and water authorities test water quality as an action to improve water quality. The other 15% of the Mykonos hospitality stakeholders

believe that public and water officials provide maintenance of cisterns and reservoirs to improve the water quality on Mykonos.

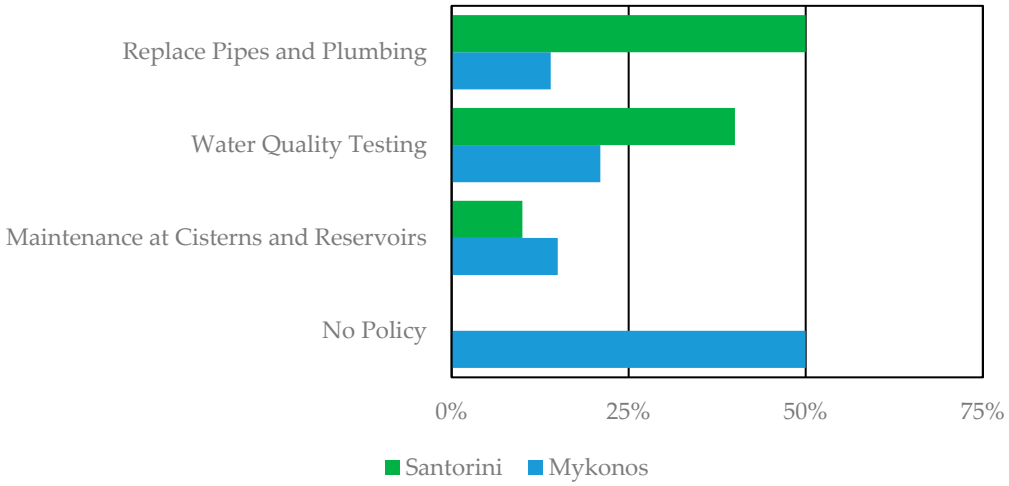

Figure 4. Respondents' perceptions: the public and water authorities' policies, strategies, or plans to guarantee better water quality (according to Mykonos and Santorini hospitality stakeholders—Q10).

On the other hand, as seen in Figure 4, half of the Santorini hospitality stakeholders believe that replacing old pipes and plumbing is the most important policy of the public and water authorities to guarantee better water supply on the island. In addition, 40% of the Santorini hospitality stakeholders perceive that water quality testing is the second most important action by the public and water authorities to improve the water quality on the island.

These responses indicate that the Mykonos hospitality stakeholders have more negative perceptions of the public and water authorities' water quality policies or strategies than Santorini hospitality stakeholders. However, things have changed dramatically for Santorini Island after the COVID-19 pandemic, as discussed below.

5. Discussion

Water quality is essential for sustainable tourism, and poorer water quality can degrade the value of a tourist destination. The responses of the hospitality stakeholders in Mykonos and Santorini indicate significant water quality problems on both islands since only some of the respondents are satisfied with the water quality. As Campón-Cerro et al. [41] underlined, using bodies of water with better water quality for tourist purposes creates a net of interest for water quality conservation, not only because of its environmental importance but also because it is commercially valuable as the engine of a new economic and social push such as in the case of Extremadura, Spain.

The importance of better quality for using bodies of water for tourist purposes can indicate that poorer water quality or pollution may stop the interest in water quality conservation, which can have adverse external effects even on the image and economy of the tourist destination. Therefore, key stakeholders should focus on water-based experiences with better water quality. It should not be forgotten that these water-based experiences with more outstanding quality can revitalize economies, provide new job possibilities, and, most importantly, promote responsible and long-term water usage [41].

Hence, the hospitality stakeholders in Mykonos and Santorini know that poor water quality can create adverse environmental externalities on their hotels and resorts, and their businesses can face significant adverse economic consequences unless the public and water authorities take action on the islands. Many hotels in Mykonos often complain to DEYAM and demand solutions or actions regarding the poor water quality because it damages the positive image of the islands (Mykonos Hospitality Stakeholder 3, Authors' Interview, August 2014). Water scarcity issues forced hotels and resorts to shut down their

swimming pools and spas (Mykonos Hospitality Stakeholder 4, Authors' Interview, August 2014). Consequently, the combination of water scarcity and poor water quality can end the tourism lifecycle of Mykonos and Santorini unless the public and water authorities take action.

The frequency of poor water quality problems can be critical for the sustainability of a tourist destination. The responses of the hospitality stakeholders in Mykonos and Santorini show us that poor water quality issues and pollution "sometimes" occur on the islands. Nevertheless, the perceptions of the Santorini hospitality stakeholders indicate that they experience more poor water quality problems than Mykonos hospitality stakeholders. As Reopanichkul [42] underlined, a tourist destination that often faces poor water quality problems or pollution has significant negative externalities on the environment and economy, which ultimately can damage the image of the tourist destination, such as in the case of Phuket, Thailand. On the other hand, the installation of tourism facilities might influence water quality, and land development frequently entails the loss of vegetation and changes to the natural environment, which can exacerbate soil erosion. This can lead to additional sediments and contaminants being carried into water bodies after rains, lowering water purity and quality, as in the case of Phuket, Thailand.

Mykonos and Santorini hospitality stakeholders stated that the over-tourism phenomenon had a role in water scarcity and poor water quality problems on the islands. The poor water quality problems have become more frequent, particularly during the summer months, ever since the start of the Greek Financial Crisis since it created the necessity for increasing the number of accommodation facilities in Santorini (Santorini Hospitality Stakeholder 10, Authors' Interview, August 2015). The increase in the number of accommodation facilities genuinely increased the number of tourist arrivals, and the rise in the number of daily cruise ship arrivals to the islands made the situation more chaotic since the land development changed (Santorini Hospitality Stakeholder 8, Authors' Interview, August 2015). On the other hand, the sewage capacity started to exceed its capacity due to millions of arrivals during the summer months in Mykonos, which ultimately created higher pollution risks (Mykonos Hospitality Stakeholder 12, Author's Interview, July 2015).

Consequently, we can notice that the hospitality stakeholders in Mykonos and Santorini perceive that "maybe" the tourism activity can play a role in the poor water quality problems on the islands. As Sun and Liu, 2020, underlined, the increase in the number of tourists and tourism revenues led to the rise in poor water quality and water pollution since they were not monitored by the public and water authorities in the West Lake Basin (Hangzhou, China). The government pursued tourism economic gains alone, disregarding the damage caused by littering and releasing pollutants into the water resources produced by tourism operations [43]. In other words, short-term-based water resource management led to environmental externalities, which damaged the image of the West Lake Basin.

Mykonos and Santorini hospitality stakeholders believe that short-term water resource management has a specific role in the problem of poor water quality. There were moments when hotels had to serve their clients brownish muddy water from the taps, particularly during the Water Crisis 2014 (Mykonos Hospitality Stakeholder 14, Author's Interview, July 2015). On the other hand, hotels and resorts had to change their washing machines and dishwashers. The muddy water from the leading pipelines damaged their machines, and the public and water authorities could not solve the problem quickly during the summer of 2014 when the water crisis took place (Santorini Hospitality Stakeholder 9, Author's Interview, August 2015). For that reason, the hospitality stakeholders in Mykonos and Santorini believe that short-term-based water resource management may have a more prominent role than tourism activity due to their negative experiences with the public and water authorities on the islands.

Agricultural activity can negatively impact water resource quality, and there are many examples worldwide. Rad et al. [44] highlighted that wastewater from excessive pesticide and herbicide usage in agriculture is becoming a global concern, particularly in developing nations. Nevertheless, the responses of the hospitality stakeholders in Mykonos and

Santorini show us that agricultural activity does not have a significant role in the water quality problems on the islands. Industrial activity can also lead to severe water pollution and poorer water quality, among many other examples. For example, Dehkordi et al. [45] underline that soil and water pollution caused by heavy metals can be caused by mining activities, which can ultimately damage the health of the residents of a particular location. However, the responses of the hospitality stakeholders in Mykonos and Santorini indicate that industrial activity does not contribute to the water quality problems on the islands.

Climate change has been affecting water resources in destinations with arid or semi-arid climates through low precipitation rates, extreme heat waves, and droughts. The responses of the hospitality stakeholders in Mykonos and Santorini show no particular impact of climate change in terms of water resource quality on the islands back in 2014 and 2015. On the contrary, their responses focus mainly on the water availability issues due to climate change. However, Delpha [46] highlighted that increasing temperatures (water, air, and soil) or heavy rainfall led to increased dissolved organic matter, micropollutants, and pathogens in temperate regions, ultimately decreasing water quality. For that reason, the hospitality stakeholders' perceptions regarding the role of climate change on water quality problems on the islands may change with the increasing impacts of climate change within the near future.

The Greek Financial Crisis in 2009 was a turning point for Greece and changed the country dramatically. As Halikiopoulou [47] mentioned, the anti-EU sentiment significantly increased after the crisis, and the public's view on EU policies/regulations has become skeptical; there has been mistrust against the EU since the crisis. Most of the respondents in Mykonos and Santorini stated that they "strongly disagreed" or "disagreed" that the EU was behind the water quality problems and pollution on both islands. On the contrary, the EU policies/regulations, such as EU WFD 2000, have been helpful and almost a guidebook for the general public, water authorities, and hospitality stakeholders in the Cyclades Islands (Santorini Hospitality Stakeholder 2, Author's Interview, August 2014).

Cleaning and changing water filters have been critical for hospitality stakeholders to ensure improved water quality for their consumers. As a result, most of the Mykonos and Santorini hospitality stakeholders stated that cleaning and changing water filters was the most critical action or strategy for improving water quality in their facilities. As Lange et al. [48] underlined, not all water filter types offer enhanced drinking water security, and the efficacy of low-cost systems should be constantly checked by the public authorities, such as in the case of low-cost ceramic candle filter systems in South Africa. For that reason, the hotels focus mainly on better-quality water filter systems in both islands. They invest a high amount of their budget in cleaning and changing their water filter systems to guarantee better water quality to their customers (Mykonos Hospitality Stakeholder 4, Author's Interview, August 2014; Santorini Hospitality Stakeholder 10, Author's Interview, August 2015).

Water testing is another critical measure hospitality stakeholders take to ensure superior, pollution-free water quality. Several Mykonos and Santorini hospitality stakeholders stated that water testing was the second most crucial action or policy for improving water quality on their premises. Water testing in tourism facilities should be performed regularly and frequently by the hospitality stakeholders. According to Toyosada et al. [49], a basic water testing experiment showed that Vietnam lodging facilities in Hanoi City had nitrate levels but no residual effective chlorine. In contrast, Japan's accommodation has neither nitrate nor residual adequate chlorine levels in its water resources. These examples demonstrate the significance of water testing in accommodation establishments.

Nevertheless, there have been issues with the environmental regulations, particularly those related to water quality in Greece. It is not on the agenda of many small or mid-range hotels or boutique hotels to have water testing on their premises unless the municipality enterprises do it for them (Mykonos Hospitality Stakeholder 1, Author's Interview, July 2014). However, the respondents among the four-star or five-star hotels or resorts have water testing on their agendas and test their water quality independently

and frequently, particularly in Santorini (Santorini Hospitality Stakeholder 4, Author's Interview, August 2014).

The actions of the public and water authorities are of greater importance than the actions of the hospitality stakeholders to improve water quality and ensure it is free from pollutants or contaminants because they are the leading suppliers and are responsible for distributing water resources to hotels or resorts. As mentioned above, half of the Mykonos hospitality stakeholders' responses stated that the public or water authorities did not have policies to improve water quality and resolve pollution problems in 2014 and 2015.

Although DEYAM released a detailed press report regarding safety measures taken to improve the water quality and resolve water pollution, the problems and pollution worsened after the COVID-19 Pandemic in Mykonos since the residents and tourists had to use contaminated water in 2021. According to DEYAM, the problem originated as a consequence of refinery damage, which caused a water service stoppage in Marathi, Kantounia, Agia Sofia, Tourlos, Agios Stefanos, and Houlakia, which caused the muddy water to run from the taps. DEYAM tried to solve the damage; however, many residents and tourists had no access to clean water for almost a whole day on the island [50].

As mentioned above, DEYAM released a detailed press report regarding safety measures taken to improve water quality and resolve any water pollution in 2020, at the beginning of the COVID-19 Pandemic. The report stated that DEYAM is testing water for contaminants and pollutants according to Greek national regulations in coordination with the EU WFD 2000. The main reason for this detailed press report release was related to a news report by the Greek Newspaper "Economy", which stated that Mykonos water quality is inferior and the water is contaminated according to independent water testing results [51]. Consequently, the contamination event in 2021 created an outrage among the residents and the lodging facilities since their clients had no access to clean water [50].

The contamination and pollution events in Mykonos resurfaced in the summer of 2024. According to *Mykonos Voice* [52], the aging water networks are one of the leading causes of poor water quality, and it was found that there are even areas in Mykonos that are supplied with water unsuitable for human consumption. The water quality has decreased significantly in Mykonos since the island was reopened for tourism after the COVID-19 restrictions were removed. At the same time, the water consumption in 2020 (quarantine year) was 955,505 m^3 of water; in 2021, it increased to 1,174,254 m^3 (+22.9%); in 2022, to 1,513,068 m^3 (+28.8%), and reached 1,618,069 m^3 in 2023 (+7%). In other words, if we consider that 2020 was not an ordinary year due to the coronavirus, the water consumption in Mykonos within two years (from 2021 to 2023) increased by 37.8%. Furthermore, an increasing number of private wells used in Mykonos create poor water quality problems due to being over-pumped [53].

A similar trend can be observed in Santorini since the water scarcity and poor water quality events resurfaced in the summer of 2024. It has to be noted that water consumption increased dramatically in Santorini. The water consumption in 2019 was 1,758,474 m^3; in 2022, it rised to 2,075,000 m^3 (+18%) and reached 2,360,000 m^3 in 2023 (+34%). The high consumption led to poorer water quality supply through the pipelines on the island [23,29].

It should be highlighted that half of Santorini hospitality stakeholders stated that replacing old pipes and plumbing was the public and water authorities' most critical action or policy to guarantee better water quality. In addition, the other 40% of the hospitality stakeholders in Santorini stated that water testing was the second most crucial action or policy for resolving the island's poor water quality issues and pollution in 2014 and 2015. We can understand from these responses that public and water authorities were taking action to improve the water quality and tried to serve the residents and tourists water without pollutants. Nevertheless, there were episodes of water shortages or brownish water running from the taps during the 2014 water crisis 2014, which created an outrage among the residents and lodging facilities, which meant that there were still poor water quality issues (Santorini Hospitality Stakeholder 8, Author's Interview, August 2015).

Nonetheless, the situation worsened after the Greek government lifted the COVID-19 restrictions since the over-tourism phenomenon created extreme water stress on the island, as is in the case of Mykonos. Brackish water started to appear from the new boreholes because of over-pumping, and desalinated water has become almost the only water resource to supply the water demand in Santorini [29]. Perissa, Perivolos, and Vlyhada settlements in Santorini had suffered a lot because of the contaminated water that was coming through the boreholes, and many hotels and residential houses had to repair their washing machines and dishwashers because of the brownish water with inferior quality, which went through the pipeline network during the summer months of 2021. On the other hand, hotels had to close their swimming pools due to a lack of access to clean water. DEYATH built bigger desalination plants to solve the water availability issues and poor water quality problems on the island, and the situation became relatively better in 2023 [29].

However, the desalination plants could not meet the tourists' needs during the summer of 2024, and water shortages and poor water quality issues reappeared within a year. This time, water shortages and poor water quality significantly impacted not only the daily lives of the residents but also agricultural activities, such as those of the wine producers on the island [54]. Therefore, creating water availability through desalination plants can only solve water scarcity and poor water quality problems if tourism is limited in Santorini because the island's carrying capacity is insufficient to sustain the high summer water demand. According to Coccossis and Parpairis [55], a tourist area's carrying capacity can be defined as the level at which the minimum infrastructure/superstructure requirements, as well as natural resource assets that generate demand, become insufficient to fulfill the needs of both the local population and visiting tourists, resulting in the threat of environmental externalities. Hence, similar situations can be observed in Mykonos and Santorini's cases when the islands' carrying capacity is exceeded, and water resource problems with both quantity and quality arise.

Our case study analysis shows that institutions can function very late, such as in the case of Greece. EU Water Framework Directive 2000 has been an active regulation for the last 24 years, but Greece was not able to implement it at all, and Greece was finally referred to the EU Court for not implementing the directive mentioned above. Hence, we can indicate that major crises can become major obstacles to governing and regulating the CPRs even though there are international organizations or institutions involved.

Therefore, Mykonos and Santorini are textbook examples of how short-term decision-making can generate environmental externalities and how the tourism lifecycle can stagnate or end unless key tourism and water resource management stakeholders consider environmental regulations and a destination's carrying capacity. The crisis management of the key stakeholders during the Greek Financial Crisis in 2009 and the COVID-19 Pandemic in 2020 has been determinant since both crises shifted the focus of critical stakeholders away from environmental regulations and toward increasing tourism revenues, leading them into a process whose ways of operating (Modus operandi) have been mentioned above (Figure 5). In other words, the greater focus on tourism revenues and the less emphasis of the critical stakeholders on water quality and regulations, such as EU WFD 2000, made Mykonos and Santorini face significant water quality issues, particularly during summer months.

In short, we can notice that the vicious cycle is repeating in Mykonos and Santorini, and the public and water authorities neglect EU WFD 2000 or Greek national water directives to increase tourism revenues and the "saving the day principle". We can see that there has been no positive change on the islands since we conducted the interviews back in 2014 and 2015, and instead, things worsened on both islands right after the COVID-19 restrictions were removed.

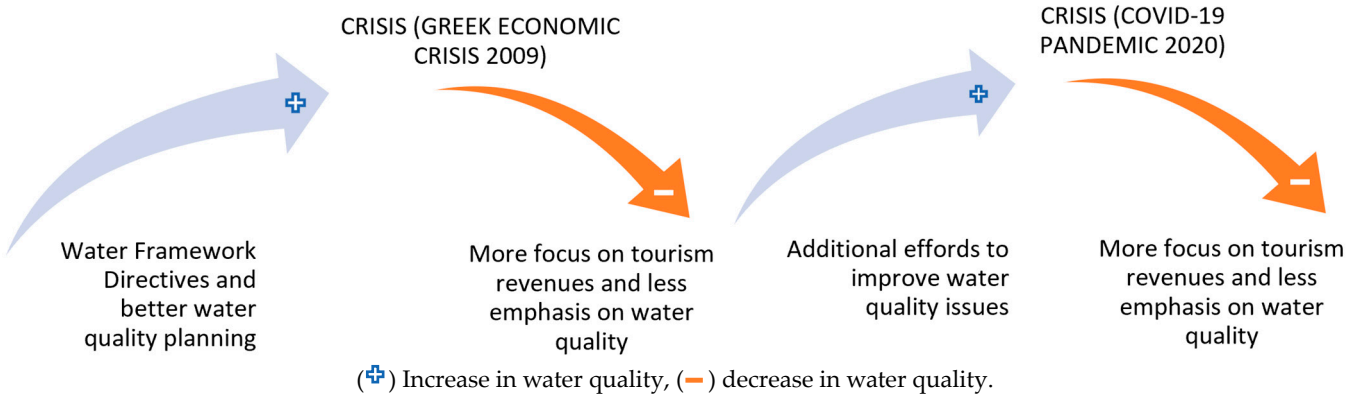

Figure 5. The Water Quality and "The Modus Operandi" of destination evolution between two crises (2009–2020) on the Cyclades Islands.

6. Conclusions

Greece is one of the Southern European nations that faces challenges and delays in implementing the EU WFD 2000. As in the case of Greece, many Southern European countries such as Spain are far from accomplishing the EU Frameworks and other environmental regulations, and they do not have enough climate change adaption and mitigation planning, which resulted in devastating Valencia floods [10]. Hence, this indicates that there should be more emphasis on environmental regulations, climate change adaptation plans, and climate change mitigation plans to avoid this kind of catastrophic event. The delays with the EU WFD 2000 led Greece to have significant issues with the availability and quality of water resources. The Cyclades Islands are of essential importance to the Greek tourism sector. Their role has grown significantly during the two crisis periods of the Greek Financial Crisis in 2009 and the COVID-19 pandemic outbreak in 2020 because of creating substantial revenues for the Greek economy. Mykonos and Santorini's examples show the implementation issues of the EU WFD 2000 in Greece. European Commission finally referred Greece to the Court of Justice of the EU for failing to finalize the revision of its water plans in March 2024 [56]. The Greek Financial Crisis in 2009 and the COVID-19 Pandemic in 2020 shifted the attention of the key stakeholders from following water regulations, such as the EU WFT 2000, to increasing tourism revenues. At the same time, it made the key stakeholders implement their actions according to the "saving the day" principle.

The sustainability and durability of a location are determined by the decisions made by its key stakeholders. The responses of the hospitality stakeholders contacted for this study demonstrate that short-term water resource management and unsustainable tourism activities play unique roles in the poor water quality concerns in Mykonos and Santorini. The stakeholders confirmed the existence of water quality problems, which "sometimes" occur on both islands. Nevertheless, climate change, agricultural activity, industrial activity, and EU policies are not seen as the reasons behind the water quality problems on these islands.

Elinor Ostrom [7] underlined that CPRs can only be governed through institutions and their regulations. She also stressed the need for a graded disciplinary system with warnings, penalties, and informal reputational implications. Our case study shows that if there are major crises, such as the Greek Financial Crisis or the COVID-19 pandemic, managing CPRs through institutions and their regulations becomes more complex because the "saving the day" principle appears due to financial concerns. We created Figure 5 to underline that each crisis that Greece faced, whether national or global, became a major setback for water resource management. Public and water authorities put more emphasis on financial matters than environmental concerns.

It is important to remember that focusing on the supply side will not result in sustainable water resource management. Crisis management should focus not only on creating more water availability and increasing tourism revenues but also on taking into account the

potential environmental externalities. Key decision-makers should focus on water resource management's supply and distribution aspects because water is crucial and exists at the heart of tourism. Sustainable tourism requires sustainable water resource management. As a result, rising levels of poor water quality may suggest unsustainable tourism in the long term. The water conservation plans and Integrated Water Resource Management (IWRM) can be options for the key stakeholders to maintain a balance and sustain the needs of the residents and tourists.

This study has several limitations. Time and budget constraints prevented us from conducting interviews and questionnaires with additional hospitality stakeholders. Additionally, we conducted these questionnaires and interviews during the summers of 2014 and 2015; currently, Mykonos's and Santorini's water quality and water scarcity problems are more chaotic and complex than 10 years ago. Tourist numbers are growing, and the adverse effects of climate change are putting further strain on the availability of water resources, particularly during the summer. Furthermore, new hotels and resorts are erected on the island annually, resulting in an increasing number of hospitality stakeholders. Moreover, Airbnb has begun to account for a significant portion of island tourism, as it provides cheaper lodging options for travelers and consumes a considerable portion of the island's water supply. The changes in land development regulations on the island of Santorini, which can have significant impacts, should also be considered.

These developments bring up fresh areas of study to analyze the current situation with a bigger sample size; as the number of lodging facilities has grown, so has the number of hospitality stakeholders. At the same time, future studies may look at Airbnb and second-home owners in Mykonos and Santorini: because their proportion of the tourism industry has risen significantly over the previous 6–8 years, they can be considered hospitality stakeholders.

In conclusion, Mykonos and Santorini Islands have had water quality problems ever since the key stakeholders mismanaged the crisis of the Greek Financial in 2009 and the COVID-19 pandemic outbreak in 2020. Water scarcity and water quality problems occur repeatedly each summer due to increasing tourist arrivals. The islands can enter the "stagnation" phase of their tourist lifecycles soon unless the key stakeholders decide to exit from the vicious cycle.

Author Contributions: Conceptualization, I.A., B.S. and Ò.S.; methodology, I.A., B.S. and Ò.S.; writing—original draft preparation, I.A.; writing—review and editing, I.A., B.S. and Ò.S. All authors have read and agreed to the published version of the manuscript.

Funding: ADAPTOUR project (The adaptability of complex tourist destinations in the present era of social, economic, and environmental transformations: innovative paths towards destination resilience) funded by MCIN/AEI/10.13039/501100011033 (Spain): PID2020-112525RB-I00; and URV/Dow Chair of Sustainable Development.

Institutional Review Board Statement: This study was conducted following the principles and evaluation criteria of the Committee Concerning Research into People, Society, and the Environment of the Universitat Rovira i Virgili (CEIPSA): code CEIPSA-2022-TD-0022.

Informed Consent Statement: Informed consent was obtained from all subjects involved in this study.

Data Availability Statement: Data are contained within the article.

Acknowledgments: We thank David Katz (Haifa University, Department of Geography and Environmental Studies) for his guidance and advice and the Mykonos and Santorini hospitality stakeholders involved in this study.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of this study, in the collection, analyses, or interpretation of data, in the writing of this manuscript, or in the decision to publish the results.

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