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Review

Integrating Environmental Sensitivity Analysis into Strategic Environmental Assessment for Sustainable Tourism Planning: A Review

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Abstract: Tourism development frequently leads to significant environmental impacts, particularly in vulnerable areas. While strategic environmental assessment (SEA) serves as a crucial tool for integrating environmental considerations into policies and plans, its effectiveness in tourism destinations is often constrained by a lack of integrated tools to assess environmental sensitivity. Environmental sensitivity analysis (ESA), which identifies areas sensitive to anthropogenic disturbance, is applied at the project level (environmental impact assessment), rather than being proactively integrated into strategic territorial planning for tourism. The analysis of this concept is crucial for identifying high-priority areas for conservation and sustainable tourism management. This systematic review addresses this gap by analyzing the inter-relationship between the conceptual aspects of SEA and ESA methodologies and the sustainable planning of territories. The central research question guiding this study is as follows: can the integration of ESA into the SEA of the tourism sector lead to improved territorial environmental management in areas with tourism potential? The research evidences the necessity for strategic environmental planning that effectively prevents impacts before tourism projects commence. The best way to achieve this goal is by integrating ESA into SEA. The notion of sustainable territorial management is particularly relevant in regions where tourism growth has the potential to affect local ecosystems and the quality of life of local communities. The incorporation of tools to better assess the environmental sensitivity of such areas is, therefore, essential to ensure policy decisions do not compromise the socio-environmental conditions of these areas. The study lays the groundwork for future research to develop and apply practical ESA methodologies for strategic and sustainable tourism planning.

Keywords: decision making; environmental risk; strategic assessment; tourism development

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1. Introduction

At the end of the twentieth century, tourism was regarded as one of the most significant branches of the global service sector, generating economic benefits in revenue and providing employment for a considerable proportion of the labor force in tourist destinations. It also became an important source of foreign exchange, playing an important role in local economies and generating multiplier effects. Several works have examined the impact of globalization on tourism, highlighting how this has led to a new geography, particularly in relation to beach destinations, which has resulted in competition between tourist sites

with similar products. This has resulted in the emergence of new growth areas at regional and local scales, which has had a significant impact on the transformation of societies and territories [1]. The accelerated growth of tourism has yielded significant beneficial impacts; however, it has concomitantly engendered substantial negative consequences, including explosive population growth and parallel urban development; increased pressure on jobs, public and private services, and housing; the modification of psychological factors among the local host population related to the lack of cultural identity; the redirection of the development of traditional activities; and, fundamentally, the degradation of natural areas, whose sensitive environmental spaces are rapidly deteriorating.

The planning of tourism activity under the scheme of sustainable development implies a new way of imagining regional development and land planning. This new approach seeks to preserve natural and cultural resources, to use them rationally, to attend to the needs of the local population, to generate economic benefits for the localities derived from tourism-related activities, and to generate tourist satisfaction, among other things [1].

The sustainability of tourism development is a global challenge that requires an integrated approach to territorial planning and management. Strategic environmental assessment (SEA) is a preventative environmental management tool aimed at integrating the environment into the process of formulating policies, plans, and programs (PPPs) and verifying the reality of this. Integration can be defined as the incorporation of environmental sensitivity, judgement, knowledge, and commitment at the formulation stage of PPPs, with the objective of ensuring that public decisions are as sound as possible [2]. Verification encompasses two aspects: firstly, the assessment of the integration of environmental considerations into the formulation of the PPP; and secondly, the evaluation of the outcomes achieved. Strategic environmental assessments are, therefore, used to ensure that environmental considerations are integrated into the decision-making process at the policies, plans, and programs level [2]. However, there is a growing need to improve the accuracy and predictive capacity of SEA by incorporating tools to better assess the environmental sensitivity of territories.

Research done worldwide has indicated that the environmental management of the tourism model that has been implemented to date is not sustainable [3–8] because the environmental variable is not integrated into the strategic planning of the tourism sector. In this context, sustainable land management and the incorporation of strategic environmental assessment into new tourist destination developments are of utmost importance to avoid repeating past experiences of environmental—both natural and social—impacts. A key approach to mitigating these impacts involves the application of environmental sensitivity analyses to sites demonstrating tourism potential [9].

Environmental sensitivity is defined as the potential for an environment to be affected by alterations to the physical, biotic, and socioeconomic processes that characterize it due to the construction and operation of a development project [10]. Environmental sensitivity analysis (ESA) is a methodical approach that aims to identify and prioritize geographical areas deemed to be particularly vulnerable to human disturbance.

The term "'Environmental Sensitivity Analysis" is used to describe the assessment of the susceptibility of the environment to be affected in its functioning and/or intrinsic conditions by the location and development of any project and its areas of influence [11]. The incorporation of this analysis into SEA can provide a more detailed and tailored assessment of the potential environmental consequences of tourism developments, especially in island countries, thus promoting more-sustainable territorial management. The high environmental value of these island territories is due to the presence of coastal areas with beaches, dunes, coastal lagoons, mangroves, and coastal wetlands, as well as their proximity to important protected areas in temperate and tropical countries with good weather condi-

tions. These environmental conditions have resulted in an increase in tourism value across a range of previously underutilized regions; however, tourism development in coastal areas can, in certain instances, lead to the degradation of ecosystems that are particularly sensitive, including coral reefs and mangroves [12].

Although it is not common to carry out environmental sensitivity assessments of territories at the local or regional level that will be submitted before tourism development, there have been successful cases of ESA being applied to the evaluation of individual tourism projects [10,13]. The integration of environmental sensitivity analysis within SEA improves the ability of land managers to anticipate and mitigate environmental impacts on sites of tourist interest, and therefore, the possibility of applying the ESA methodology in strategic and sustainable tourism planning is raised.

To delimit the scope of this research, it was asked if the analysis of environmental sensitivity can be included in the strategic environmental assessment of the tourism sector and, thus, improve the territorial environmental management of spaces with tourism potential. To analyze this context, the state-of-the-art concepts in strategic environmental assessment, environmental sensitivity analysis, and sustainable tourism planning are explored to analyze the existing relationship between these concepts and evidence the need for the strategic environmental planning of territories that effectively addresses the prevention of impacts on a territory before the realization of tourism development projects (either public or private). In general, it is known that there is still a knowledge gap between the theory of these concepts and their practical application, which restricts the understanding of how to integrate environmental sensitivity analyses into the strategic planning of territories, in this case, for tourism purposes.

2. Materials and Methods

To understand the state of the art in terms of environmental sensitivity analysis and its use in territorial and land planning, the Preferred Reporting Items for Systematic Reviews and Meta-Analysis—PRISMA—was used for a systematic review. Records were recruited using specific inclusion and exclusion criteria defined by the authors [14]. The platforms used were SCOPUS and EBSCOhost.

In the case of SCOPUS, the inclusion criteria were as follows: (i) the year of publication (1990–March of 2025), (ii) reports and studies that provide statistical data (from 1990 to the present), (iii) reviews and research papers, (iv) articles published only in English and Spanish. The exclusion criteria were as follows: (i) articles in languages other than English and/or Spanish, (ii) duplicate search engine registrations, (iii) insufficient data, (iv) irrelevant data for environmental sensitivity analysis, (v) statistical data from unreliable databases (vi) technical reports, and (vii) records that do not include the keyword used by the authors. The keywords used were "environmental" AND "strategic" AND "assessment", obtaining some 2364 results. Of the 2364 records identified, 326 were selected according to new keywords, such as *sensitivity* AND *analysis*, which were incorporated into the search. Finally, those with open access were selected (137 results).

Likewise, the EBSCOhost database and the available tools were consulted. The search options in this case were (i) title, abstract, full text, and keywords; (ii) research/scientific journals/studies related to strategic environmental assessment and tourism management; (iii) articles published from 1990 to the present. The following keywords (combined or separate) were used: *environmental* AND *strategic* AND *assessment*, obtaining some 2587 results. Of the 2587 records identified, 38 were selected according to new keywords, such as *tourism* AND *management*, which were incorporated into the search. Finally, those with open access were selected, for a total of 8 results. The search results are shown in Figure 1.

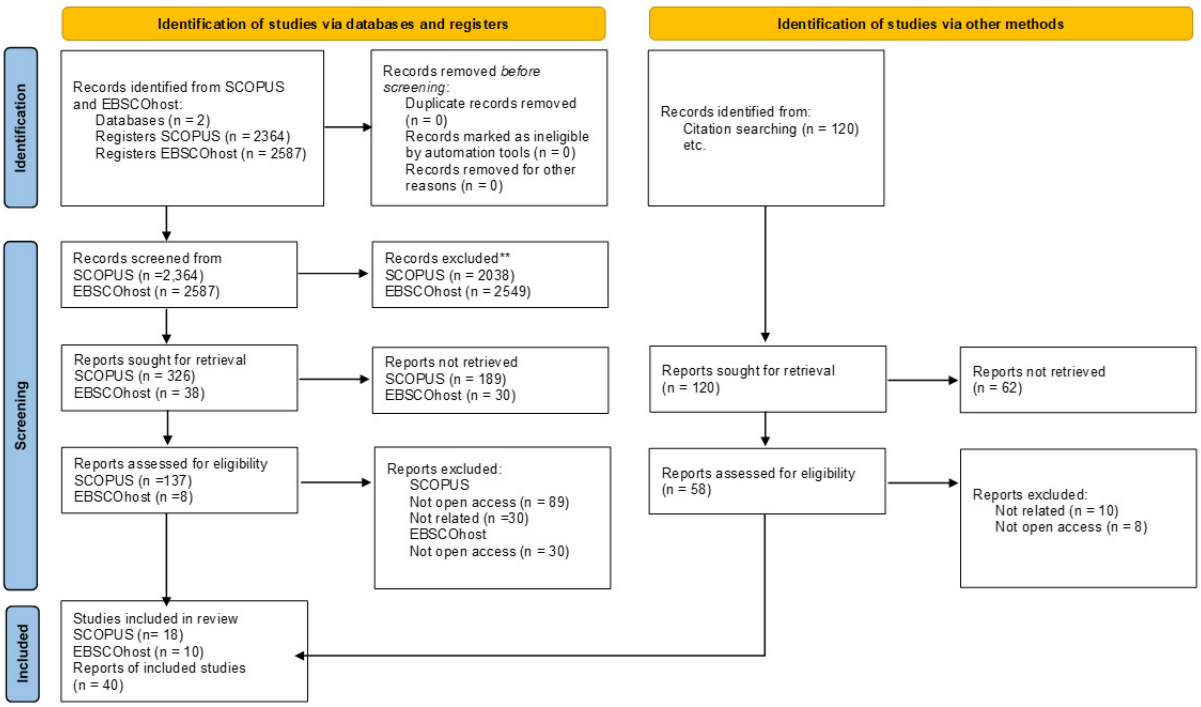

Figure 1. PRISMA process carried out for this systematic review. ** Records excluded based on the searching by "sensitivity" AND "analysis".

The process started with the screening of the titles and the abstract for potential inclusion, taking into account the above-mentioned criteria. In addition, among the articles obtained with the primary criteria, we were interested in those that address additional issues, such as *sustainable* AND *planning* AND *development* AND *territorial* AND *land use* AND *spatial* AND *integrating* AND *mapping* AND *geographic information system* AND *methodologies* AND *impact* AND *prevention*.

In cases of inconsistencies as to whether a specific study/report/manuscript should be included or excluded, these were resolved through extensive discussion among the authors. Full papers were downloaded for further evaluation when the review team was unsure if a particular paper met the inclusion criteria or not.

3. Results

The largest number of publications found in the Scopus database came from the United States, China, and Italy, and 90% corresponded to articles in indexed scientific journals. The highest number of these publications occurred in 2024: a total of 26 out of 137 in the case of SCOPUS. Furthermore, the publications found started being published in 2002 (Figure 2). This is an indication of the novelty of including ESA in territorial planning analyses, and it is expected that this year, the number of articles published will increase. After an indepth review of the selected literature, the main issues found are shown in the following sub-sections.

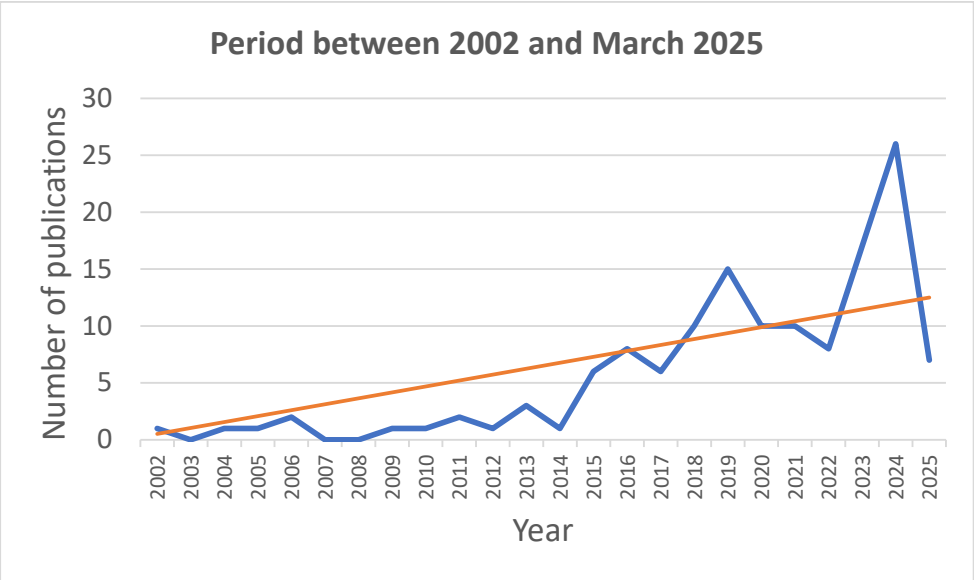

Figure 2. Publications and their increasing frequency observed over past years, based on the Scopus database (blue line: number of publications per year; orange line: line of tendency).

3.1. Strategic Environmental Assessment (SEA)

To define the concept of strategic environmental assessment, various authors concurred that it is the application of environmental impact assessment to policies, plans, and programs [15,16]. SEA is defined as a systematic process for assessing the environmental consequences of policies, plans, and programs (PPP) prior to their adoption and implementation [17] to ensure that they are fully included and appropriately considered in the early stages of decision-making at the same level as economic and social considerations. SEA provides a framework for integrating environmental considerations into strategic decision-making. SEA can thus be defined as a methodological approach used to integrate environmental considerations into strategic decision-making that affects policies, plans, and programs. Since its introduction in the 1980s, SEA has evolved significantly from a tool used primarily in urban planning to a key component in sustainable territorial planning and management. SEA is most effective during the formulation and elaboration stages of policies, plans, and programs, rather than in terms of managing the outcomes of these processes. Its purpose is to influence the manner and priorities of decision-making, as well as the scope of the vectors considered relevant for the decision [18].

SEA can be regarded as a preventative environmental management instrument whose primary objective is to integrate environmental considerations into the formulation process of policies, plans, and programs and, subsequently, to verify the realization of these environmental principles [2]. Integration involves the incorporation of sensitivity, criteria, knowledge, and environmental commitment into the PPP preparation process from the outset, ensuring that public decisions are as accurate as possible. The verification of SEA involves two facets: firstly, the verification that an effort has indeed been made to integrate the environment into the PPP formulation process; and secondly, the evaluation of the results achieved.

SEA emerged as a response to the achievements and limitations of environmental impact assessments (EIAs), which focus on specific projects, rather than considering cumulative or long-term impacts. It can be regarded as an evolution of environmental impact assessment (EIA), whose function is to evaluate the environmental impacts of specific projects. SEA, in contrast, focuses on a higher level of planning, assessing the environmental impact of policies, plans, and programs and providing a framework for integrating

environmental considerations into strategic decision-making [15] and, at higher levels, into the logical hierarchy of decisions in developmental planning [19]. SEA, therefore, can be defined as a formal process that ensures that the environmental effects of PPPs are identified and assessed during their preparation and before their adoption.

In this sense, several authors have established the fundamental differences between SEA and EIA [20–22]. In this regard, certain scholars have delineated the central objective of SEA and differentiated it from EIA by underscoring that the former is employed in contexts of strategic decision-making that precede project decisions [20]. It is explained that, as it is associated with decisions on goals and objectives for future development, SEA can deal with issues such as need and demand management, evaluating, for example, different fiscal, regulatory, administrative, and spatial development options. Conversely, EIA pertains to detailed decisions concerning the location and design of a project. Consequently, EIA has frequently been demonstrated to center on measures to mitigate negative environmental impacts. However, it is indicated that SEA would normally aim to prevent negative impacts and proactively enhance positive developments. Furthermore, a notable distinction is highlighted when it is explained that, while in EIA projects the alternatives being evaluated are often limited to minor variants, SEA can address a wide range of alternatives spanning different sectors.

In this sense, by examining the different levels of the environmental assessment system, the following figure was established [21], which compares the depth of environmental assessment in relation to SEA and EIA (Figure 3). Thus, policies, plans, and programs are related to SEA and projects to EIA.

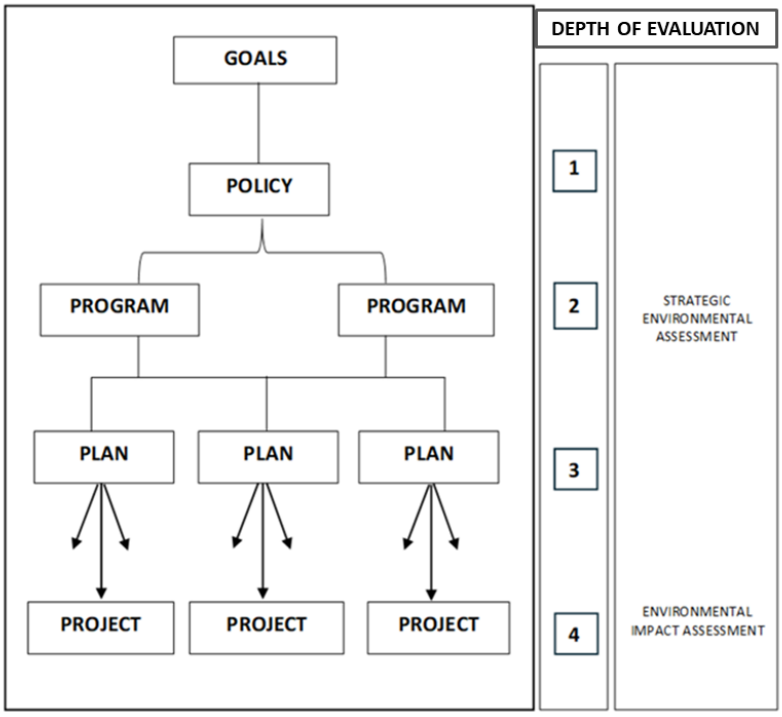

Figure 3. The levels of the environmental assessment system (from 1 to 4), based on González Herrera (2006) [21].

Another contrast that illustrates the difference between EIA and SEA is that EIA focuses on assessing the specific impacts of production, service, and infrastructure projects, whereas SEA aims to assess the environmental impacts of programs, plans, or policies, moving from a reactive assessment to a complex and long-term evaluation of projects and overcoming the many limitations of the project-by-project approach [22]. In turn,

SEA is divided into three levels: policies, plans, and programs. Policies are the general guidelines that guide action, such as environmental legislation or the promotion of tourism. Plans are the documents that detail how policies will be implemented, including specific objectives, goals, and actions, such as a destination-specific tourism development plan. Programs are sets of concrete projects that seek to achieve the objectives of a plan, such as a wetland conservation program or an infrastructure construction program (Table 1). An important aspect to note in the table is that, at the level of plans and programs, SEA can still dedicate itself to concrete development actions that are presented as planning solutions or investment actions.

Table 1. Levels of SEA implementation to ensure that strategic decisions consider environmental impacts; evaluation purposes and impact assessment instruments according to each aforementioned level.

SEA Level	Function	Evaluation Purpose	Impact Assessment Instrument
SEA in policies	Ensures that laws, regulations, and other normative instruments are environmentally sustainable and that they do not generate unwanted environmental impacts.	Defines the vision, global objectives, priorities, and intentions of development.	SEA
SEA in plans	Verifies that development, urban, sectoral plans, etc., integrate the environmental dimension into their objectives and actions.	Establishes the concept of development, lines and proposals for action, and territorial models.	SEA
SEA in programs	Evaluates the environmental viability of the specific projects that make up a program, ensuring that they are carried out in a sustainable manner and with the least number of environmental impacts.	Defines a coherent set of investment and development programmatic actions.	SEA/EIA

Source: own elaboration, based on Therivel, R.; Partidário, M.R. (2013) [16].

In territorial management, SEA has become a key tool to ensure that territorial development is carried out in a sustainable manner. By identifying the potential environmental impacts of different development alternatives, SEA enables decision-makers to choose the most sustainable option. In this context, SEA should help to identify problems early enough to solve them proactively, thereby maximizing positive impacts and preventing damage, rather than simply mitigating negative impacts. By acting as a proactive decision framework and supporting more systematic PPP processes, SEA can help to identify not only direct, but also indirect, cumulative, and synergistic effects [20].

However, it is indicated that although SEA is a very useful tool for improving the environmental performance of projects, it alone has not been able to ensure environmental sustainability, and problems of environmental degradation persist in developing countries [19].

Other limitations, pointed out in [22], relate to the political weakness of democratic states in reversing the influence of interests in certain government decisions; the failure to consider the interests of all the actors involved; the lack of interest and professional capacity of decision-makers; the absence of active participation by society; and the lack of transparency and research on the subject. They point out that, at the Latin American level, there is an overabundance of regulations and a lack of capacity to enforce them, and they conclude that it is necessary to promote a methodological leap from environmental assessment to a new generation of structured and inter-related assessment tools that allow an effective and efficient link to be established between the dynamics of the policy cycle and the instances in which it is materialized (legislative initiatives, policies, plans, programs,

and projects) [23]. This process should actively involve different social actors, especially those affected by negative impacts on the territories they inhabit.

Some of the weaknesses in the application of SEA have been identified [18]:

- Few entities have experience in the application of SEA.
- The results of SEA need to be integrated into the political decision-making process, which may be driven by a different agenda.
- SEA in the international arena does not apply to the highest levels of decision-making corresponding to policies, plans, and programs. In this sense, it is not aimed at the evaluation of alternatives at these levels or at the evaluation of projects, where only environmental impact assessment (EIA) is applied.
- In the development of SEA, cumulative impacts are generally not considered.
- SEA does not yet have a common methodology.

There are significant challenges in implementing and integrating policy-driven, strategic spatial planning into the standardized, process-oriented management systems of local authorities [24]. The integration of environmental perspectives into strategic spatial planning processes depends on (i) the general concern for environmental issues in local policy and (ii) how administrative management systems can facilitate transformative planning practices.

On the other hand, the importance of considering SEA as a non-uniform process, one without standardizable "recipes" but that is instead adapted to each context and the dynamics between actors, is highlighted as "no methodology can be applied uniformly". It is pointed out that SEA needs to be adapted to the existence of different agendas, actors, discourses, knowledge requirements, and negotiating styles within the different policy-making sectors" [25].

The Organization for Economic Co-operation and Development (OECD) describes SEA as a "family of approaches using a variety of tools rather than a single, fixed, prescriptive approach". At one end of the spectrum, impact-based SEA integrates biophysical environmental considerations into the higher levels of decision-making by predicting the potential effects of policies, plans, and programs on the environment and adopting appropriate protection and mitigation measures. At the other end of the spectrum, institution-based SEA aims to incorporate mainstream environmentalism and sustainability into the higher levels of policymaking by assessing the capacity of the institutional and policy framework to identify environmental risks and its ability to manage them in a timely and effective manner [17].

SEA faces significant challenges, particularly in its ability to incorporate detailed assessments of environmental sensitivity. Traditional methodologies often fail to capture the ecological complexity of areas, especially in areas of tourist interest, where impacts can be diffuse and cumulative [26].

3.2. Environmental Sensitivity Analysis

Environmental sensitivity analysis refers to the assessment of the vulnerability of an area to different types of environmental impacts. This approach makes it possible to identify critical areas that require special protection and can be used to guide spatial planning, constituting a supporting tool for EIA, as it makes it possible to identify those areas that require special attention due to their high susceptibility to environmental changes and disturbances [10]. This approach has gained importance as a tool that complements SEA by providing an assessment of geographical areas requiring special protection and planning the territory accordingly. In this sense, and in accordance with the three levels of SEA indicated above, SEA, at the program level, is considered the most appropriate for the integration of ESA since it assesses the environmental viability of the specific projects that

make up a program, ensuring that they are carried out in a sustainable manner and with the least amount of environmental impact.

Environmental sensitivity analysis (ESA) was defined as "the assessment of the susceptibility of the environment to be affected in its functioning and/or intrinsic conditions by the location and development of a project and its areas of influence" [11]. It was also defined as "the assessment of the vulnerability of the environment to be affected in its operation and/or intrinsic conditions by the location and development of any project and its areas of influence" [27]. It was pointed out that sensitivity analysis provides a framework for systematically and objectively determining the potential for significant environmental impacts. The greater the natural or acquired sensitivity of the receiving environment, the less able it is to cope with human-induced changes [28]

The ESA assesses the vulnerability and resilience of the characteristic variables of the environment due to the actions planned in the preliminary phase of the project. On this basis, it establishes a model of environmental sensitivity, based on the assessment of spatial relationships, with the aim of seeking sustainable development. There are three general ways to conceptualize and measure sensitivity [29]: (a) analyzing the characteristics of a system or region that make it susceptible to change, i.e., the starting point [30]; (b) analyzing the resulting impacts, i.e., focus on the endpoint [31]; and (c) analyzing the environment's exposure, sensitivity, and adaptive capacity, i.e., a systemic approach that considers the interactions between all the components (Figure 4).

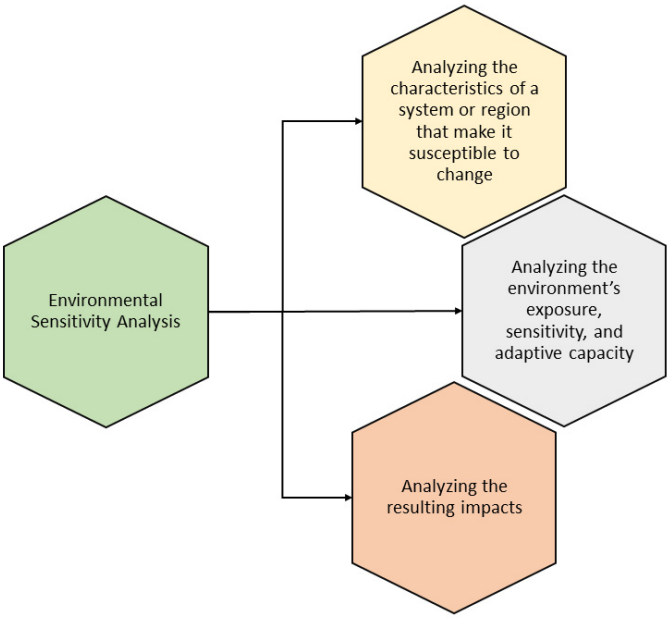

Figure 4. The three general ways to conceptualize and measure environmental sensitivity analysis, based on [29–31].

Environmental sensitivity refers to the susceptibility of an area to damage due to changes in environmental conditions or pressure from human activities [32]. This concept is crucial for identifying high-priority areas for conservation and sustainable management. Sensitive areas are those with high biodiversity, fragile ecosystems, or critical ecosystem services that can be severely affected by changes in land use or economic development.

3.3. The Use of Environmental Sensitivity Analysis as a Methodological Framework for Strategic Land Planning

Various methods have been developed to assess environmental sensitivity, including geospatial analysis and GISs (Geographic Information Systems), which map sensitive areas

based on ecological and environmental criteria. Ecological Risk Analysis—ERA—involves the mapping of environmental sensitivity indices, the creation of an operational web tool to analyze environmental sensitivity, and analytical hierarchy process methods, among other things. Other methods used are the establishment of environmental sensitivity indices and indicators, multicriteria analyses (the integration of different environmental variables to assess sensitivity based on multiple criteria), vulnerability models (the use of mathematical models to predict how sensitive areas may respond to different types of environmental pressures), and the analysis of ecosystem services.

Within the literature consulted, various methods of environmental sensitivity analysis proposed by different authors were analyzed. One of them [33] made a methodological proposal for the environmental planning of a territory based on environmental sensitivity. For example, the Ministry of Environment and Natural Resources of El Salvador has a methodology for the environmental planning of territories, and the strategy was applied to two specific projects: the first involved environmental zoning related to the evaluation of territorial sensitivity, which was applied to an area under the influence of a road; the second involved environmental zoning and land use and was applied to a metropolitan subregion. The methodology applied in both cases consists first of a diagnosis of the environmental conditions, then an assessment of the sensitivity of the territory, then an assessment of environmental zoning according to territorial sensitivity, and finally an assessment of guidelines for environmental zoning according to the territorial sensitivity. Under these conditions, the territorial planning is based on the environmental capacities, from which its potential is determined, and the basis for the development and preservation of the territory are established through the determination of its uses and conditional factors, as well as the limitation of activities.

Other authors used multicriteria analyses to assess the environmental sensitivity of the Anús sub-basin, which forms a part of the Trujillo and Portuguesa river systems in Venezuela, due to its functional importance in the conservation of biodiversity and the protection of water and landscape resources [27]. In this sense, they indicated that they considered physical (geology, geomorphology, slope, life zones), social (land use, roads), biological (plant coverage), and legal (areas under special management regime, land use capacity, protected zones of watercourses) variables in the Multicriteria Evaluation (MCE). The characteristics of each variable were then tabulated in the QGIS software and rasterized, and the weighted average method was applied to generate the sensitivity scale and, thus, the final map. On the other hand, other researchers developed a GIS model based on the classification of the identified impact factors and variables, as well as selected classification algorithms that were used to assess the categories of ecological sensitivity that can assist decision-makers in planning and managing sustainable tourism in sensitive areas at risk of ecological degradation [34].

Some methodologies use environmental sensitivity indices (ESIs) [35], which were originally proposed as a tool for responding to oil spills [36]; since then, various approaches have been used to assign numerical values to the sensitivity of a riverbank to hydrocarbons, generally using a scale from 1 to 10, which covers most classes of riverbanks likely to be found anywhere in the world [37]. On the same subject, Galeano et al. (2022) applied the methodology of coastal environmental sensitivity indices used by the National Oceanic and Atmospheric Administration (with an adjustment to the defined parameters) to an oil spill in the coastal area of the Central Pacific of Costa Rica, and they also outlined an approximation and methodological proposal for its offshore zone, taking into account the territorial sea up to 12 nautical miles, calling the proposed methodology Marine Sensitivity Indices [38]. The work considered the elaboration of the Coastal and Marine ESIs, transforming them into an online tool that represents the basic information for the development

of a strategic plan and is intended to facilitate urgent decision-making in the event of a possible oil spill, minimizing the environmental and socioeconomic impacts.

In other cases, the Environmental Sensitivity Index (ESI) was used, adapting global standards to the unique conditions of the Caspian Sea area and producing a coastal sensitivity map, which later became one of the components of the comprehensive sensitivity map for the entire Caspian Sea, which includes several biotic and abiotic components [39]. A comprehensive geographic database was also developed, including topographic, infrastructure, and hydrodynamic data. Oil spill scenario modeling was used to simulate spills of different sizes to analyze their potential impact on the marine and coastal environments. The results enabled the production of vulnerability maps, identifying the areas of greatest risk and facilitating strategic response planning, and demonstrated the critical importance of integrating advanced geospatial analyses and dynamic modeling techniques to improve oil spill preparedness and response strategies. Similarly, other authors [40] indicate that tools such as Environmental Sensitivity Index (ESIx) mapping can provide useful information that can significantly mitigate or help eliminate the known impacts of crude oil spills by proactively identifying environmentally sensitive areas through a multicriteria approach.

Moreover, it was argued that the sensitivity classification of the ecological environment is the prerequisite of its spatial distribution for land use planning, and for this they established a diffuse matter element model and a factor superposition method to analyze the ecological sensitivity of Yicheng City [41]. Four ecological indicators were used to classify the ecological sensitivity, including soil condition, water condition, atmospheric conditions, and biodiversity. The results were classified into five areas: insensitive, mildly sensitive, moderately sensitive, highly sensitive, and extremely sensitive areas.

In another context, the methodology using the environmental sensitivity indices of landscape units was applied to the peri-urban area of Mar del Plata to support the main activities carried out in it [42]. These landscape units were defined by integrating factors from the natural and socioeconomic environment, weighted with a sensitivity value that was a function of the activities. The integration of the results allowed the authors to obtain a final index for each of the units, which was low ($\leq$5), moderate (between 6 and 9), high (between 10 and 13), or very high ($\geq$14).

The methods used by Colombia's National Environmental Licensing Authority (ANLA) [32] include environmental sensitivity exercises in the context of environmental licensing. It considers the five (5) regions in which the Subdirectorate of Environmental Licensing Supervision is divided and works with the cartography of areas and lines of licensed projects available in the Geoviewer of the ANLA-AGILE entity, which have been used as basic information for the calculation of the following criteria: very low, low, medium, high, and very high. In 2020, ANLA developed the environmental sensitivity exercise, which includes the following components and/or semi-criteria: Surface water, Subterranean hydrology, Atmosphere, biotic, and social.

Another methodology used was the determination of the degree of the environmental sensitivity of sites of ecotourism interest in areas of mass tourism [9], where parameters and variables were established to define the value of the environmental sensitivity of these sites based on (1) information and field data (the degree of theoretical environmental sensitivity) and (2) information on the perception of the different social actors regarding the environmental sensitivity of the site of tourist interest (the degree of perceived environmental sensitivity). The methodology then integrates the degrees of environmental sensitivity and consequently analyses the potential impacts of tourism activity and management patterns.

Environmental sensitivity maps are really important in environmental impact studies, highlighting areas that are more vulnerable and helping to reduce harm or even make up

for environmental damage if it happens [43]. The authors also argued that maps should also constitute an accessible language (instrumental models) so that society can internalize the environmental conditions in a situation with or without a project [43]. In this case, environmental sensitivity analyses are included as a part of the impact prediction phase and as a basis for a preliminary assessment of the current environmental conditions in relation to the measures planned in the project idea phase. In other words, ESA is used within the EsIA but not within the SEA. In this case, the method is used on a case-by-case basis.

An environmental sensitivity assessment (ESA) was carried out, using a mapping process based on the Ecological Risk Analysis (ERA) methodology [44]. ERA is an environmental assessment tool used in Germany for landscape planning, the environmental impact assessment (EIA) of projects, and the strategic environmental assessment (SEA) of programs and plans. It is based on a qualitative methodology, supports its results with intersubjective foundations (evaluation based on value judgements that go beyond individual subjective opinions), and addresses qualitative aspects using ordinal scales. Geographical Information Systems have also been used to develop an operational web tool for analyzing environmental sensitivity [28]. The web-based tool allows for a rapid and replicable spatial examination of environmental sensitivities and the potential for land use conflicts, which underpins the strategic environmental assessment and ultimately informs planning and decision-making.

On the other hand, a methodology was developed to generate models of environmental sensitivity based on the analysis of spatial relationships between thematic information and the implementation of anthropic activities likely to generate environmental impacts [11]. The analysis was based on a qualitative model based on the application of geo-statistical weighting techniques, spatial analysis, the Delphi method, and expert judgement. As a result of this process, three models (biological; physical + infrastructure; and legal sensitivity) were obtained, presented as three maps and their respective determination functions. Other systems use fewer numerical values [45], and in other cases, a higher number of numerical values are used [46], depending on how detailed the characteristics of the study area are.

A further step is taken in SEAs when they include the analysis of environmental services; for instance, of a peri-urban development plan [47]. They point out that the definition of priority ecosystem services, together with environmental objectives, can be useful to integrate the concept of ecosystem services into all the stages of the SEA process, thus creating a coherent workflow between the SEA process and the integration of ecosystem services into the SEA process.

Table 2 lists some of the SEA methodologies developed and reviewed, indicating the type of methodology used, authors, year, country, and its application, highlighting those that can be used for strategic land planning in tourism areas.

Table 2. Revised methodologies, including ESA.

ESA Methodology	Authors, Year	Country	Application
Environmental Zoning	Piratova (2019) [33]	El Salvador	Environmental land planning based on environmental sensitivity.
GIS and HS maps	Núñez (2015) [43]	Argentina	The ESA is used within the Environmental Impact Study—EIS—for impact forecasting.
	Otta S. et al. (2018) [44]	Argentina	A cartographic process based on Ecological Risk Analysis (ERA) methodology in landscape planning, the environmental impact assessment (EIA) of projects, and the strategic environmental assessment (SEA) of programs and plans.

Table 2. *Cont.*

ESA Methodology	Authors, Year	Country	Application
GIS and HS maps	Onyeayana et al. (2024) [40]	Nigeria	Environmental Sensitivity Index mapping provides information to mitigate or eliminate the effects of oil spills by identifying environmentally sensitive areas.
	Gonzalez Del Campo (2017) [28]	Ireland	Used Geographical Information Systems—GISs—to develop an operational web tool to analyze environmental sensitivity.
	Ólafsdóttir and Runnström (2009) [34]	Iceland	A GIS model based on the classification of identified impact factors and variables was used to evaluate environmental sensitivity categories for tourism planning and management.
	Lemon et al. (2016) [48]	Langkawi, Malaysia	An integrated GIS-based evaluation model using a standard scoring system and weights was determined using the analytical hierarchy process (AHP) method.
Multicriteria Analysis	Méndez J. et al. (2018) [27]	Venezuela	An analysis of the functional importance of the conservation of biodiversity and of the protection of water and landscape resources.
Environmental Sensitivity Indices and Indicators	Álvarez Hernández et al. (2019) [35]	Cuba	They analyzed different scenarios for the management of oil spills.
	Galeano et al. (2022) [38]	Costa Rica	
	Iskakov et al. (2024) [39]	Caspian Sea	
	Zulaica et al. (2009) [42]	Argentina	Peri-urban landscape units to support key economic activities.
	Salciccia (1996) [9]	Venezuela	Determined the degree of the environmental sensitivity of sites of ecotourism interest in areas of mass tourism.
	Gesambconsult (2012) [13]	Quito	It analyzed the degree of environmental sensitivity through the selection and weighting of physical, biological, socioeconomic, and cultural variables and attributes.
	Zhang et al. (2011) [41]	China	They used four ecological indicators, soil condition, water condition, atmospheric conditions, and biodiversity, to establish sensitivity zones and develop the spatial distribution map of environmental sensitivity for land use planning.
ABC Method Greenway Corridors	Ndubisi et al. (1995) [49]	United States	Modified an abiotic–biotic–cultural (ABC) strategy to assess and link ESAs in greenway corridors. The ABC method allows the assessment of the structural and functional characteristics of the landscape.
Analysis of Environmental Services in SEA	Semerano et al. (2021) [47]	Italy	A peri-urban development plan incorporating ecosystem services.
Environmental Sensitivity Models	Rebolledo (2009) [11]	Venezuela	Environmental sensitivity models based on the analysis of the spatial relationships between thematic information and anthropic activities likely to generate environmental impacts.

Of the methods analyzed, eight have the potential to be applied for strategic territorial planning in tourism areas [9,13,27,33,34,41,42,44]. Only [9,10,34] have written the results of their application in territorial planning for tourism development areas on a specific scale.

3.4. Applying ESA to the Strategic Planning of an Area for Sustainable Tourism

Tourism can have a profound impact on the environmental sensitivity of an area, especially on areas of high ecological and cultural value. These impacts include habitat degradation, water and soil pollution, and pressure on local natural resources. Coastal areas are particularly vulnerable, and managing their environmental sensitivity is critical to their long-term sustainability. The environmental significance of tourism in the organization of

geographical space is very important. Tourism is sensitive to the environment because it requires a high level of environmental comfort for optimal functioning, but at the same time, the environment is sensitive to the development of tourism. This double conditioning reflects the close relationship between tourism and environmental quality [21]. In this sense, the impact of natural factors on the tourist environment also affects sustainability, as is the case with tourism climate indices. These indices can represent the bioclimatic conditions applicable to human fatigue over a wide range of climatic conditions, and the availability of such data can be very useful in environmental sensitivity analysis [50]. Human health, well-being, and optimal comfort are the result of the complex influence of natural and anthropogenic factors, of which climate is one of the most important. In tropical areas, the climate is one of the most attractive parameters due to the relative stability throughout the year, facilitating tourist activity in all seasons [51].

What happens in the development of tourism, for example in the Caribbean, is a clear reflection of the union of Butler's and Gormsen's models and implies the constant construction of new enclaves in a succession of "tourist peripheries", repeating the following cycle: Tourism "discovers" a certain relatively virgin territory and initiates the first activities, which later give way to massive commercial exploitation [52]. Then the destination becomes massively popular, loses its novelty, and begins to degrade. At this point, the destination is reconverted, reinvented, or enters a phase of decline. At the same time, capital "flees" to other destinations that are "to be discovered", where it can begin to promote a more "attractive" offer, thus generating a spatial expansion and restarting the cycle [53]. It is at this time that environmental planning and strategic environmental assessment are not integrated into the development of these other destinations to be discovered, and this produces a new cycle that will end with a huge environmental impact, the creation of an unsustainable system, and environmental degradation that will ultimately lead to social and economic degradation.

Some real estate investments related to the construction of tourist accommodation have been a real shock for certain regions that have reached high levels of environmental and landscape degradation. It points to the need to propose mechanisms that allow the strategies of tourism development and environmental management to be compatible, as integral parts of the same process. It identifies a number of planning measures that constitute real principles for the design of tourist areas, including (1) the drawing up of territorial guidelines, indicating the criteria for the allocation of land uses and the optimal densities and occupancy rates to be achieved, taking into account the benefits for the visitors themselves and their quality of life while at the same time defining activity thresholds which, if exceeded, would mean the deterioration of ecosystems; and (2) the assessment of the environmental impacts (physical, environmental, and social) by using the EIA technique as a planning tool to consider the impact of a project before it is carried out, with the possibility of modifying or even rejecting an action if irreversible environmental effects occur [4].

In this context, the sustainable management of the territory and the inclusion of environmental sensitivity analysis in the strategic environmental assessment for the development of new tourist destinations are of paramount importance to avoid repeating the experiences of environmental impacts—natural and social—that have occurred in previous destinations. A more integrated planning system means that environmental and sustainability criteria are incorporated throughout the planning process, for example in the identification of suitable (or unsuitable) sites for development and in the evaluation of alternative public–private partnerships. The SEA framework could allow the principle of sustainability to be transferred from policies to individual projects [16].

Integrating environmental considerations into tourism planning has proven effective in reducing the negative impacts of tourism. However, this integration remains a challenge due to the lack of standardized methodologies that can be applied to different geographical and ecological contexts. Key challenges include the lack of high-resolution data for accurate analysis, the difficulty of integrating multiple sources of information, and stakeholder resistance to more rigorous approaches. With regard to the latter, in addition to resistance to the adoption of more rigorous approaches, there are political weaknesses in states that act as conditioning factors to reverse the influence of particular interests in certain government decisions; the failure to take into account the interests of all the actors involved; the lack of interest and professional capacity of decision-makers; the lack of the active participation of society; and the lack of transparency and research on the subject [22]. Some practical suggestions for integrating ESA into SEA would be (i) to incorporate environmental criteria into tourism land use plans; (ii) to carry out rapid environmental assessments of territories valued for tourism development; (iii) to strengthen the technical capacities of local governments in the identification of sensitive areas in their territories; (iv) to integrate local knowledge into rapid environmental assessments as the insights and understanding of local communities are valuable for identifying environmental and socio-cultural sensitivities; (v) to incorporate environmental and sustainability criteria throughout the entire planning process; (vi) to use the regional or local geographical area as the basis for analyzing tourism planning based on a systemic, territorial approach, allowing for the evaluation of problems derived from various activities and the territory's potential for tourism and considering the inter-relationships between physical, biological, socio-cultural, and economic factors; (vii) to establish territorial guidelines that indicate criteria for the allocation of land uses, optimal densities, and occupancy rates, and these guidelines should be based on the environmental carrying capacity and the sensitivity of the territory to prevent degradation; (viii) to involve social actors (local, regional, and national communities and stakeholders) in tourism and municipal land use plans; (ix) to utilize environmental sensitivity analysis as a planning tool before a project is carried out.

The focus of the work related to the tourism phenomenon must necessarily consider territorial analysis from a systemic perspective through a methodology that uses the regional geographical area as a basis for the analysis of tourism planning (Figure 5), which would allow for the evaluation of the problems derived from the different productive activities and human settlements and of the potential options offered by the territory for tourism [1]. This proposal involves the completion of four phases of work, which include the following: (1) the characterization and analysis of the territorial system, (2) the diagnosis of the territorial system, (3) the integration of the diagnosis with the prospective land use, and (4) the proposal of the land use model.

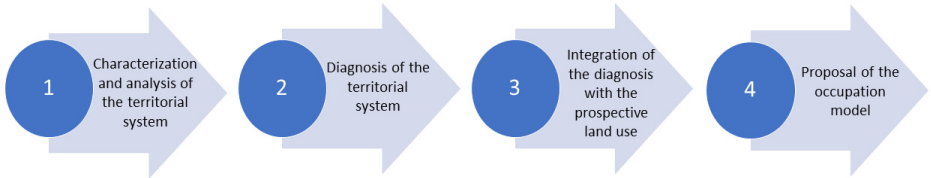

Figure 5. Methodology based on the analysis of a regional geographical area as a basis for the analysis of tourism planning.

It also considers that the analysis of the tourism phenomenon is based on the analysis of systems, so it is necessary to work with the inter-relationships between the physical, biological, socio-cultural, and economic environments, which function as an organized totality. The approaches offered by spatial planning to support the analysis and evaluation of tourism activity in the context of sustainability are based on the construction of indicators,

which prove to be a fundamental working tool for identifying and evaluating the specific cause-and-effect relationship between the tourism phenomenon and its appropriation of the territory. In this context, there are several works, among which, the one proposed by the World Tourism Organization suggests two types of indicators: (1) key indicators of sustainable tourism, generally applicable to all destinations; and (2) destination-specific indicators, applicable to specific types of tourism or ecosystems, covering eight themes: site protection, pressure, the intensity of use, social impact, development control, waste management, planning process, critical ecosystems, tourist satisfaction, local population satisfaction, and the contribution of tourism to the local economy.

Some authors [54] systematically reviewed the contributions of research on the development of sustainable tourism indicators (STIs) based on four criteria, including the following: (a) the relevance of STIs to the Sustainable Development Goals (SDGs); (b) governance; (c) the stakeholders involved; and (d) the distinction between subjective and objective indicators. The results show that among the themes of the sustainability of economic growth, social inclusion, environmental protection, and governance, STI studies tend to overlook the governance dimension. They also conclude that residents are the most engaged stakeholders, and tourists are the least engaged compared to government and business. The results also show that more attention is paid to objective indicators than subjective ones, and that much of the focus is on European countries, rather than the Global South, which is the focus of the SDGs.

Sustainability indicators have been widely adopted in tourism planning and management, and the type of indicator (set or index) is chosen according to the situation analyzed and the purpose behind the study [55]. In general, a set of indicators may be more useful and accurate for assessing the sustainability of a tourism destination, while an index may be more suitable for comparing different spatial units. However, it is recognized that the effectiveness of indicators in achieving the ideals of sustainable tourism development is affected by the ambiguity of the definition of the concept of sustainable tourism and the problems associated with the availability of baseline data and knowledge. The main challenge is to go beyond the strategic guidelines and the political and theoretical proposals of indicators and to achieve practical applications for the sustainable development of tourism. In this sense, the emphasis is on innovation and knowledge transfer, although the nature of this knowledge remains key. For their part, other authors that we consulted [56] state that the assignment of indicators will provide quantitative and qualitative information that will make it possible to assess the efficiency and effectiveness of the management of the tourist area.

Likewise, other authors elaborate a working methodology based on the objectives of sustainable development [57], for which they establish a system of indicators and GIS tools for the planning of tourism activity, which requires the intervention of different territorial, economic, social, and environmental components and factors.

On the other hand, one paper reflected on why it is necessary to measure sustainable tourism and warned against the risk of focusing too much on the measurement itself and losing sight of what is important for sustainability [58]. They pointed out that the definition of spatial boundaries has been a long-standing tension between the desire for data specificity, the achievement of greater comparability, and the involvement of policy makers and other stakeholders, while technological and methodological advances may allow further progress in addressing the shortcomings of sustainable tourism measurement.

The final report of the strategic environmental assessment of the tourism sector in Mexico established a working procedure that involved all interested parties through interviews, meetings, and cabinet work. National tourism development planning policies were identified through three basic tools, and based on the evaluation of the content of

these tools, a series of weaknesses were identified that hinder the sustainability of tourism activity in Mexico. Among these weaknesses are the following: (a) The incidence of land use change. (b) The lack of consideration of environmental and social impacts, such as the existence of two alternative cities (the planned and the unplanned); the increase in demand for local infrastructure and other types of public services; the attraction of new residents to coastal areas; the competition for the use of resources; speculation in regard to the price of land; the overexploitation of some resources; and the disappearance and/or degradation of feeding, shelter, reproduction, and breeding areas for animal species, such as mangroves, beaches, and reefs, among others [26].

The application of land management in tourist areas must address the challenges posed by pressure on natural resources and local infrastructure through an integrated approach that includes strategic environmental assessments and sensitivity analyses. Some authors speak of the geospatial dimension of tourism, pointing out that to understand the geospatial problem of tourism it is necessary to know the complexity of the environment in which it is inscribed, since the practice of this activity is conditioned by the enhancement of this environment as a source of resources and support for tourism activities [59]. It is pointed out that since the environment has been included as an object of tourist consumption, the growth of this activity has increased human pressure on environmental systems. On the one hand, higher quality standards are needed to meet the demands of tourists who want to enjoy a healthy environment with environmental guarantees. On the other hand, it is indicated that in the context of territorial management, it is essential to determine the reception capacity of the territory since this makes it possible to hit two strategic planning goals at once: promoting the multiple use of ecosystems and regulating the behavior of activities [3].

Finally, it is noted that the concept of sustainable tourism will depend on what is understood by sustainable, and it is explained that, in this case, a wide variety of ideological and philosophical implications of the concept have been identified [56]. It is suggested that there are at least four ways of interpreting tourism in the context of sustainable development: (1) a sectoral view, such as the economic sustainability of tourism; (2) an environmental view, emphasizing the need for environmentally sustainable tourism; (3) a view of the long-term viability of tourism, identifying the competitiveness of destinations; and (4) a vision that accepts tourism as a part of a sustainable development strategy in all physical and human environments [59].

4. Discussion

SEAs have been used in the planning of tourist destinations to assess the potential impacts of tourism development policies on the environment and local communities, and although they have established themselves as a valuable tool for environmental planning and management, the effectiveness of their application in the context of tourist destinations is often limited by a lack of the integration of tools that address and assess the environmental sensitivity of a territory. This is one of the major challenges found, and without any doubt, it is important to remark on the necessity of integrating tools for a better evaluation before any project commences. In this context, environmental sensitivity analyses are of paramount importance, since SEA is based on a holistic vision of the territory and its environmental sensitivity, which allows it to be classified according to its constraints and potentialities, so that any project proposed in the territory can take its sensitivities into account before being designed, which is crucial to ensure that territorial development is carried out in a sustainable manner.

Given that environmental sensitivity refers to the susceptibility of an area to be damaged due to changes in environmental conditions or pressure from human activities, it can

be said that the analysis of this concept is the key for identifying areas of high priority for conservation and sustainable tourism management. Tourist areas often have their environment as their main attraction. In this sense, integrating tools such as ESA into land management policies is a challenge to prevent environmental degradation and jeopardize local or regional sustainability. Moreover, land policy should be changed, implemented, and/or improved in many countries, providing new perspectives for land planning, especially in the critical situation of climate change that it is affecting human activities and environmental health.

Among the environmental sensitivity analysis methods analyzed in this systematic review, it can be seen that some are useful for the strategic planning of territories with tourism potential and at the regional scale, such as the environmental zoning method of Piratova [33]; those that apply GIS and cartography, such as those of Otta et al. [44] and Ólafsdóttir and Runnström [34]; or those that use indices indicators, such as Salciccia [9], Gesambconsult [13], Zhang et al. [41], and Zulaica et al. [42]; as well as those that use road corridors [49] and environmental sensitivity models [11]. Other methods have been used for more specific analyses [35,38,39] using indices and indicators for specific cases, such as oil spills, for which GIS methods and ESA maps are also used [40]. Other authors used ESA within an EIS for specific projects [43]. In this sense, it is important to note that in addition to the different existing methodologies that can be analyzed and used to address the issue of environmental sensitivity analysis in sites with tourism potential, it is essential to choose the one that is most convenient to apply with the existing information.

It is also important to distinguish between methodologies that use indicators and/or indices of environmental sensitivity for territorial planning [9,10,13,41,42] and those that use sustainable tourism indicators [1,54–57,60]. The former refers to the evaluation of the site prior to the incorporation of tourism development, while the latter also evaluates the operation of the activity.

Sustainable land management aims to balance economic development with environmental protection, ensuring that land use decisions are made in a way that preserves natural resources for future generations. This concept is particularly relevant in regions where tourism growth can threaten local ecosystems and the quality of life of communities. In this sense, sustainable land management refers to the development of land use policies and practices that promote a balance between economic development, environmental conservation, and social well-being. Incorporating environmental sensitivity analysis into this process is essential to ensure that development decisions do not compromise natural resources or the ability of ecosystems to support future generations. In this context, organized communities have a fundamental role to play in the planning process, both in the design and application of the methodology and in the planning of their own territory to anticipate potential conflicts between tourism development and the environment. Community participation can be effectively integrated into strategic planning by involving community members in the decision-making process, from the identification of sensitive areas of the territory to the evaluation of the results of the application of the methodology. This is achieved through clear communication and the creation of spaces for dialogue, where ideas and perspectives can be expressed. Among the actions necessary to integrate community participation into the strategic planning of the territory are identifying key actors; clearly communicating the initiative; creating spaces for participation; listening to suggestions and commitments from the community; communicating the results obtained from their participation; and finally, monitoring the implementation of the process and evaluating whether the proposed objectives have been achieved.

Among the challenges and opportunities of integrating ESA into the strategic planning of tourist areas are those shown in Table 3.

Table 3. Challenges and opportunities of integrating ESA into the strategic planning of tourist destinations. Source: own elaboration.

Challenges	Opportunities
A lack of standardized methodologies that can be applied to different geographical and ecological contexts.	Incorporate environmental and sustainability criteria throughout the planning process.
A lack of high-resolution data for accurate analysis.	Identify suitable (or unsuitable) sites for development and assess alternative PPPs.
Stakeholder resistance to more rigorous approaches.	Enable the principle of sustainability to be translated from policy to individual projects through SEA.
Political weaknesses due to the influence of vested interests in certain government decisions.	Use the regional or local geographical area as a basis for analyzing tourism planning.
The failure to consider the interests of all stakeholders.	Establish specific destination indicators applicable to specific types of tourism or ecosystems [1].
A lack of professional capacity among decision-makers.	Establish territorial guidelines indicating the criteria for the allocation of land uses and the optimal densities and occupancy rates to be achieved.
A lack of active participation by society.	Identify environmental impacts, using the ESA as a planning tool, considering the impact of a project before it is carried out, with the possibility of modifying or even rejecting an action if irreversible environmental impacts occur.
Going beyond strategic guidelines and political and theoretical proposals for indicators to practical applications for the sustainable development of tourism.	

[1] Destination indicators such as site protection, pressure, the intensity of use, social impacts, development control, waste management, planning processes, critical ecosystems, tourist satisfaction, local community satisfaction, and the contribution of tourism to the local economy.

Some strategies to overcome these challenges are related to the incorporation of local, regional, and national social actors in tourism land use plans and municipal land use plans in order to put into practice the opportunities identified.

5. Conclusions

This review examines the state of the art in concepts of strategic environmental assessment, environmental sensitivity analysis, and sustainable tourism planning to analyze the relationship between these concepts and the need for the strategic environmental planning of territories that effectively achieves the prevention of impacts on a territory prior to the implementation of tourism development projects. The interest of this research focuses on the analysis of the existing problems in many areas of tourism development worldwide, where a lack of environmental planning has had significant impacts on sensitive areas due to the construction and operation activities of these developments.

Various works carried out have been analyzed, showing the importance of strategic environmental assessments and their relationship with the sustainable environmental planning of areas with a tourism focus. This relationship should be based on a regional and/or local perspective of the territory, analyzing it as an entity with specific socio-environmental characteristics on which tourism development plans and policies will have an impact. One of the tools of great importance for analyzing and developing this relationship is environmental sensitivity analysis, which is the assessment of the susceptibility of the environment to be affected in its functioning and/or intrinsic conditions by the location and development of any project and its areas of influence.

In this sense, the study of environmental sensitivity analysis methodologies has shown that there are various theoretical and methodological mechanisms, some of which are specific, such as indices and indicators and the use of GISs, mapping, and models,

while others are more general, such as zoning, multicriteria analysis, and environmental services analysis, which have been useful in the evaluation of projects or the development of activities. However, many of them are applied to specific cases, so it is necessary to integrate these methodologies into the strategic planning of territories for tourism purposes, and for this, the identification and analysis of which levels of SEA and ESA methodologies should be proposed for specific study cases is essential. It is important to highlight in this work that the research carried out shows that environmental sensitivity analyses must be carried out before the tourism-driven development of a region or site.

The contribution to knowledge of this review is that it allows us to infer the importance of including the analysis of environmental sensitivity in the strategic environmental assessment of the tourism sector in order to improve the territorial environmental management of areas with tourism potential. It is proposed, for future research, to carry out environmental sensitivity analyses (at the local or regional level) of territories with tourism development potential through the preparation and application of an ESA methodology for the strategic and sustainable planning of tourism, using a practical case study. In this sense, the Caribbean area, which has undergone exponential growth in the development of tourism since 1980, needs the application of strategic environmental assessment to be integrated into tourism planning and projects' environmental assessments as its environment is one of the main major attractions for tourists, being a biodiversity hotspot.

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Abbreviations

The following abbreviations are used in this manuscript:

ABC	abiotic–biotic–cultural
AHP	analytical hierarchy process
ANLA	Autoridad Nacional de Licencias Ambientales
EIA	environmental impact assessment
EIAs	environmental impact assessments
EIS	Environmental Impact Study
ERA	Ecological Risk Analysis
ESA	environmental sensitivity analysis
ESI	Environmental Sensitivity Indicator
GISs	Geographic Information Systems
MCE	Multicriteria Evaluation
OECD	Organization for Economic Co-operation and Development
PPPs	policies, plans, and programs
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analysis (www.prisma-statement.org; accessed on 27 March 2025)
SDGs	Sustainable Development Goals

SEA	strategic environmental assessment
STIs	sustainable tourism indicators

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