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ORIGINAL

Toxic Waters: The pollution of Lake San Roque and the influence of hotel companies on the environment

Aguas Tóxicas: La contaminación del lago San Roque y la influencia de las empresas hoteleras en el medio ambiente

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ABSTRACT

In the following Final Degree Project, the current situation of water pollution in Lake San Roque, located in Punilla, Córdoba province, Argentina, and the contribution to it by hotel and gastronomy companies in the area, specifically in the city of Villa Carlos Paz, recognized worldwide as one of the major tourism and student tourism capitals, are analyzed. An introduction is carried out to get to know the Howard Johnson Villa Carlos Paz Hotel, one of the most representative and luxurious hotels in the city, which will serve as a representative of the major hotel chains that claim to be great defenders of the environment and ecosystem care policies. The current situation of lake pollution, its history, and the initial cases of sewage discharge into its waters are analyzed. Also, various proposals to solve the problem and their results are examined. Finally, the creation of a four-episode podcast is proposed, in which the situation will be addressed together with expert guests in pollution, doctors, and specialists, in order to raise awareness about the issue and influence the population to demand effective solutions. To achieve this, quantitative research methods such as Surveys and content analysis were used, alongside qualitative research methods such as Interviews, document analysis and observation.

Keywords: Lake San Roque; Pollution, Ecosystem; Environment; Greenwashing; Cyanobacteria; Sewage discharge; Hotels; Tourism.

RESUMEN

En el siguiente Trabajo Final de Grado se analiza la situación actual de contaminación de las aguas del Lago San Roque, ubicado en Punilla, provincia de Córdoba, Argentina y el aporte a la misma que estarían realizando las empresas hoteleras y gastronómicas de la zona, específicamente en la ciudad de Villa Carlos Paz, reconocida a nivel mundial como una de las grandes capitales del turismo y turismo estudiantil. Se lleva a cabo una introducción para conocer al hotel Howard Johnson Villa Carlos Paz, uno de los más representativos y lujosos de la ciudad y que servirá como representante de las grandes cadenas hoteleras que abogan ser grandes defensoras del medio ambiente y las políticas de cuidado del ecosistema. Se analiza la situación actual de contaminación del lago, su historia y los primeros antecedentes de volcamiento de efluentes cloacales en sus aguas. También las diversas propuestas para solucionar la problemática y sus resultados. Por último se propone la realización de un podcast de cuatro capítulos en los que se abordará la situación junto a invitados expertos en contaminación, médicos y especialistas para dar a conocer la problemática e influir a la población para que exijan soluciones efectivas. Para conseguirlo se recurrió a métodos de investigación cuantitativa como la Encuesta y el Análisis de contenido y a métodos de investigación cualitativos como la Entrevista, el Análisis de documentos y la Observación.

Palabras clave: Lago San Roque; Contaminación; Ecosistema; Medioambiente; Greenwashing; Cianobacterias; Efluentes cloacales; Hoteles; Turismo.

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INTRODUCTION

Since the industrial revolution, humanity has embarked on a process of growth unprecedented in the history of the planet, affecting every conceivable area. Economy, tech, health, culture, education, security, food, housing, and a long list of other areas only serve to confirm that in just two centuries, our species has advanced much more than in the previous three thousand years of civilization. But within this whirlwind of discoveries, inventions, and improvements in the quality of life of most societies, there was one area in particular that was virtually forgotten until well into the second half of the 20th century: environmental protection. The reasons that led our species to ignore, throughout almost all of our history, but particularly during 150 years of scientific advances, the consequences that would result from the destruction of the earth, air, and water have been studied from hundreds of angles. Therefore, in this analysis, we will focus on a specific case that is highly relevant to the recovery of the planet and that directly impacts the abuse of vital non-renewable resources: the pollution caused by large hotel chains and how effective their efforts are in counteracting its effects. To this end, we will take as our case study the Howard Johnson Villa Carlos Paz, a five-star hotel located between the Cordoba mountains and very close to Lake San Roque. It was opened in 2016 by Pablo Elliot and is managed by his daughters Barbara and Jesica. It is a franchise belonging to the famous American hotel chain Howard Johnson Plaza, currently part of Wyndham Hotels & Resorts.[1]

Company history

Howard Johnson by Wyndham is a US-based and owned hotel and restaurant chain founded in 1925 by Howard Deering Johnson and recognized worldwide. It is currently part of Wyndham Hotels and Resorts.[2]

In Argentina

The Howard Johnson chain arrived in Buenos Aires in 1997 with the construction of two hotels, the first of which was located in the city of La Plata. Since then, a total of 40 hotels have been opened in the country and another 14 are under construction, making it the chain with the most hotels in Argentina. According to information gathered from its website, projects are carried out after in-depth market research that seeks not only to determine the viability and success of the project, but also to define the type of hotel that will best suit the needs of the location.[3]

Howard Johnson Villa Carlos Paz

In 2011, Pablo Elliot, a hotel entrepreneur from Salta, began construction of the Howard Johnson Carlos Paz, located in the famous Cordoba city of the same name. After three years, the project was completed, featuring 127 rooms, a restaurant, a convention center, and a full range of first-class services that would automatically earn the hotel the "Plaza" category. It was officially inaugurated in 2016, with the unique feature of being a condo hotel, a model that combines real estate with the hotel business. The same shareholders own apartments or rooms that are maintained by the administration. This allows investors to own their own hotel and earn income from the property they own. This system has gained ground worldwide as it allows for higher returns than the traditional hotel system. The hotel is managed by sisters Jesica and Bárbara Elliot, daughters of the majority shareholder and founder, who took over the project at the highest level.[4]

Environmental policies

Due to its proximity to Lake San Roque and its location surrounded by the famous Cordoba mountains, the hotel's management maintains that it was designed to blend into the natural landscape without disrupting its harmony. This is based on the premise of minimizing environmental impact by maintaining a "green policy" of water conservation, energy saving, and waste recycling. Guests are also invited to request information about sustainability policies and how to be part of them.[5]

Howard Johnson Carlos Paz, like many of the city's large hotels, is endorsed by the Greenest Hotels program, run by the Argentine Tourism Hotel Association. It is also certified by the Argentine Institute for Standardization and Certification (IRAM). This is due to the hotel's environmental integration and care policies, which include:

- Water care and management: Low-consumption washing machines are available, and guests are encouraged to reuse towels to reduce washing cycles.
- Water monitoring: Counting of bacteria (aerobic, mesophytic coliforms, etc.), active chlorine, ammonium, arsenic, among others, to maintain water quality at the highest standards.
- Greywater reuse: The hotel treats and reuses a percentage of greywater for park irrigation. This policy greatly reduces the facility's water consumption.
- Awareness: The hotel has "Howie," a mascot bird that plays an important role in promoting a message of friendship with nature and care for the environment to both children and adults.

Situation analysis

The water for consumption in the city of Córdoba comes from two water basins: 70 % from the San Roque dam (north) and 30 % from the Los Molinos dam (south). Exequiel Di Toffino, a graduate in Chemical Sciences from the National University of Córdoba, has been researching the water basins of Córdoba since 2007. He explains that sewage effluents from Cosquín, La Falda, and especially Villa Carlos Paz are discharged into the Punilla Valley, which, combined with forest fires, deforestation, and erosion, contribute to serious changes in the composition of the water, causing the proliferation of algae and derived toxins. According to Di Toffino, the lake has cyanobacteria levels higher than those recommended by the World Health Organization (WHO) for human consumption. These toxins are absorbed by the organisms that consume them and can cause health problems such as gastroenteritis,

abdominal pain, vomiting, diarrhea, liver inflammation, and kidney damage.[6]

"These toxins, not being a living agent, cannot be eliminated, and the purification treatments being carried out by the company responsible for this purpose are not efficient in removing them. As a result, a large proportion of the toxins end up in the domestic water supply," says Di Toffino. Although traditional home water purification methods eliminate bacteria, they have been shown to be ineffective in removing these types of toxins because they are not living organisms: "Chlorinating or heating water is counterproductive because this toxin in particular alters its molecular structure and becomes more toxic than it was before".[7]

A study conducted by the Gulich Institute (UNC/CONAE) showed that in some areas of Lake San Roque, water quality has deteriorated compared to previous years. Contaminants end up concentrating in the throat of the dam, an area close to the point where water is extracted for purification.[8]

Ecologist, pediatrician, and neonatologist Medardo Ávila Vázquez, who is also coordinator of the University Network for Environment and Health, argues that chlorination of water as a method of eliminating cyanobacteria is dangerous because it requires the use of larger amounts of chlorine, which can combine with the toxins secreted and enhance their toxicity.[9]

Resolution 176/16 of the Provincial Ministry of Water cites various scientific studies in Cordoba that detected microcystins in the water of Lake San Roque and confirmed the toxic effect of cyanobacteria.[10]

Ávila Vázquez recalls that an alert was issued by the National Ministry of Health in February this year, confirming the presence of cyanobacteria in the water: "The National Ministry of Health calls on the population to take extreme care when exposed to cyanobacteria, which release toxins into water commonly used for cooling during the summer season and pose a potential threat to environmental and human health," the text said.

In response to this warning, the specialist points out that the province did not disseminate this information and that there were cases of people who suffered the effects of the toxin in the San Roque lake basin.

For his part, Di Toffino affirms that it must be assumed that there is a problem in order to implement possible solutions. He recommends sustaining the resource and complying with water supply standards. He maintains that the information obtained by various institutes should be compared for greater objectivity in addressing the issue.

Background summary

The contract to build the first San Roque dam was signed in 1886 with the aim of controlling the flow of mountain rivers and providing water to the city of Córdoba, which has historically suffered from drought in winter. The project, which would affect the entire Punilla Valley, was designed by engineers Eugenio Dumesnil and Carlos Alfonso Cassafousth and carried out by Juan Bialet Massé's construction company, which completed the wall in three years: 120 000 tons of stones mixed with hydraulic lime mortar.[11]

The dam, which was 130 meters long and 54 meters wide, was the largest in the world at the time and created a lake that quickly became a tourist attraction. But after an armed uprising and the resignation of President Juárez Celman, propaganda attacks began against everything that had been done during his administration, including the San Roque dam. In 1982, engineers Cassafousth and Bialet Massé were arrested for the crime of building an unsafe dam. President Carlos Pellegrini appointed Swedish engineer Federico Stavelius to inspect it, and he concluded that the wall had 90 serious points of filtration. An order was immediately given to build a wall of bricks and Portland cement imported from England to compensate for this. This was the starting point for the many conspiracies that still claim today that the structures containing Lake San Roque are unsafe and endanger the population.[12]

In the early 1940s, it was decided to build a new dam. It would have the same height but would be 150 meters downstream from the first one. An attempt was made to dynamite the old dam, but it was so strong that despite a triple explosion, only a small hole was made.[13]

In 1944, the new dam was completed, leaving the previous one submerged to this day. Thanks to its design, it can now hold more water and withstand greater heights, and the spillway system has also been improved.[14]

The first warnings about pollution in San Roque date back to the late 1970s, but it was not until December 1987 that the Provincial Council of Non-Governmental Environmental Organizations conducted a study at a resort four blocks from the center of Carlos Paz, finding fecal bacteria levels up to 55 times higher than the tolerable limit. This led to the first request for the cleanup of the water by environmental protection organizations.[15]

In 1982, the first sewerage works began, specifically in the areas surrounding La Falda, but they progressed at a much slower pace than expected. In 1983, the first Master Plan for the San Roque Lake Basin was approved, which was supposed to provide practical solutions to the pollution levels that had been observed. Among the proposals, one stood out: a tunnel that would cross the mountains and carry sewage to the Bajo Grande Plant, but no progress was made on this or any other proposal. In 1989, the creation of the San Roque Basin Development Committee was approved by law. The committee reevaluated proposals and possibilities for cleaning up the lake and moving forward with the sewage project, but ultimately it did not prosper.[16]

In 1996, the idea of building a tunnel to Bajo Grande was completely discarded, and a new sewage treatment proposal was put forward, which consisted of building a treatment plant for Villa Carlos Paz. This project was not completed until 2008, when it was inaugurated as the Costa Azul Sewage Treatment Plant in a ceremony presided over by then-Mayor Carlos Felpeto, former Governor Juan Schiaretti, and former President Cristina Fernández de Kirchner. The project included a series of aerators that would be installed in the contaminated waters to eliminate some of the pollution.[17]

A 2018 study conducted by Dr. Valeria Amé revealed that there was a high level of cyanobacteria in Lake San Roque, caused by the discharge of untreated sewage into the lake. In the same year, prosecutor Carlos Matheu and the Foundation Against Environmental Pollution in Defense of Health filed a complaint against several restaurants and hotels based on 60 reports issued by the Water Resources Department for discharging untreated sewage into Lake San Roque and its tributaries.

In 2019 and again in 2023, the Municipality of Villa Carlos Paz filed criminal charges against Integral Cooperative, which regulates drinking water in the area, for the poor operation of the Costa Azul treatment plant, specifically for the inadequate management and irregular treatment of sewage.

Problem

Howard Johnson Villa Carlos Paz, like most of its direct competitors, complies with basic environmental care standards, which has earned it the Bronze certification from Greenest Hotels, recognized and validated by the Global Sustainable Tourism Council since 2013, an institution that promotes responsible and eco-friendly hospitality worldwide.

Council since 2013, an institution that promotes responsible and eco-friendly hospitality worldwide. However, as environmental awareness evolves and expands, it is becoming clear that the efforts of large hotels are insufficient to counteract the effects of their operations. Electricity consumption, water use and abuse, the carbon footprint generated by heating systems, hotel kitchen waste, and light pollution are some of the reasons why Howard Johnson Carlos Paz has a Bronze certification and not a Gold certification for Greenest Hotels. When applied to the total number of hotels and hotel chains in the region, which also do not comply with higher certifications, this reveals the enormous ecological impact that is being made at the regional, national, and international levels. But if there is one problem with the damage caused by large hotels in Villa Carlos Paz, it is the alarming level of pollution in Lake San Roque, which for more than a decade has been recording increasingly high levels of untreated sewage. At first glance, the waters have taken on a mossy green hue and a putrid odor in areas frequented by tourists, especially in areas close to major hotel chains and renowned restaurants.

These circumstances raise questions about the authenticity of the ecological practices carried out by hotel chains, as many of them do not seem to have a truly positive or even neutral impact on the ecosystem. However, national and international certifications and awards continue to endorse their operations without taking into account this environmental damage, its implications for the coming decades, and the health risks to the inhabitants of the area. At a time when new generations are increasingly concerned about the future of the planet, it has become fashionable in many ways to advertise all kinds of products and services as "green" or "environmentally friendly" when in reality they are not. This practice is commonly known as greenwashing, and while there are several types, they all involve the use of labels to make a product or service appear to be something it is not, something that does not pollute, or even something that is beneficial to the environment. This leads us to ask ourselves: Are hotel chains' efforts to care for the ecosystem real, or is this merely a marketing ploy?

Relevance of the case

Despite all the studies and warnings from scientists, doctors, and other experts, the official bodies responsible for monitoring compliance with water distribution contracts relating to the quality and quantity consumed in Córdoba, which include, to varying degrees of responsibility, the Government of Córdoba, through the Provincial Water Resources Administration and the Public Services Regulatory Agency (ERSEP), and the Municipality of the City of Córdoba, declare that the water in the network is safe. The same is said by Aguas Cordobesas, the company responsible for the distribution and analysis of the liquid element. But in the face of such overwhelming evidence, it is clear that this situation is, at the very least, worrying.

While hotels in the area are not solely responsible for the high levels of pollution in San Roque, their mere existence contributes very high amounts of sewage that, whether through their own negligence or that of the treatment plant, end up in the waters of a lake that is becoming increasingly difficult to recover. In a case where the health of millions of people could be affected in the short and long term, it is considered that it is not only necessary to call for effective solutions, but also to make the situation known to as many people as possible so that social pressure can help push for urgent and definitive measures. If the decontamination of the lake depends on stopping the discharge of sewage into its waters, and if this requires more stringent controls on hotels, the population, and the water treatment plant, it must be the population that demands it.

General Objective

Inform the community about the importance, risks, and consequences of the pollution problem in Lake San Roque so that they demand that the relevant authorities take the necessary measures against the hotel and restaurant companies that are contributing to the damage.

METHOD

Carry out the project in podcast and video format due to their ease of sharing on platforms and social networks (Spotify, YouTube, Vimeo, Facebook, Instagram), as well as their popularity among young people, who are currently more aware of and committed to caring for the environment.

- Invite the population through the podcast to become more aware of this environmental problem and demand prompt and efficient solutions.
- Highlight the incompetence of municipal and provincial authorities in solving a problem that has been steadily worsening for decades.
- Encourage the population to demand that hotel and restaurant companies extend their green policies to the treatment and proper management of sewage effluents.

Specific actions

Produce a podcast to raise awareness of the lake pollution problem among the population of Córdoba.

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Implementation plan

Podcast "Convergent."A series of four episodes will be recorded in audio and audiovisual format under the brand name "Convergente," with the aim of giving voice and visibility to issues that affect societies and place them in situations of vulnerability or danger. These first episodes will deal in depth with the issue of pollution in Lake San Roque, with each episode lasting 30 minutes. The content of each episode will be divided as follows:

Chapter 1

- A brief history of Lake San Roque and the city of Villa Carlos Paz (5 minutes).
- The local economy, how the city's inhabitants subsist, and the importance of the natural environment for productive development (7 minutes).
- Introduction to the problem of pollution in Lake San Roque (13 minutes).
- Comparison with other similar cases around the world, the consequences and dangers of pollution in large lakes (10 minutes).

Chapter 2

- Presentation of audio and audio-video recordings of street surveys conducted with residents and tourists in Villa Carlos Paz, inquiring about their knowledge and opinions on the pollution of the lake (10 minutes).
- Interview with an expert in environmental pollution who is familiar with the San Roque problem (20 minutes).

Chapter 3

- Presentation of evidence that hotels and restaurants are largely to blame for the lake's pollution levels. Some of the violations recorded by the Córdoba Environmental Police will be used (10 minutes).
- Interview with a current government official, preferably from the Córdoba Ministry of Environment and Sustainable Development, who can explain the problem (20 minutes).

Chapter 4

- Debate between the environmental pollution expert, the Ministry of Environment official, and a virologist, in which there is an in-depth dialogue that allows viewers and listeners to draw their own conclusions on the subject (30 minutes).

RESULTS

Although the Internet does not respect barriers of space and time, the expected reach of the proposal in podcast format involves the province of Córdoba in a timely and urgent manner, because, as biologist Federico Kopta said in the interview, 70 % of the province's population receives drinking water from Lake San Roque, while the remaining 30 % receives it from Lake Los Molinos, which is beginning to experience similar levels of pollution. It is also hoped to reach the rest of the provinces of Argentina, with the aim of raising awareness of the possible repercussions of not properly controlling sewage, political inaction, and the lack of interest on the part of certain commercial sectors in caring for the environment.

Recursos humanos	Recursos materiales	Recursos económicos
• Conductor para el podcast "Convergente" • Productor • Experto en audio y video • Asistente de montaje y postproducción.	• Habitación con aislamiento acústico. • 3 micrófonos lavaliers o corbateros. • Set de luces LED de colores varios. • 1 cámara de video con	• Alquiler de habitación acústica $15000 • 3 micrófonos lavaliers $8000 • Set de luces LED $5500 • Alquiler de cámara y trípode $20000 • Grabador periodístico $15000
• Periodista/notero. • Invitado Médico • Invitado Funcionario • Invitado Experto en contaminación.	seguimiento Cannon Powershot. • 1 trípode para cámara. • 1 mesa circular y 3 sillas o banquetas. • 1 grabador periodístico. • 1 notebook.	• Alquiler de mobiliario $7000 • Notebook propia $00 • Pago experto audiovisual $15000 • Pago Asistente de montaje $15000

Figure 1. Resources involved

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Implementation time

Pre-production: 2 to 3 weeks

- Gather relevant information.
- Search for and secure future interviewees.
- Obtain material, human, and financial resources.
- Create a complete script.

Production: 2 weeks

- Record interviews with guests.
- Record opinions from people on the street.
- Record hard news segments.
- Record an introduction and closing for each episode.

Post-production: 4 weeks

- Audio and video editing (sound quality, clarity, and color)
- Select shots and audio that meet the necessary quality standards.
- Cut and overlap shots.
- Add sound and image effects.
- Add background music.
- Adapt audio and video formats for various digital devices.

Publication: 4 weeks

One episode will be published per week during the month of October, in anticipation of the upcoming holiday season in the country, in order to generate greater impact on the general population. To this end, distribution channels will be created during the post-production period on YouTube, Vimeo, Facebook, Instagram, and Spotify. Once created and in agreement with the post-production staff, short segments and images will be uploaded in story format to each platform to gain followers prior to publication.

Proposals for measurement or evaluation

The following metrics will be analyzed:

- Number of video views on YouTube.
- Number of audio plays on Spotify.
- Number of plays on Vimeo.
- Number of followers and plays of clips on Facebook.
- Number of followers and reel plays on Instagram.

To consider the dissemination of the project as successful in terms of reach, the following must be achieved: Before publication.

- 300 followers on YouTube.
- 500 followers on Facebook.
- 500 followers on Instagram.
- 100 followers on Vimeo.

Within the first 7 days of the publication of chapter 1.

- 700 YouTube followers with 5 000 views and 1 500 likes.
- 1 000 followers on Facebook with 5 000 views of clips and 1 500 shares.
- 1 000 followers on Instagram with 5 000 reel views and 1 000 likes.
- 200 followers on Vimeo with 1 000 views.
- 200 followers on Spotify with 2 500 audio plays and 400 shares.

Within the first 7 days of the release of chapter 2.

- 1 300 followers on YouTube with 10 000 views and 2 800 likes.
- 1 500 followers on Facebook with 12 000 fragment views and 2 800 shares.
- 1 500 followers on Instagram with 12 000 Reels plays and 2 200 hearts.
- 400 followers on Vimeo with 1 500 views.
- 500 followers on Spotify with 5 500 audio plays and 900 shares.

In the first 7 days since the release of chapter 3.

- 2 000 followers on YouTube with 16 000 views and 4 000 likes.
- 2 200 followers on Facebook with 25 000 fragment views and 4,000 shares.
- 2 200 followers on Instagram with 25 000 Reels plays and 3 200 hearts.
- 700 followers on Vimeo with 2 200 views.

- 1 200 followers on Spotify with 8 000 audio plays and 1 500 shares.

In the first 7 days since the release of chapter 4.

- 3 000 followers on YouTube with 25 000 views and 5 000 likes.
- 3 400 followers on Facebook with 32 000 views of clips and 5,000 shares.
- 3 400 followers on Instagram with 32 000 Reels plays and 4 000 shares.
- 1 000 followers on Vimeo with 3 000 views.
- 2 000 followers on Spotify with 12 000 audio plays and 2 000 shares.

SWOT Analysis

A SWOT analysis was carried out to accurately measure the implications of this work, taking into account its internal weaknesses or shortcomings, as well as external threats or dangers, but also its internal strengths and positive possibilities towards the outside world, also known as opportunities.

Fortalezas	**Debilidades**
• Análisis profundo y abarcativo sobre el lago San Roque. • Respaldo de expertos y profesionales de la salud y las leyes medioambientales a través de entrevistas. • Realiza un barrido histórico que demuestra que los problemas con el lago no son recientes.	• No toma en cuenta otros espejos de agua para contrastar información. • No se consiguió entrevistar a representantes del sector gastronómico y hotelero de la zona para comparar versiones. • Falta una mirada desde la política no partidaria.
Oportunidades	**Amenazas**
• Llegar al público joven a través de redes sociales y lograr un impacto rápido y contundente en la sociedad. • Propiciar mayor cantidad de estudios científicos y el interés por parte de medios audiovisuales en difundir lo que está ocurriendo en el lago San Roque y otros espejos de agua como el lago Los Molinos, también de Córdoba.	• Al ser en formato podcast, el proyecto podría ser ignorado por la población mayor de treinta años. • Proyectos audiovisuales que contradigan parte de la información con una mirada política y empresarial incluida. • Si no se logra una viralización eficiente, el proyecto se perderá en la web y se olvidará rápidamente.

Figure 2. SWOT

CONCLUSIONS

The levels of pollution in Lake San Roque are extremely high and dangerous to the health of those who use its waters, whether for consumption or recreational purposes. The dangers posed by this pollution are both short-term (gastroenteritis, abdominal pain, vomiting, diarrhea, liver inflammation) and long-term (kidney damage, cancer).

Although it was not possible to obtain the names of the 60 hotels and restaurants fined for polluting the lake with sewage effluents, it is clear that the policies implemented by the hotel chains in Villa Carlos Paz are generally insufficient to counteract their effects on the environment, especially on Lake San Roque. Suspicions that many of them engage in greenwashing could not be proven due to the lack of names of the polluting companies, but it is clear that many of the standards and activities proposed as "green" or having a positive impact on the environment are actually harmless or even useless.

The lake's pollution problems have much deeper roots than expected, dating back to the construction of the first dam and have always been linked to corruption, incompetent political leaders, and dishonest businesspeople seeking to maximize their economic gains without concern for the environment.

The region's population and summer tourists, in general, do not seem particularly concerned about the pollution situation in Lake San Roque, since despite the fact that

the first complaints from authorities, scientists, and organizations date back more than forty years, there has been no serious and sustained interest on the part of the inhabitants of the Cordoba mountains, nor has there been a decrease in visitors during the holiday season.

The fact that the situation with Lake San Roque continues to be virtually ignored is causing collateral damage, such as the contamination of Lake Los Molinos in similar and even faster ways. It is presumed that this has to do with the precedent of inaction on the part of the authorities, which leads those who pollute to take the consequences of their actions lightly.

RECOMMENDATIONS

Conduct a study through interviews and surveys of the population to determine the level of awareness at the provincial level about the levels of pollution in Lake San Roque and its implications. The results could be compared with the obtained in this report to expand the conclusions and find solutions to this high-impact problem.

Based on Federico Kopta's recommendations in the interview, it is recommended that new studies on the effects of pollution in Lake Los Molinos be added to this report and disseminated to the population through other digital channels to inform as many people as possible. It will be important to emphasize the need for urgent action so that the people of Cordoba become aware of the importance of this problem and demand its immediate resolution.

BIBLIOGRAPHICAL REFERENCES

1. Howard Johnson Villa Carlos Paz Gestión Sustentable. Disponible en: https://hjvillacarlospaz.com.ar/portal/es-es/210/GestionSustentable

2. Hoteles Más Verdes. Programa de Certificación. Disponible en: https://www.hotelesmasverdes.com.ar

3. Manual de Prácticas Ambientales Para Establecimientos Hoteleros y Gastronómicos. Disponible en: https://aehga.com

4. Organización Mundial del Turismo. Disponible en: https://www.unwto.org

5. Global Sustainable Tourism Council. Disponible en: https://www.gstcouncil.org

6. Organización de las Naciones Unidas, Comisión de Desarrollo y Medioambiente. Disponible en: https://www.un.org/es/ga/president/65/issues/sustdev.shtml

7. Presencia de Microcistinas y otros Metabolitos Secundarios de Cianobacterias en el Lago San Roque-Córdoba, Argentina. Doctora Valeria Amé. Disponible en: https://efncentro.biblio.unc.edu.ar//cgi-bin/koha/opac-detail.pl?biblionumber=5479

8. Facultad de Ciencias Médicas UNC. Instituto de Virología "Dr. J.M Vanella". Disponible en: https://unciencia.unc.edu.ar/salud/identifican-un-conjunto-de-virus-en-aguas-del-lago-san-roque/

9. Córdoba: Detectan la Presencia Crónica de Toxinas Graves en los Diques. Disponible en: https://argentinambiental.com/notas/ecopress/cordoba-detectan-la-presencia-cronica-toxinas-graves-los-diques/

10. La Voz. Carlos Paz: Denuncia Penal del Municipio Contra la Cooperativa de Cloacas por Contaminación del Lago San Roque. Disponible en: https://www.lavoz.com.ar/ciudadanos/regionales/carlos-paz-denuncia-penal-del-municipio-contra-la-cooperativa-de-cloacas-por-contaminacion-del-lago-san-roque/

11. Municipalidad de Villa Carlos Paz Denuncia a la Coopi. Disponible en: https://villacarlospaz.gov.ar/detallenoticia.php?id=9834

12. Denuncian a Restaurantes y Hoteles por Arrojar Residuos al San Roque. Disponible en: https://www.perfil.com/noticias/cordoba/denuncian-a-restaurantes-y-hoteles-por-arrojar-residuos-al-san-roque.phtml

13. Contaminación del San Roque: Están en Riesgo la Industria del Turismo y la Salud de la Ciudad de Córdoba. Disponible en: https://www.marcainformativacba.com/lago-san-roque/contaminacion-del-san-roqueestan-riesgo-la-industria-del-turismo-y-la-salud-la-ciudad-cordoba-n33102

14. Ley General de Ambiente 25675. Disponible en: https://www.argentina.gob.ar/normativa/nacional/ley-25675-79980/texto

15. Ley Orgánica de Agua y Saneamiento de Córdoba. Disponible en: https://www.argentina.gob.ar/normativa/provincial/ley-8548-123456789-0abc-defg-845-8000ovorpyel/actualizacion

16. Lavado de Cara Verde… ¿Qué es el Greenwhashing?. Disponible en: http://archivo-es.greenpeace.org/espana/es/Blog/lavado-de-cara-verdequ-es-el-greenwashing/blog/29122/

17. La historia del embalse más grande del Mundo. Disponible en: http://www.diquesdecordoba.com.ar/san-roque-la-historia-del-embalse-mas-grande-del-mundo/#:~:text=Fr%C3%ADas-

FINANCING

None.

CONFLICT OF INTEREST

None.

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