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Thalassotherapy Activity in Tourism: Impacts and Development in Coastal and Island Destinations

Abstract

Thalassotherapy, a health practice dating back to ancient times in coastal areas, is closely linked to the origins of tourism in several regions. This study aims to identify the impacts of thalassotherapy practices on tourist destinations. A systematic review was conducted from the perspectives of tourism and health. A total of 61 documents were selected from the *Scopus*, *Web of Scienc*e, and *PubMed* databases. The PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) method and the *VOSviewer* software were used for word analysis. The primary findings indicate that thalassotherapy activities in tourist destinations do not generate negative environmental impacts and contribute positively to the socioeconomic conditions of the region. Health-related benefits include improved patient outcomes, enhanced quality of life, and increased work capacity. The study highlighted case studies from Greece, Spain, Croatia, and Japan. The co-occurrence analysis underscored the relationship between thalassotherapy and tourism development. This research contributes to tourism management by emphasising the inclusion of health benefits in assessing tourism destinations, alongside environmental and socioeconomic impacts. A health-sector method was adapted to improve systematic reviews in tourism, adding specific items. No economic evaluations were found in thalassotherapy projects despite evidence from case studies.

Keywords: tourism, impacts, thalassotherapy, health, development

1. Introduction

Thalassotherapy refers to the therapeutic use of marine environments, including seawater, marine climate, seaweed, sea mud, sand, plankton and phytoplankton, sea breeze, sea salt, and sunlight. Advances in medicine and increased life expectancy have transformed thalassotherapy's traditional medical uses, yet it remains a holistic approach that considers both personal well-being and the environment, supporting its expanding role in health and wellness tourism (Morer, 2016). Thalassotherapy projects can generate positive social and economic impacts, particularly in coastal and island destinations (Nomura, 1991). The health-related use of the marine environment has evolved into a health and wellness tourism product. However, it still requires improvements in public administration, management, development strategy, and international networking for scientific participation, among other areas that need further research (Kušen, 2011; Pančić Kombol, 1996). All stakeholders need to implement strategic measures to promote sustainable growth and local development in island destinations (Lopes et al., 2020).

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Medical, health, and wellness tourism is a rapidly growing sector, with key research themes focused on markets, destinations, and policy environments. It is expected to integrate further with other care services and contribute to sustainable development and quality-of-life policies, thereby influencing regional and national development strategies (Zhong et al., 2021). These dimensions are relevant in sustainable destination planning and development in coastal and island destinations. Public recognition of thalassotherapy is increasing, highlighting the importance of sustainably preserving marine resources. Policies should prioritize local communities to prevent disruptions to traditional livelihoods (M. J. Kim, 2022). Most research on health tourism experiences has focused on wellness aspects rather than therapeutic ones. These experiences require greater attention to the natural environment, as it is the setting where they occur, and customers are willing to pay more for this connection with nature (Dryglas & Smith, 2024). Alternative approaches and comprehensive economic evaluations are essential, especially for coastal and island destinations, which possess unique resources that can enhance public health (C.-G. Kim & Cho, 2022).

This study addresses the need for a comprehensive evaluation of thalassotherapy by examining its environmental impacts, socioeconomic implications, and potential health benefits. It is guided by four research questions: which case studies have analysed thalassotherapy projects in coastal and island destinations; what environmental and socioeconomic impacts these developments have; what health benefits are associated with thalassotherapy; and what economic evaluations have been conducted. The study adapted a health-sector method to improve systematic reviews in tourism. The study contributes to tourism management by highlighting the importance of incorporating health outcomes into destination assessments alongside environmental and socioeconomic factors. Despite the case study findings, the study identified no economic evaluations, revealing a notable gap in the literature. This research offers new perspectives for tourism planning by integrating health-focused approaches into destination assessment and management.

2. Literature review

2.1. Health tourism at coastal and island destinations

Historically, people often ascribed water's healing properties to divine forces, but since the nineteenth century, scientific research has identified specific therapeutic components in seawater (Costanzo et al., 2024; Weber, 1905). Coastal and island destinations inherently provide restorative environments, such as stress-relieving beaches and therapeutic waters, utilized for recreation, sport, and medical treatment (Kruizinga, 2016). Thalassotherapy spas and resorts help promote health and wellness tourism. Their main draw is the resort itself, especially its natural setting and great location (Rodrigues et al., 2022). Destinations should leverage their unique characteristics and local empowerment, emphasising health within the destination (Jafari, 2005).

Thalassotherapy attracts visitors to coastal areas by offering recognized health benefits, and evidence links its appeal strongly to its therapeutic qualities (Chae & Lee, 2024). Endogenous elements contribute to coastal destinations' value and distinctiveness. When standard medical treatments fail to provide relief, thalassotherapy is considered a complement to other therapies (Ledo, 1996). Coastal activities in warm climates benefit individuals and families, especially when combined with health tourism facilities (Skjeldal et al., 2009). Thalassotherapy has shown efficacy in treating various conditions, with implications for medical and health tourism, a growing public health concern (Hall, 2016). Environmental resources, such as algae (Gómez Pinchetti & Martel Quintana, 2016; Mourelle et al., 2017, 2023) and mud (Rebelo et al., 2010), are endogenous elements that play essential roles in thalassotherapy and are widely used.

2.2. Tourist development impacts at coastal and island destinations

Uncontrolled growth, especially in sun-and-beach tourism, poses significant risks to vulnerable coastal ecosystems (Mejjad et al., 2022). For over five decades, researchers have highlighted the need to balance tourism's social,

environmental, and economic dimensions to promote sustainable development (Mathieson & Wall, 1982). Nonetheless, environmental impacts remain underexplored despite their critical role in sustainability (Butler, 1974, 2024). Small islands, with few alternative industries, face a high risk of overdependence on tourism. Strengthening local linkages and carefully managing carrying capacity are essential to avoid negative cultural, social, and environmental impacts (Dłużewska & Giampiccoli, 2021). Responsible tourism is crucial, particularly in ecologically sensitive areas (Li et al., 2023). However, thalassotherapy is vulnerable to environmental pollution, underscoring the need to protect the environment (Camacho et al., 2019). The well-being of tourists, local host communities, and the overall destination experience is essential for its long-term success (Hartwell et al., 2018).

The organisation of the tourism sector and government policies significantly shape economic outcomes. Tourism revenues can drive economic growth by increasing imports of capital goods and sector-specific investments (Hajdinjak, 2014). Tourism can initially harm residents' health, but long-term benefits highlight the need for health impact assessments to inform destination marketing and management strategies (Godovykh & Ridderstaat, 2020). Environmental quality in coastal tourism destinations can be improved at any stage of development and is essential for providing suitable therapeutic environments (Jennings, 2004). Products such as sea salt, with a history of therapeutic use (Manoharan & Kaliaperumal, 2022), add value to sites like old salt flats for restoration aims. Collaboration between the health and tourism sectors is essential to maintain a positive destination image and meet visitors' health recovery expectations, while health self-efficacy and the perceived benefits of these therapies significantly influence visitors' decisions to engage with such destinations (Moreno-González et al., 2020, 2025). However, coordinated political action is required to monitor and manage the social impacts of tourism expansion. Although few economic evaluations address thalassotherapy specifically, studies of centers offering mineral-medicinal water therapies report nearly double returns on investment (Torres-Pruñonosa et al., 2022).

3. Methodology

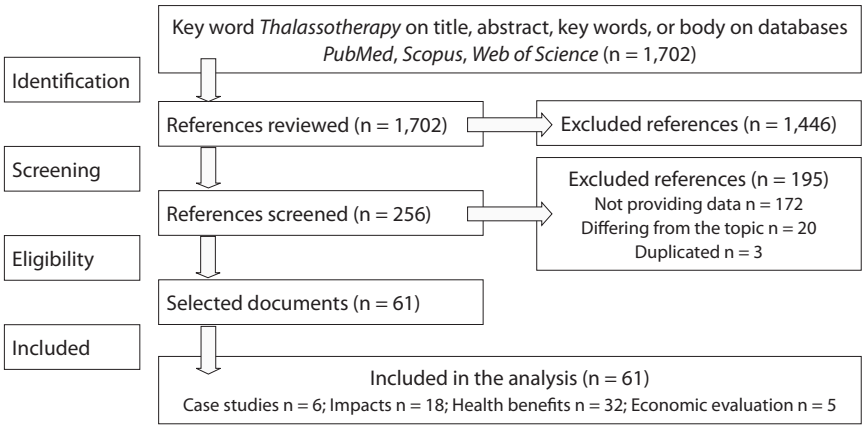
Tourism research requires a multidisciplinary perspective to understand the complex dynamics of destinations (Jafari & McCabe, 2024). This study adopts the PRISMA guidelines (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) (Page et al., 2021; Urrútia & Bonfill, 2010). Researchers have used this method in systematic reviews in tourism research, and it is recommended to minimize potential sources of bias (Pahlevan-Sharif et al., 2019). Although this method was initially developed for systematic reviews of health interventions, researchers have also used it in reviews on wellness tourism (Martins et al., 2023). The PRISMA method was adapted to effectively address this research's objectives. A checklist of 34 descriptive items was created, based on the original 27 items from the PRISMA checklist; in addition, seven supplementary items were included to reflect the specific focus of this research: socioeconomic impacts, environmental impacts, health impacts of the intervention, geographical location of the study (region, country, or center), therapeutic services offered, target market segments, and a final item addressing relevant data for future economic evaluation.

The literature search used three academic databases particularly relevant to Tourism and Health studies: *Scopus*, *Web of Science (WoS)*, and *PubMed*. Scopus and WoS have previously been used in systematic reviews on the bibliometric aspects of thalassotherapy, thermalism, and spa (del Río-Rama et al., 2018), on thalassotherapy alone (Munteanu & Munteanu, 2019), and on climatotherapy and thalassotherapy in health (Schuh, 2009). However, no systematic review has yet addressed tourism and health aspects, combining databases commonly used in tourism with those used in medicine. This study included PubMed because it is a leading global database for medical literature and is widely used in systematic reviews on health-related topics (Abdulla & Krishnamurthy, 2016).

The search covered publications from 1999 to January 2024, and relevant information addressing the research questions was found. All references in which the term "thalassotherapy" appeared in the title, abstract, keywords, or main text were included. Documents that did not address the research questions, those with similar content published in close timeframes, and patents were excluded from the analysis. Language and

geographic location were not restrictive factors. Documents in English, Italian, Croatian, Spanish, and German were selected and translated. Publications discussing environmental impacts, socioeconomic implications, economic evaluations, case studies, and health benefits were analysed. Data were compiled in spreadsheets to support subsequent analysis. The main results were compiled according to the research questions. Figure 1 presents the process flow diagram illustrating the sequential process.

Figure 1
Flow diagram PRISMA



Source: Authors.

The qualitative data analysis tool *VOSviewer* has been widely used to visualize and analyse scientific literature (Pan et al., 2018). In this study, several word co-occurrence analyses were performed on the titles and abstracts of the reviewed documents, generating text-based data maps. Different tests were conducted to examine word associations and identify relevant terms. The analysis included the titles and abstracts of 61 reviewed documents, excluding structured abstract labels and copyright statements. A total count was performed. For metadata analysis, clustering, overlay visualization, and link strength density were applied, considering the top 95% of the most relevant terms with a minimum of five co-occurrences.

4. Results

The main findings indicate that researchers have studied thalassotherapy primarily within health and health-related fields, accounting for about 95% of the research focus. A smaller proportion of studies have examined the Natural Sciences (10%), with minimal representation in Engineering, Business and Economics, Social Sciences, and other disciplines. Some studies span multiple fields. These proportions are based on Scopus data; PubMed does not categorize references by field, and *WoS* shows a similar distribution.

To address the research questions, documents that met the selection criteria were included, a total of 61 documents to analyse: 36 research articles (59%), 14 dissertations (23%), nine reviews (15%), and two books (3%). Among these, 34 documents provided full-text content (56%), while 27 included only the abstract (44%). The PRISMA checklist was applied to each document. The findings have been organized into four main areas: case studies, socioeconomic and environmental impacts, health benefits, and economic evaluations.

4.1. Software to analyse qualitative data

The findings are visualized through clustering, publication-date overlays, and link-strength density. The software grouped 86 terms into five clusters interconnected through 2,032 links. Of the 2,011 extracted terms from abstracts and titles, 90 met the threshold of at least five co-occurrences, and 95% of the most relevant terms add at the end of the paragraph (Figure 2).

Figure 2
Cluster items

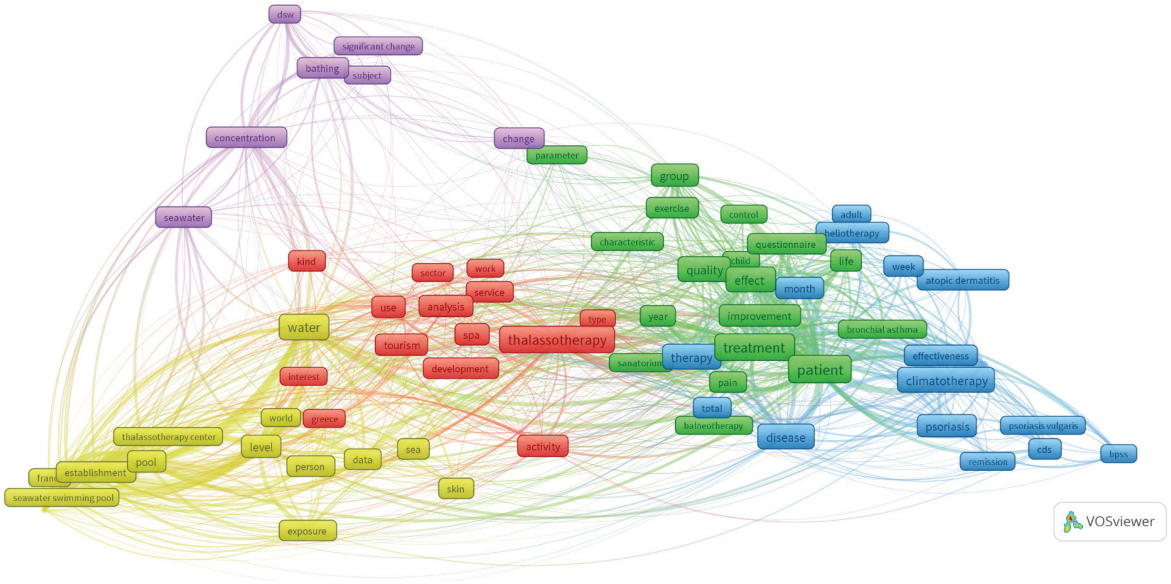
Cluster 1 (22 items)	Cluster 2 (22 items)	Cluster 3 (18 items)	Cluster 4 (15 items)	Cluster 5 (9 items)
activity	balneotherapy	adult	brominated compound	bathing
analysis	bronchial asthma	atopic dermatitis	chlorine	change
benefit	characteristic	bpss	data	concentration
century	child	cds	establishment	dsw
company	control	climatotherapy	exposure	influence
development	day	dead sea	france	minute
greece	effect	disease	level	seawater
health tourism	exercise	effectiveness	person	significant change
interest	fibromyalgia	efficacy	pool	subject
kind	group	heliotherapy	sea	
methodology	improvement	month	seawater swimming pool	
paper	life	psoriasis	skin	
research	pain	psoriasis vulgaris	thalassotherapy center	
sector	parameter	reduction	water	
service	patient	remission	world	
spa	quality	therapy		
thalassotherapy	questionnaire	total		
thermalism	sanatorium	week		
tourism	spa treatment			
type	symptom			
use	treatment			
work	year			

Source: Authors.

Each cluster aggregated relevant items by identifying metadata patterns and categorizing them by shared attributes and underlying affinities. Notably, the same cluster integrates tourism, development, and thalassotherapy items.

The clustering analysis (Figure 3) identifies key research areas within thalassotherapy. One primary cluster focuses on climatotherapy and later expands to broader therapeutic applications. Another two clusters examine seawater and swimming pools, emphasising water quality and exposure. Furthermore, the thalassotherapy item underscores its interdisciplinary relevance across health, environmental sustainability, and medical research.

Figure 3
Clusters



Source: Authors.

The overlay visualization (Figure 4) shows the chronological evolution of research, initially focused on climatotherapy for skin diseases. Over time, the scope broadened to include rehabilitation, patient care, and wellness-related outcomes. Recent studies increasingly address quality of life, therapy effectiveness, and patient-centered care, aligning with trends in health and wellness tourism.

Figure 4
Overlay

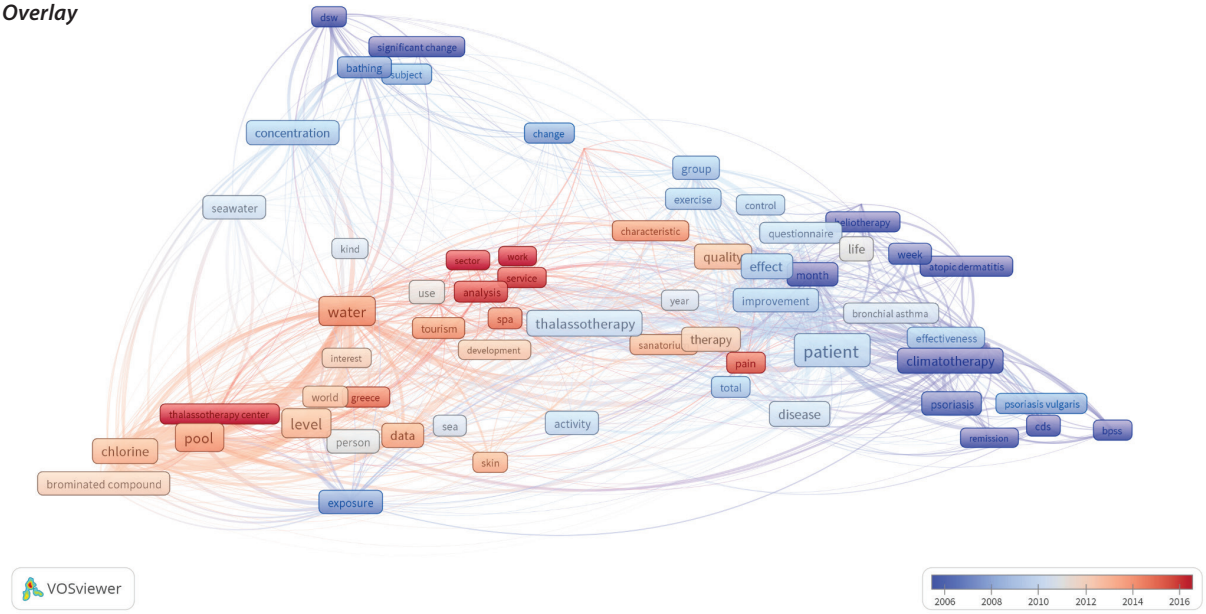


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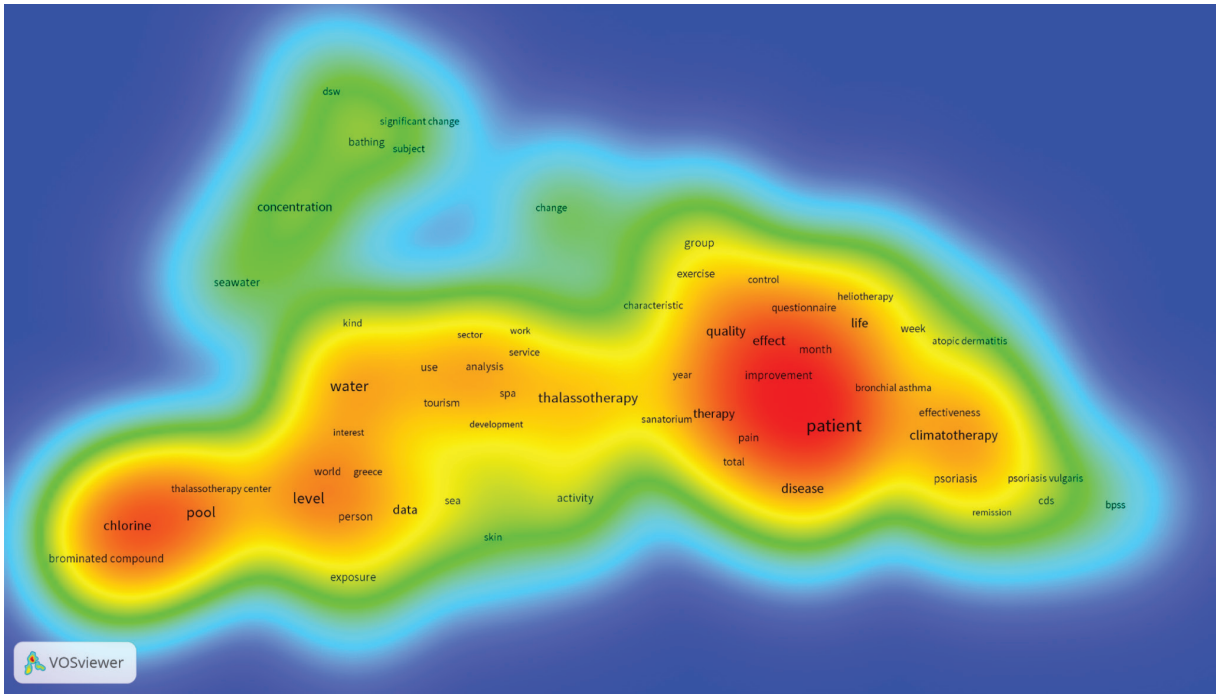
Figure 5
Link strength density



Source: Authors.

The density map (Figure 5) highlights influential terms such as patient, treatment, therapy, and quality of life, reinforcing thalassotherapy's medical importance. Environmental factors such as water and pool conditions also emerge, linking research to sustainable spa and tourism practices.

4.2. Case studies

Expanding thalassotherapy in tourist destinations involves identifying and using natural resources, establishing transport options, and building essential infrastructure to support these activities, as shown by tourist development in four countries.

Certain regions of Greece have practiced these activities for millennia. Experts and centers advocate for certifications based on tradition, environmental quality, nutritious food, and qualified medical personnel (Pavlakou-Panagiotopoulou, 2015).

Entire areas in Croatia have been transformed to support specialized medical activities. Nowadays, the University of Rijeka leads healthcare initiatives in this area, with its teaching base at the *Thalassotherapia* centre (Muzur, 2006; Uremović et al., 2006).

The development of thalassotherapy-centered tourism has laid the groundwork for broader tourism growth across many coastal areas through floating bath structures and bathing houses established along the coasts, marking a shift in regional economies and setting the stage for modern tourism infrastructure in Spain (Grao-Gil, 2020; Tatjer, 2009).

Dedicated recreational and therapeutic areas have also led to centers that blend traditional and modern treatments in Japan. Comprehensive planning remains essential for launching rehabilitation and health-promotion activities, particularly regarding local natural resources and environmental sensitivities (Vasil'chenko et al., 2014).

As the literature shows, selecting a location for a future centre or project requires active stakeholder involvement, early engagement, and a deep understanding of available resources. Human action and medical expertise in health prevention and restoration play a pivotal role in initiating, developing, and sustaining thalassotherapy as an economic activity in a coastal region.

4.3. Impacts of the thalassotherapy activity

The evidence suggests positive socio-economic effects, including regional economic growth, job creation, overall health benefits for the community, and knowledge acquisition, among others. The literature also highlights environmental interactions, indicating that this activity has not negatively affected the destinations where it has been implemented. Additionally, the potential medical use of local resources is enhanced (see Table 1).

Table 1
18 documents analysed using the PRISMA method for 'thalassotherapy' keyword in the impact category

IMPACTS	
Authors, year	**Title**
Potenza et al., 2006	Thermalism: Economical problems and regulations
Martínez Moure, 2008	[Thalassotherapy and tourism: The therapeutic resources of seawater as a sustainable mechanism for tourism promotion in coastal municipalities: The case of the province of Pontevedra (Galicia)]
Marchand, 2008	What policies for a lasting protection of the ocean and coastal seas?
Charlier & Chaineux, 2009	The healing sea. A sustainable coastal ocean resource: Thalassotherapy
Moss, 2010	Water and health: A forgotten connection?
Crecente et al., 2012	A multicriteria approach to support the location of thalassotherapy (seawater therapy) resorts: Application to Galicia region, NW Spain
Lee & Kyung, 2013	A study on the industrialization of deep seawater in Japan and Korea, and its implications on the utilization of Jeju Magma seawater

Table 1 ***(continued)***

Mastora, 2015	Sports, exercise, recreational activities and remedial tourism
Jurczak et al., 2011	The influence of health-resort services on the quality of life of patients with bronchial asthma
Krüger et al., 2011	Significant immediate and long-term improvement in quality of life and disease coping in patients with vitiligo after group climatotherapy at the Dead Sea
Parinet et al., 2012	Exposure levels to brominated compounds in seawater swimming pools treated with chlorine
Lee, 2015	The development of 'stay tourism products' in farming and fishing villages: Focused on wellness/ medical tourism
Álvarez-García et al., 2017	How do quality practices affect the results? The experience of thalassotherapy centres in Spain
Jaziri-Bouagina, 2017	The tacit knowledge through the customer experience: Conceptualization, externalization methods, and use application to Tunisian thalassotherapy centers
Boudenne et al., 2017	Monitoring and factors affecting levels of airborne and water bromoform in chlorinated seawater swimming pools
Iliescu et al., 2018	Statistical view through balneal activity in Techirghiol medical area
Sánchez-Medina et al., 2018	Predicting thalasso tourist delight: A hybrid SEM-artificial intelligence analysis
Cañete Arratia, 2020	A sea of benefits: Health effects of marine baths in Chile

Source: Authors.

Adverse effects have been reported when artificial pools treated with chemicals are not used properly. However, the literature has not documented harmful environmental effects when these activities are conducted in natural settings.

Marine spa activities require further study to establish their role based on evidence-based guidelines. Social benefits include improved quality of life, job creation, cultural preservation, and protection of coastal resources. No negative environmental impacts have been identified. Evidence also indicates environmental interactions that use marine resources for health benefits, though the full potential of these resources remains unknown.

4.4. Economic evaluations of thalassotherapy activity

To identify potential investment projects, we searched these databases and found a large volume of publications featuring terms like "Economic Evaluation" or "Cost-benefit" in their titles, keywords, or abstracts, with counts reaching the hundreds of thousands. However, publications that combine terms such as "Thalassotherapy" with "Economic Evaluation" or "Thalassotherapy" with "Cost-benefit" are relatively limited.

Two cost-effectiveness analyses (Harari et al., 2000; Zijlstra et al., 2007), a suitability assessment (Autio et al., 2002), a willingness-to-pay study (Dobrev et al., 2017), and a comparative study (Roos et al., 2010) of treatments have been conducted to investigate various pathologies and their corresponding treatments.

In summary, economic evaluation research indicates that thalassotherapy, in the context of the studied pathologies, reduces drug consumption and associated side effects while improving quality of life and enhancing patients' capacity to work or perform daily activities. Artificial forms of thalassotherapy can substitute for natural thalassotherapy, although natural environments support faster recovery.

4.5. Health benefits and effectiveness of thalassotherapy

Numerous studies report benefits across various human body systems, for adults and children. Several publications focus on general health. The most studied system is the integumentary system, with particular attention to atopic dermatitis and psoriasis vulgaris. Substantial research also examines the musculoskeletal system. Literature research has also explored effects on the circulatory, nervous, digestive, reproductive, endocrine, and visual systems. Rather than providing a detailed analysis of each document on the health

benefits of thalassotherapy, we include a table with the titles and authors of the analysed documents (see Table 2).

Table 2
32 documents analysed using the PRISMA method for the 'thalassotherapy' keyword in the health benefits category

HEALTH BENEFITS	
Authors, year	**Title**
Frentz et al., 1999	Malignant tumors and psoriasis: Climatotherapy at the Dead Sea
Tsuchiya et al., 2003	Changes in plasma lactate and pyruvate concentrations after taking a bath in hot deep seawater
Hristakieva, 2003	Thalassotherapy as an alternative treatment in dermatology
Hodak et al., 2003	Climatotherapy at the Dead Sea is a remittive therapy for psoriasis: Combined effects on epidermal and immunologic activation
Stasić et al., 2004	Heliomarinotherapy in psoriasis
Wang et al., 2004	Effects of seawater physical exercise on cerebral and cardiac hemodynamic in patients with cerebral infarction
Happach, 2004	Treatment of the rheumatic diseases at Kołobrzeg-spa
Hodak et al., 2004	An open trial of climatotherapy at the Dead Sea for patch-stage mycosis fungoides
Zijlstra et al., 2005	Spa treatment for primary fibromyalgia syndrome: A combination of thalassotherapy, exercise and patient education improves symptoms and quality of life
Cohen et al., 2005	Effectiveness of climatotherapy at the Dead Sea for psoriasis vulgaris: A community-oriented study introducing the 'Beer Sheva Psoriasis Severity Score'
Yagev et al., 2005	The effect of the Dead Sea environment on uveitis
Simonickova et al., 2006	The influence of thalassotherapy on atopic eczema
Lucchetta et al., 2007	The historical-scientific bases of thalassotherapy: State of the art
Fedorov et al., 2008	Sanogenetic effects of thalassotherapy in medical personnel of a surgical emergency team
de Andrade et al., 2008	[Benefits of thalassotherapy and balneotherapy for fibromyalgia]
Schuh, 2009	[Evidence of the efficacy of climatotherapy and thalassotherapy: A review]
Ben-Amitai & David, 2009	Climatotherapy at the Dead Sea for pediatric-onset psoriasis vulgaris
Lampa & Rossi, 2010	[Vincenzo Cuomo, pioneer in thalassotherapy]
Maraver et al., 2011	Is thalassotherapy simply a type of climatotherapy?
Schuh & Nowak, 2011	[Evidence-based acute and long-lasting effects of climatotherapy in moderate altitudes and on the seaside: A qualitative review]
Rogozian, 2011	Thalassotherapy: Long-term developments
Harari et al., 2011	Increased vitamin D serum levels correlate with clinical improvement of rheumatic diseases after Dead Sea climatotherapy
Badtieva et al., 2013	[Optimization of the treatment of the patients presenting with chronic venous insufficiency in the lower extremities with the use of the modern methods of thalassotherapy]
Gordon & Avtomeenko, 2013	The effectiveness of the spa and health resort treatment for the pre-gravid preparation of the women at high risk of obstetric and perinatal pathology
N.-I. Kim, 2018	Changes of stress hormone and autonomic nervous system in deep sea water thalassotherapy after sleep deprivation
Carbajo & Maraver, 2018	Salt water and skin interactions: New lines of evidence
del Río-Rama et al., 2018	State of the art of research in the sector of thermalism, thalassotherapy and spa: A bibliometric analysis
Gómez Pérez et al., 2019	Spa techniques and technologies: From the past to the present
Morer et al., 2020	Evaluation of the feasibility of a two-week course of aquatic therapy and thalassotherapy in a mild post-stroke population
N.-I. Kim et al., 2020	Changes in fatigue recovery and muscle damage enzymes after deep-sea water thalassotherapy
Ezhov, 2021	Climate-therapy at seaside resorts in modern medical and wellness practice
Dourmishev & Guleva, 2021	Ultraviolet diagnostic and treatment modalities in the coronavirus disease 2019 pandemic

Source: Authors.

Thalassotherapy benefits human health when health specialists prescribe and administer it. To date, no adverse effects have been identified, except in cases of intense and prolonged sun exposure over several years, which is considered part of the treatment effect. Moreover, thalassotherapy has been regarded as an alternative to systemic hospital treatment for dermatological conditions.

5. Discussion

This study adopts a multidisciplinary approach, integrating health and tourism insights to better understand thalassotherapy's impact on destinations. Research should incorporate economic perspectives and promote local marine products to support livelihoods. Destinations must recognize their unique human, temporal, and spatial characteristics and distinguish themselves from other regions. Success depends on leveraging distinctive attributes, implementing empowerment strategies, and adopting local management practices (Jafari, 2005).

Evaluating tourism impacts is essential for academic research and professional practice (Mathieson & Wall, 1985). Despite limited research on tourism's environmental and socioeconomic effects (Butler, 1974, 2024), such assessments remain crucial. Medical and health tourism also raise ethical concerns with implications for global public health (Hall, 2016). Studies on thalassotherapy highlight its historical and modern contributions to health and coastal development, with no reported negative tourism impacts.

Effective policies must coordinate stakeholders in health tourism, environmental sustainability, and economic sectors. Collaboration between the healthcare and tourism industries is key to maintaining a positive destination image and ensuring visitor satisfaction in health recovery (Moreno-González et al., 2020). Properly integrated into health tourism, thalassotherapy benefits both tourists and local communities.

This research's primary theoretical contribution is demonstrating how thalassotherapy can support public policy development with high societal value; revitalise coastlines; enhance public health; and enrich tourism offerings in coastal and island regions. A literature review identifies theoretical gaps and the need for economic evaluations of investment projects. By expanding the scope of studied impacts, this study contributes to improving tourism management strategies.

Destinations hosting thalassotherapy centers can foster tourism growth, support socioeconomic development, and generate broad benefits. Implementing sustainable tourism development in islands depends on local stakeholders (Lopes et al., 2020), and coastal and island locations offer advantages because of their natural healing properties (Kruizinga, 2016). The research encourages a paradigm shift toward governance models that assess benefits for all stakeholders.

Future studies should explore how coastal tourism management can balance impacts and benefits for tourists and residents. This includes developing evaluation models for best practices in coastal and island tourism. A comprehensive assessment model for thalassotherapy projects that considers shared coastal attributes will guide decision-making and optimize strategies for all stakeholders.

6. Conclusions

This research addresses the questions based on findings from the literature. Although the literature has methodological limitations and lacks extensive studies, existing research supports its health benefits across various physiological systems and conditions. In the context of climate change and sustainability, thalassotherapy offers significant social benefits, helps mitigate environmental degradation, and promotes sustainable tourism practices. No adverse environmental impacts have been linked to thalassotherapy. The case studies reviewed highlight socioeconomic benefits, including infrastructure development, job creation, and tourism growth.

Therefore, research on thalassotherapy should integrate tourism, health, and economic perspectives to inform public policy that responsibly benefits both society and the environment. As a recognized therapeutic resource, thalassotherapy enhances the attractiveness of the services offered by specialized centers and destinations. Its perceived value is closely tied to its health-related benefits. The adapted PRISMA checklist has proven appropriate for tourism research.

Economic assessments of tourism projects should be conducted to anticipate potential impacts. Evidence supports the absence of negative effects associated with thalassotherapy, rather than merely a lack of data.

However, economic studies on thalassotherapy remain scarce. While some evaluations have examined specific diseases and conditions, comprehensive economic analyses of thalassotherapy remain lacking. Nonetheless, case studies demonstrate its social, economic, and environmental benefits. The metadata analysis suggests that thalassotherapy can be a valuable resource for coastal and island destinations, strengthening tourism while supporting public health and sustainable development.

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Declaration of Competing Interests

The authors declare that they have no known competing interests that could have appeared to influence the work eported in this paper.

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Appendix

Table of 61 documents analysed using PRISMA method for thalassotherapy keyword

Databases: Scopus, Web of Sciences and PubMed. Data frame from 1999 to 2024.

Authors, Year	Title
CASE STUDIES	
(Muzur, 2006)	Thalassotherapy in Opatija: A century and a half long tradition and half a century of an institution
(Uremović et al., 2006)	Thalassotherapy and health tourism in Crikvenica: Origins and development
(Tatjer, 2009)	In the origins of coastal tourism: Bathing in the sea and maritime spas in Catalonia
(Vasil'chenko et al., 2014)	The natural resources of the expedition bay as a basis for the creation of the health resort centre at the coast of the Peter the Great Bay, the Sea of Japan
(Pavlakou-Panagiotopoulou, 2015)	Trends and prospects in remedial and rehabilitation tourism
(Grao-Gil, 2020)	[Ephemeral constructions in wood: The spas of the Alicante seafront (19th and 20th centuries)]
IMPACTS	
(Potenza et al., 2006)	Thermalism: economical problems and regulations
(Martínez Moure, 2008)	[Thalassotherapy and tourism: The therapeutic resources of seawater as a sustainable mechanism for tourism promotion in coastal municipalities: The case of the province of Pontevedra (Galicia)]
(Marchand, 2008)	What policies for a lasting protection of the ocean and coastal seas?
(Charlier & Chaineux, 2009)	The healing sea: A sustainable coastal ocean resource: Thalassotherapy
(Moss, 2010)	Water and health: A forgotten connection?
(Crecente et al., 2012)	A multicriteria approach to support the location of thalassotherapy (seawater therapy) resorts: Application to Galicia region, NW Spain.
(Lee & Kyung, 2013)	A study on the industrialization of deep seawater in Japan and Korea, and its implications on the utilization of Jeju Magma seawater
(Mastora, 2015)	Sports, exercise, recreational activities and remedial tourism
(Jurczak et al., 2011)	The influence of health-resort services on the quality of life of patients with bronchial asthma
(Krüger et al., 2011)	Significant immediate and long-term improvement in quality of life and disease coping in patients with vitiligo after group climatotherapy at the Dead Sea
(Parinet et al., 2012)	Exposure levels to brominated compounds in seawater swimming pools treated with chlorine
(Lee, 2015)	The development of 'stay tourism products' in farming and fishing villages: Focused on wellness/ medical tourism
(Álvarez-García et al., 2017)	How do quality practices affect the results? The experience of thalassotherapy centres in Spain
(Jaziri-Bouagina, 2017)	The tacit knowledge through the customer experience: Conceptualization, externalization methods, and use application to tunisian thalassotherapy centers
(Boudenne et al., 2017)	Monitoring and factors affecting levels of airborne and water bromoform in chlorinated seawater swimming pools
(Iliescu et al., 2018)	Statistical view through balneal activity in Techirghiol medical area
(Sánchez-Medina et al., 2018)	Predicting thalasso tourist delight: A hybrid SEM-artificial intelligence analysis
(Cañete Arratia, 2020)	A sea of benefits: Health effects of marine baths in Chile
HEALTH BENEFITS	
(Frentz et al., 1999)	Malignant tumours and psoriasis: Climatotherapy at the Dead Sea
(Tsuchiya et al., 2003)	Changes in plasma lactate and pyruvate concentrations after taking a bath in hot deep seawater
(Hristakieva, 2003)	Thalassotherapy as an alternative treatment in dermatology
(Hodak et al., 2003)	Climatotherapy at the Dead Sea is a remittive therapy for psoriasis: Combined effects on epidermal and immunologic activation
(Stasić et al., 2004)	Heliomarinotherapy in psoriasis
(Wang et al., 2004)	Effects of seawater physical exercise on cerebral and cardiac hemodynamics in patients with cerebral infarction
(Happach, 2004)	Treatment of the rheumatic diseases at Kołobrzeg-spa
(Hodak et al., 2004)	An open trial of climatotherapy at the Dead Sea for patch-stage mycosis fungoides
(Zijlstra et al., 2005)	Spa treatment for primary fibromyalgia syndrome: A combination of thalassotherapy, exercise and patient education improves symptoms and quality of life
(Cohen et al., 2005)	Effectiveness of climatotherapy at the Dead Sea for psoriasis vulgaris: A community-oriented study introducing the 'Beer Sheva Psoriasis Severity Score'

(Yagev et al., 2005)	The effect of the Dead Sea environment on uveitis
(Simonickova et al., 2006)	The influence of thalassotherapy on atopic eczema
(Lucchetta et al., 2007)	The historical-scientific bases of thalassotherapy: State of the art
(Fedorov et al., 2008)	Sanogenetic effects of thalassotherapy in medical personnel of a surgical emergency team
(de Andrade et al., 2008)	[Benefits of thalassotherapy and balneotherapy for fibromyalgia]
(Schuh, 2009)	[Evidence of the efficacy of climatotherapy and thalassotherapy: A review]
(Ben-Amitai & David, 2009)	Climatotherapy at the Dead Sea for pediatric-onset psoriasis vulgaris
(Lampa & Rossi, 2010)	[Vincenzo Cuomo, pioneer in thalassotherapy]
(Maraver et al., 2011)	Is thalassotherapy simply a type of climatotherapy?
(Schuh & Nowak, 2011)	[Evidence-based acute and long-lasting effects of climatotherapy in moderate altitudes and on the seaside: A qualitative review]
(Rogozian, 2011)	Thalassotherapy: Long-term developments
(Harari et al., 2011)	Increased vitamin D serum levels correlate with clinical improvement of rheumatic diseases after Dead Sea climatotherapy
(Badtieva et al., 2013)	[Optimization of the treatment of the patients presenting with chronic venous insufficiency in the lower extremities with the use of the modern methods of thalassotherapy]
(Gordon & Avtomeenko, 2013)	The effectiveness of the spa and health resort treatment for the pre-gravid preparation of the women at high risk of obstetric and perinatal pathology
(N.-I. Kim, 2018)	Changes of stress hormone and autonomic nervous system in deep sea water thalassotherapy after sleep deprivation
(Carbajo & Maraver, 2018)	Salt water and skin interactions: New lines of evidence
(del Río-Rama et al., 2018)	State of the art of research in the sector of thermalism, thalassotherapy and spa: A bibliometric analysis
(Gómez Pérez et al., 2019)	Spa techniques and technologies: From the past to the present
(Morer et al., 2020)	Evaluation of the feasibility of a two-week course of aquatic therapy and thalassotherapy in a mild post-stroke population
(N.-I. Kim et al., 2020)	Changes in fatigue recovery and muscle damage enzymes after deep-sea water thalassotherapy
(Ezhov, 2021)	Climate-therapy at seaside resorts in modern medical and wellness practice
(Dourmishev & Guleva, 2021)	Ultraviolet diagnostic and treatment modalities in the coronavirus disease 2019 pandemic
ECONOMIC EVALUATIONS	
(Harari et al., 2000)	Climatotherapy of atopic dermatitis at the Dead Sea: Demographic evaluation and cost-effectiveness
(Autio et al., 2002)	Heliotherapy in atopic dermatitis: A prospective study on climatotherapy using the SCORAD index
(Zijlstra et al., 2007)	Cost-effectiveness of spa treatment for fibromyalgia: General health improvement is not for free
(Roos et al., 2010)	[Psoriasis: Natural versus artificial balneophototherapy]
(Dobrev et al., 2017)	Implementation of instrument based on eight health related quality of life domains for measuring of willingness to pay for psoriasis treatment