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Regulatory Analysis of Strategic Environmental Assessment Follow-Up

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Abstract: The incorporation of environmental variables into policies, programs, plans and projects has been achieved through the use of an Environmental Impact Assessment (EIA). However, the recognition by scholars of several limitations of the EIA has prompted the consideration of Strategic Environmental Assessment (SEA) as the appropriate instrument for achieving this objective. Studies on SEA have concentrated in phases prior to the decision-making, despite the fact that, after the strategic decision has been made, it is also necessary to follow up on the environmental impacts or effects produced by the plan, as well as the possibility of adopting measures to correct them when they cause adverse or unforeseen effects. The way in which this following-up takes place will vary from country to country, based on the respective legal system. Therefore, this study aims to understand these forms of follow-up in urban land planning instruments, at the local level which are legally binding, comparing regulations in France, Portugal and Chile, through three research questions focused on determining whether this phase exists, whether it is possible to modify the local planning instrument in the event of adverse effects and whether there are offset measures for those effects. This study employs a mixed methodology based on the law and content analysis, enabling the identification of pertinent aspects for investigation, the compilation of material for this study, and the answering of research questions through the comparative analysis of the laws of the selected countries. Results show differences and similarities between the regulations of the countries analyzed, regarding the ability to reverse undesired, negative or different effects from those originally considered in urban plans. It will shed light on the possibility for other countries to take follow-up action in the face of undesirable scenarios in the application of planning instruments. The gaps found in our research may also exist in the legislation of other countries.

Keywords: strategic environmental assessment; land-use planning; environmental effects; follow-up regulation

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1. Introduction

Environmental Impact Assessment (EIA) has been defined as a procedure for assessing the environmental implications of a decision to enact legislation, implement policies and plans, or initiate development projects [1]. Since the 1960s and 1970s, EIA has been utilized to incorporate the environmental variable into the decision-making process of certain policies, plans, programs (PPPs), and, in particular, investment activities or projects [2–6].

Lobos and Partidário [7] have confirmed that EIA was generated as a technical–scientific analysis instrument to "objectively" inform the decision processes through prediction and analysis of the environmental consequences of different development alternatives. However, the timing and the nature of the decision, and the level of information, were

reasons to move away from EIA to SEA [8]. The ability of the EIA to incorporate environmental issues into the design of individual projects is not necessarily the same when dealing with cumulative or indirect impacts, or large-scale effects [9]; additionally, EIA projects may occur too late in the planning process to ensure that all the relevant alternatives and impacts are adequately considered [2].

Gomez [10], Feldman [11] and Alshuwaikhat et al. [12] identify a number of shortcomings in the development of an EIA application (Table 1) to instruments such as urban land planning.

Table 1. Shortcomings of EIA. Based on Gomez, Feldman and Alshuwaikhat et al. [10–12]. Based on in-house research.

N°	Author	Issues	Detailed Issues
1	Gómez; Alshuwaikhat et al. [10,12]	Assessment of previous instruments	EIA projects are not useful for assessing instruments that rationally precede a project, such a policies, plans or programs.
2	Gómez; Alshuwaikhat et al. [10,12]	Consideration of alternatives	EIA does not consider alternative options to projects, as part of its assessment process, given that the projects are already defined at the outset.
3	Gómez; Alshuwaikhat et al. [10,12]	Reactive approach	EIA assesses defined projects, taking into account potential impacts and trade-off measures elaborated by the author of the project.
4	Gómez; Feldman [10,11]	Consider other instruments	EIA hardly consider others environmental management instruments or sectoral plans (for instance ISO norms, other related policies, plans).
5	Gómez; Alshuwaikhat et al. [10,12]	Cumulative impacts	Project EIAs do not adequately consider the cumulative impacts caused by several related projects.
6	Feldman; Alshuwaikhat et al. [11,12]	Time elapsed	Project EIAs often have to be carried out in a very short period of time because of financial constraints and the timing of planning applications.

These limitations of EIA led to Strategic Environmental Assessment (SEA) being considered the appropriate route for identifying—in a formalized assessment process, at an early stage—the environmental impacts of decisions made at the policy, plan and program level [3]; and a tool that makes it possible to link the degradation of nature with the sustainable development objectives of poverty reduction [13,14]; as well as recognizing its influence on the choice between development alternatives during the early phases of decision-making. In other words, SEA can facilitate a proactive approach, in order to ensure that environmental and sustainability considerations are taken into account during the initial phases of a strategic decision-making process [15].

Incorporation of the environmental variable (whether by EIA or SEA) has been concentrated on the analyses prior to decision-making [16]. However, after the strategic decision has been made (for example, a plan regulating urban land use), it is also necessary to follow up on the environmental impacts or effects ultimately produced by the plan, whether they are positive or adverse, direct or indirect, cumulative or synergistic, foreseen or unforeseen [17]. Additionally, most studies on the topic have concentrated on the early stages of SEA [18–20]; however, Gachechiladze-Bozhesku and Fischer [21] consider that post-decisional stages of SEA or SEA follow-up are essential for achieving the overall effectiveness of SEA and for the sustainability–friendly delivery of strategies.

Effects of PPPs occur in an ex-post phase following the decision and its corresponding implementation, in line with Arts et al. [16], which includes activities such as monitoring, auditing, ex-post evaluation, post-decision analysis or post-decision management; i.e., the range of activities that take place after the approval of a plan, policy or program (PPP), including the following: (a) oversight of the effects after the decision; (b) assessment of the

results of the PPP; (c) feedback; (d) management thereof (enabling the rectification of the plan when certain adverse environmental effects are observed); and (e) communication [22]. These steps are considered key to increasing the effectiveness and credibility of SEA as a tool for integrating environmental sustainability into decision-making [23] or as an element necessary for SEA to achieve its objectives with regard to the sustainability of the instruments subjected to it [21]. Ultimately, only with such a comprehensive follow-up will it be possible to make effective and timely progress on the challenges established as objectives.

We have already observed that SEA follow-up is becoming more complex. As described by Cherp et al. [24], the importance of SEA follow-up lies in the fact that uncertainties in determining the environmental implications of an initiative are typically more acute than those encountered concerning the environmental impacts of an individual project. New circumstances will likely arise as a result of a strategic initiative whose scope of application is less controlled by the proponent than by the operation of a project, and deviations from the initial designs are more common in strategic initiatives than in projects.

The form taken by the follow-up will vary from country to country, according to how it is regulated in the respective legal system. For example, although the European Union incorporates SEA and the corresponding follow-up in Article 10 of Directive 2001/42/EC—the SEA Directive [25], it nonetheless grants a significant degree of flexibility to each member country to establish rules specific to their reality [23]. In Annex I of that Directive, there is a description of the measures envisaged for "monitoring" the effects of the plans and programs, in order to, inter alia, promptly identify unforeseen adverse effects and allow appropriate remedial action to be taken. Annex I identifies, among the information to be provided, the measures envisaged to prevent, reduce and, as fully as possible, offset any significant adverse effect on the environment resulting from the implementation of the plan or program.

There is a notable rise in the number of countries that include SEA [7,18,26–28], especially in land-use planning [11,29]. Studies that address the issue in developed and developing countries show that recommendations formulated by international organizations such as the Worldwide Bank, Organization for Economic Cooperation and Development (OECD) and UNDP [21] are generally followed, albeit to a lesser extent in developing countries.

The aim of this study is to understand the regulations of the follow-up phase of the instruments that regulate land use planning at a local level, comparing the regulatory design of the follow-up model established in two regions. Chile's design (Latin America region) is compared to France and Portugal's design (European region), through three research questions that will be answered based on the current regulations of the countries selected.

This type of normative analysis provides valuable insights into a crucial aspect of SEA implementation because an improved legal framework could provide a firm basis for effective implementation, including clear objectives and methodological guidelines [30]. In this sense, SEA regulations and guidelines are held at such a general level that desk officers face a severe lack of concrete tools to fulfil the required follow-up (Gachechiladze-Bozhesku and Fischer [21], and a descriptive statistical analysis shows that the main influencing factors that affect SEA implementation are contextual factors, such as laws and regulations [31].

Countries were selected based on the following criteria. First, Chile signed an agreement with the European Union to compile the lessons learned from the European Union's experience with SEA, in order to contribute to the implementation of this tool in Chile [32]. Second, it was necessary to consider unitarian countries, with developed regulations on SEA that are implemented nationally (spatial aspect), and that these regulations have a legal status (legislative hierarchy aspect). Consequently, federal countries that allow sub-national entities to develop specific regulations for themselves are excluded, as is the case of Germany, Spain and Italy. Additionally, all three countries are part of the OECD and are therefore subject to assessments by the same international body.

We have chosen the local level because, following the OECD [33], it is deemed the best place to understand how a change in land use for one parcel of land can affect adjoining parcels, and balance conflicting local interests, in order to account for varying approaches.

According to the OECD [34], the basic unit of subnational government in France is the commune. In general, a commune corresponds to a municipality, a city, a town or a village. Communes have the ultimate responsibility for promulgating and administering land use plans and for granting planning permissions through their own planning documents called plan local d'urbanisme (PLU). The PLU are the main tools to decide on land use regulations and have statutory power. Lambert-Habib et. al. [35] describes a PLU as a central town planning document since its provisions are legally opposable to all requests concerning land use (building permits, subdivision permits, etc.) that are binding. Additionally, Mayors of communes play an important administrative function in town planning processes and are responsible for delivering building permits. These instruments determine building rights [36], such as construction, size, outdoor areas and the organization of the space (function, land reserves for equipment, etc.), as well as ensure that the local objectives of the territorial directives for planning and sustainable development and the general objectives of the PLU defined by law are respected [37].

Regarding Portugal, Law No. 31/2014 established the Law on the general public policy principles for land, spatial and urban planning [38] whose article 20 stipulates that land use is defined exclusively by territorial plans at the inter-municipal or municipal level, through the definition of construction areas or, if this is not possible, through the application of quantitative and qualitative parameters and indices of utilization or constructability, under the terms of the law. Article 41 of Law No. 31/2014 establishes that territorial plans at the municipal level are the municipal master plan, the urbanization plan and the detailed plan; and article 46 of Law No. 31/2014 specifies that territorial plans at the inter-municipal and municipal level are binding on public bodies and, also, directly and immediately, on private individuals. This law is further developed by Decree-Law No. 80/2015 [39] which approves the revision of the Legal Framework for Land Management Instruments, approved by Decree-Law No. 380/99 of 22 September. Decree-Law No. 80/2015 gives the municipal council the mandate to draw municipal plans by resolution (article 76) and those plans are mandatory in both the public and private sectors [40] and have a strong influence on the control of land-use adjustments [41].

Regarding spatial planning instruments in Chile, they are regulated on three levels of action, corresponding to three types of areas: national, inter-communal and communal. At the local or communal level, Article 41 LGUC establishes that Communal Urban Planning promotes the harmonious development of the communal territory, particularly its population centers, in accordance with the regional goals of economic and social development, through the instrument of the Communal Regulatory Plan, which, according to its legal definition, is comprised of a set of regulations on adequate conditions of hygiene and safety in buildings and urban spaces, and comfort in the functional relationship between residential and commercial zones, public facilities and leisure areas [42]. Both the communal and inter-communal norms are binding regulations upon the public and private administration.

According to the Chilean regulations associated with the Communal Regulatory Plan examined, the scope of this instrument is associated exclusively with urban land use, and there is no rule that specifically determines which instruments or sectoral plans should be considered, what is meant by "environmental and sustainability policies" or which of these "could affect" the instrument being assessed or how, in spite of explicit and implicit consideration of the different ecosystem services [43]. In Portugal, however, there is coordination among the different planning levels (national, regional, sub-regional and municipal) and the integration of a wide range of sectoral policies (environment, transport, education, health, etc.) and citizen participation [44]. In the case of France, the lower levels of local urban plans must consider the territorial cohesion schemes (Article 131-2 of the Urban Planning Code), and should consider the general guidelines of policies for planning, public facilities, urbanism, landscape, protection of natural, agricultural and forest areas,

and preservation or restoration, good state of ecological continuity; general guidelines for housing, transport and travel, energy networks, development of digital communications, commercial facilities, economic development and leisure activities, adopted for all public establishments involved in inter-municipal or municipal cooperation (Article 151-5 Urban Planning Code).

2. Materials and Methods

The utilized methodology is based on the comparative law methodology, widely used [45] as an instrument of learning and knowledge that contributes to one's own legal system [46]. We used a mixed approach based on a law and content analysis, identifying relevant aspects to investigate, compiling materials and answering research questions through the comparative analysis of the laws of the selected countries.

The methodology of this research is based on a comparative review of the regulations established in France, Portugal and Chile for the spatial planning instruments (SPIs) in use in each country, which are legally binding and at the local level. These criteria were selected to make appropriate comparisons between different countries but with similar plans (urban plans) and similar environmental management instruments (SEAs) at the same stage (follow-up).

Starting from the premise (previous section) that SEA is the instrument par excellence for incorporating the environmental variable into the development of SPIs, the general regulations of local spatial planning instruments and the SEA systems will be examined.

The data for this study are as follows.

2.1. SEA Regulation Framework

In the case of France and Portugal, an official summary report was released by the European Union. This summary provides basic information on the legal, administrative and policy context regarding the SEA system in a Member State. It describes the legal and administrative framework supporting the implementation, including the organisational arrangements as well as a description of the SEA procedural obligations in place (Table 2).

In France, the Code of the Environment provides regulation of SEA; the law concerning the environmental assessment of urban planning documents is in fact governed by the Code of Urban Planning.

In Portugal, Decree-Law 232/2007 of 15 June was amended by Decree-Law 58/2011. It introduces the national legal order Directive 2001/42/EC on the assessment of the effects of certain plans and programs on the environment, defines the contents of environmental assessment [39] and regulates the Environmental Declaration and consultation process with relevant stakeholders.

In the case of Chile, the OECD Environmental Performance Reviews, released in 2016, stated that, according to the 2010 Environmental Quality Law (by Law No. 20,417/2010 and Law No. 19,300/1994, establishing the General Framework for the Environment), all territorial development plans are subject to SEA; and the SEA Regulation published in November 2015 further addressed some elements in particular: evaluation of regional, inter-communal and municipal land-use plans (by Supreme Decree No. 32 of 2015 of the Ministry of the Environment (D.S. No. 32/2015). SEA was adopted in Chile (following recommendations from the OECD [47]), as well as the requirement of subjecting spatial planning policies, plans and instruments to it, which entailed "introducing environmental assessment into the public planning process, integrating environmental and sustainability considerations into the design, approval and follow-up of policies and plans" [48].

Table 2. Data on SEA regulation framework. Based on in-house research.

N°	Official Source	Type	Country	Link
1	National report	Site web	France	https://circabc.europa.eu/ui/group/3b48eff1-b955-423f-9086-0d85ad1c5879/library/a735c8c0-3601-488d-ac58-35c1864e4c85/details?download=true
2	National report	Site web	Portugal	https://circabc.europa.eu/ui/group/3b48eff1-b955-423f-9086-0d85ad1c5879/library/e9961298-d960-47ca-8b92-6e121d4ca718/details?download=true
3	National assessment by international organization	Electronic Book	Chile	https://www.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-chile-2016_9789264252615-en
Accessed to three links on: 16 June 2024				

2.2. Urban Planning Regulation Framework

Previous research identified the urban plan regulation.

The French Urban Planning Code [49] regulates the plans for programs related to land use for the entire national territory, with the exception of the overseas communities governed by Article 74 of the Constitution–New Caledonia and the French Southern and Antarctic Territories—in accordance with the specific provisions governing those territories. The Environment Code lists the plans and programs with a significant impact on the environment; according to national summaries provided to the reports system of the European Union, the SEA Directive has been transposed in France by Articles L. 122-4 to L. 122-11 and R. 122-17 to R. 122-24 of the Code of the Environment. The transposition into national law distinguished between urban planning documents and other types of plans and programs, although the principles remain the same.

Article 3 of Decree-Law 232/2007 in Portugal establishes a list of plans and programs to be subjected to SEA, including plans and programs for the urban and rural or land use planning sectors, constituting a framework for the future approval of the projects mentioned in Annexes I and II of Decree-Law No. 69/2000 (Diário da República eletrónico. Decreto-Lei Nº 232/2007). In particular, article 78 of the aforementioned Decree-Law No. 80/2015 requires an environmental assessment (according to Decree-Law No. 232/2007) of urbanization plans and detailed plans only if it is determined that they are likely to have significant effects on the environment or in cases where they constitute the framework for the approval of projects subject to environmental impact assessment or environmental incidence assessment.

With regards to the regulation of the spatial planning instruments in Chile, they are regulated by the General Law on Urbanism and Construction (Ley General de Urbanismo y Construcciones—LGUC, available online: http://bcn.cl/2f7k6, accessed on 16 June 2024) and its General Ordinance (Ordenanza General—OGUC). These regulations are restricted to the urban area and their objective is to guide and regulate the development of urban centres in accordance with a national, regional and communal policy for socio-economic development (Art. 27, LGUC).

2.3. Analysis

The analysis involved a deal of textual analysis based on keywords pertinent to the research question, and then to proceed hermeneutically with qualitative content analysis (Table 3) and an interpretation of the identified regulation. Based on the regulations in effect in each of the countries selected, the following three research questions were answered:

First research question: Does the SEA process of the SPI include the follow-up phase for the environmental variables that may be affected by the respective instrument?

Second research question: Are there provisions establishing the need to modify the SPI as a consequence of following up on the environmental variables, in order to prevent undesired effects or effects different from those originally considered?

Third research question: Does the SEA process require the SPI to include offset measures for adverse environmental effects produced by the respective instrument?

In order to ascertain the existence of a follow-up stage, it is essential to first establish whether the regulation itself mentions this stage in its written text; this is the primary objective of the first question; the objective of the second question is to ascertain whether the regulation permits the implementation of an urgent measure, such as a modification to the instrument, in response to the emergence of unforeseen or adverse effects; with regards to the third question, it was posed to ascertain if the instrument could include measures (different to modifications to the instrument itself) that may serve to offset the negative or undesired effects (Figure 1).

Table 3. Framework of methodology. Based on in-house research.

Stage	Issue	Data Collection Method
1	Sea Regulation	Official report
2	Urban Plan Regulation	Literature research
3	Analysis	Thematic content analysis based to research questions

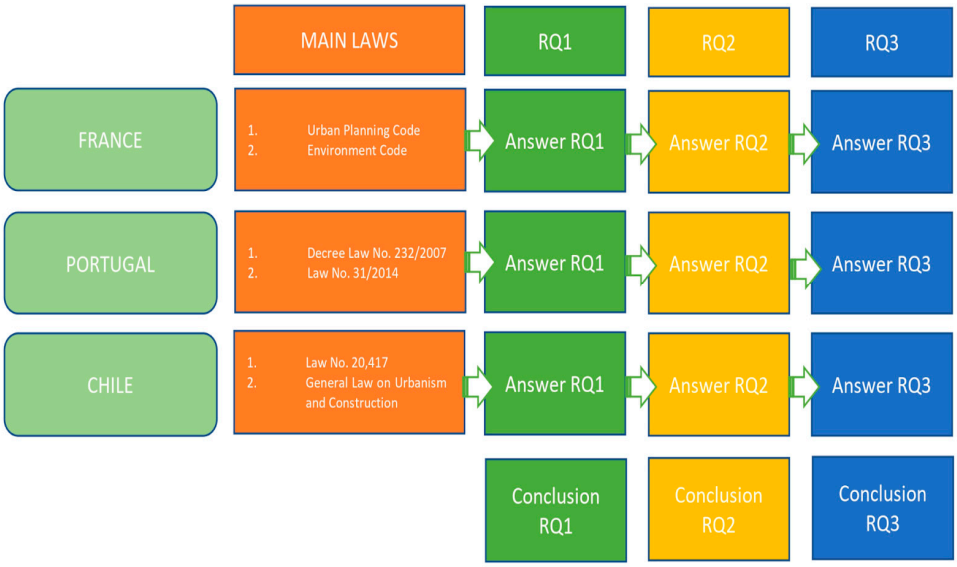

Figure 1. Summary methodology with laws and research questions. Based on in-house research.

3. Results

3.1. First Research Question: Does the SEA Process of the SPI Include the Follow-Up Phase for the Environmental Variables That May Be Affected by the Respective Instrument?

The plans local d'urbanisme from France are subjected to a Strategic Environmental Assessment [50], following article L-104-1 of the Code de l'urbanisme. The environmental report must contain the criteria, indicators and methods used to monitor the effects of the instrument on the environment, in order to identify, in particular, at an early stage, the unforeseen negative impacts and to consider, if necessary, appropriate measures (Article R-104-18 of the Urban Planning Code No. 5 and 6). The national report to the European Union indicates that article R. 122-20 of the Code of the Environment (paragraph 7) requires the presentation of the criteria, indicators and methods, including selected dates, in order to check, after the adoption of the plan or program, the correct appraisal of the negative impacts identified under paragraph 5 (the likely significant effects of the implementation

of the plan or program on the environment, including, if appropriate, on human health, population, biodiversity, fauna, flora, soil, water, air, noise, climate, architectural and archaeological cultural heritage and landscapes) and the adequacy of the measures taken in achieving the following: (a) avoiding the negative environmental impact of the plan or program on the environment and human health; (b) reducing the impact of the effects mentioned above that could not be avoided; (c) compensating, wherever possible, the significant negative effects of the plan or program on the environment or on human health that could not be avoided or sufficiently reduced.

In Portugal, article 3 of Decree-Law No. 80/2015 contains General Principles that include, inter alia, the principle of cross-cutting nature and integration of environmental policies into land-use planning and urban planning policies, namely, by carrying out an environmental assessment that identifies and monitors significant effects on the environment resulting from a territorial program or plan. Additionally, this law, in article 57, states that all territorial programs and plans must have parameters and indicators for the monitoring of the respective strategy, objectives and results of their implementation.

In addition, entities responsible in Portugal for preparing the plans or programs are responsible for monitoring the environmental effects of the plan. Firstly, article 6 of Decree-Law 232/2007 establishes that the environmental report must include significant effects on the environment resulting from the implementation of the plan, considering issues such as biodiversity, population, human health, fauna, flora, soil, water, atmosphere, climatic factors, material assets, cultural heritage, including architectural and archaeological heritage, landscape and the interrelation between the aforementioned factors. Article 11 of the aforementioned Decree-Law contains the regulation of the control measures that are presented in the environmental report, establishing the duty of the body responsible for the programs or plan to assess and control the significant environmental effects resulting from its application and implementation, verifying the adoption of the measures stipulated in the environmental declaration in order to identify unforeseen adverse effects in a timely manner and rectify them. Moreover, the results of the control must be published electronically by the corresponding bodies and updated at least once a year and must also be sent to the Portuguese Environment Agency.

The regulations governing the SPIs establish that all spatial programs and plans must define parameters and indicators that make it possible to follow up on the respective strategy, objectives and results of their implementation (Article 57, No. 1, Law No. 31-2014). Article 4 of Decree-Law No. 80/2015 states that all spatial programs and plans must contain qualitative and quantitative indicators for the purposes of the assessment stipulated in Chapter VIII. Specifically, Article 97 of Decree-Law No. 80/2015 states that Municipal Master Plan must contain qualitative and quantitative indicators that support assessment; Article 100 and Article 187 of Decree-Law No. 80/2015 state that urbanization plans must include qualitative and quantitative indicators to support the assessment provided for in Chapter VIII, that is, administration entities must constantly assess the adequacy and implementation of the discipline enshrined in the territorial programs and plans they draw up, based on qualitative and quantitative indicators they provide for. In programs and plans subject to environmental assessment, an assessment of the significant effects of their implementation on the environment must be guaranteed, in order to identify unforeseen negative effects and apply the necessary corrective measures provided in the environmental statement.

With respect to the follow-up or monitoring functions in the Chilean SEA system, the environmental report that describes the application of SEA, which must be prepared by the body responsible for submitting it to the Ministry of the Environment, should include a number of different aspects, among them, the identification of follow-up indicators for results of the implementation of the spatial planning instrument subjected to SEA (Article 21 D.S. No. 32/2015 (available at http://bcn.cl/2faef, accessed on 20 May 2024). The Body Responsible will issue a resolution ending the SEA process, which must include the identification of the follow-up criteria and indicators directed towards controlling

the results of the plan, as well as the redesign criteria that must be considered for its reformulation (Table 4).

Table 4. Summary answer research question No.1. Based on in-house research.

Does the SEA Process of the SPI Include the Follow-Up Phase for the Environmental Variables That May Be Affected by the Respective Instrument?		
France	**Portugal**	**Chile**
Environmental report must contain the criteria, indicators and methods used to monitor the effects of the instrument on the environment, in order to identify, in particular, at an early stage, the unforeseen negative impacts (article R 104-18 Urban Planning Code) Presentation of the criteria, indicators and methods to establish, after the adoption of the plan or programs the correct appraisal of the negative impacts identified (article R-122-20 Code of the Environment)	All territorial programs and plans must have parameters and indicators for the monitoring of the respective strategy, objectives and results of their implementation (article 57 of Law 31/2014). Duty of the body responsible for the programs or plan to assess and control the significant environmental effects resulting from its application and implementation (article 11 Decree-Law 232/2007)	Environmental report should include different aspects, among them, the identification of follow-up indicators for results of the implementation of the spatial planning instrument subject to SEA (article 21 D.S. No. 32/2015)

3.2. Second Research Question: Are There Provisions Establishing the Need to Modify the SPI as a Consequence of Following-Up on the Environmental Variables in Order to Prevent Undesired Effects or Effects Different from Those Originally Considered?

According to Article L-153-27 of the Urban Planning Code, no later than six years after the deliberations by which the plan was approved, or the deliberations by which it was completely revised, or the deliberations by which it was not maintained, an "Analysis of the Results of the Plan's Application" will be carried out, addressing the objectives mentioned in Article L-101-2 of the Urban Planning Code. Those objectives are the prevention of foreseeable natural risks, mining risks, technological risks, pollution and disturbances of all kinds (Objective 5); the protection of the natural environments and landscapes, the preservation of air, water, soil and subsoil, natural resources, biodiversity, ecosystems and green spaces, as well as the creation, preservation and restoration of ecological continuity (Objective 6); the fight against climate change and the adaptation to this change, the reduction in greenhouse gas emissions, the conservation of fossil fuels, energy management and the production of energy from renewable sources (Objective 7). Additionally, article R. 122-20 of the Code of the Environment (paragraph 7) requires the presentation of the criteria, indicators and methods including selected dates to check, after the adoption of the plan or programs, for the correct appraisal of the negative impacts identified, and determine, after the adoption of the plan or programs, at an early stage, any unforeseen adverse effects and to allow, if necessary, the application of the appropriate measures. This presentation must contain measures taken to avoid the negative environmental impact of the plan or program on the environment and human health; reduce the impact of the effects mentioned above that could not be avoided; compensate, wherever possible, significant negative effects of the plan or program on the environment or human health that could not be avoided or sufficiently reduced. If it is not possible to compensate for these effects, the responsible public entity must justify this impossibility.

In Portugal, at the local level, a report is prepared every four years on the state of spatial planning (Article 189, No. 3 of Decree-Law No. 80-2015). At both the inter-communal and communal levels, the plans will be revised based on the need to adapt them to the medium- and long-term evolution of the environmental, economic, social and cultural conditions that determined their development (Article 124, No. 2 of Decree-Law No. 80-2015). In any case, at this level, this revision can only be performed three years after the plan enters into effect.

Regarding the validity of the municipal plans, Article 93, No. 2 of Decree-Law No. 80-2015 states that they must be revised when the respective follow-up and assessment—reflected in the state spatial planning reports—identifies implementation levels and evolution of the

environmental, economic, social and cultural conditions that underlie them, which could lead to a modification of the territorial model established.

Furthermore, the spatial plans and programs may be revoked when the assessment of the evolution of the environmental, economic, social and cultural conditions determines that it is necessary, as established in Article 127 of Decree-Law No. 80-2015.

Chapter VIII, which corresponds to Articles 187 et seq. of Decree-Law No. 80-2015, establishes the objective of the indicators as follows: "In the programs and plans subjected to environmental assessment, it is necessary to ensure that the significant effects of their implementation on the environment are assessed, in order to identify unforeseen negative effects and apply the necessary corrective measures stipulated in the environmental declaration".

Regarding Chile, the LGUC states that SPIs must be updated periodically within a period not exceeding ten years (article 28 number 6), but there are no regulations that establish the possibility for communal and inter-communal regulatory plans (SPIs) to be modified or revised as a result of the environmental effects caused by the instrument.

The SEA in Chile considers two kinds of indicators. Article 7 number 4 of Law N°19.300 states that the resolution approving the SPI must include "the criteria and follow-up indicators intended to monitor the effectiveness of the plan or policy, and the criteria and redesign indicators that should be considered for the reformulation of the plan or policy in the medium or long term.".

The redesign criteria are defined as a set of analytical elements, derived from the follow-up criteria, directed towards understanding and assessing—within a given time frame—the need to modify or reformulate a spatial policy, plan or instrument subjected to SEA, as SPIs. Consequently, the redesign criteria will establish the need to modify or reformulate the instrument, according to the follow-up criteria and indicators. The follow-up criteria and indicators are defined as a set of analyses aimed at controlling the results of the implementation of the SPIs (article 2 D.S. No. 32/2015).

However, there is no explicit definition of what is meant by "results of the plan", and whether it includes environmental aspects. In this sense, it would be sufficient to establish follow-up criteria for the urban planning objectives of the plan (Table 5).

Table 5. Summary answer research question No. 2. Based on in-house research.

Are There Provisions Establishing the Need to Modify the SPI as a Consequence of Following up on the Environmental Variables, in Order to Prevent Undesired Effects or Effects Different from Those Originally Considered?		
France	**Portugal**	**Chile**
No later than six years after the deliberations by which the plan was approved, or the deliberations by which it was completely revised, or the deliberations by which it was maintained, an "analysis of the results of the plan's application" will be carried out (article L-153-27 Urban Planning Code). This requires the presentation of the criteria, indicators and methods including selected dates to check, after the adoption of the plan or programs, the correct appraisal of the negative impacts identified, and to identify after the adoption of the plan or programs, at an early-stage unforeseen adverse effects and to allow, if necessary, the intervention of appropriate measures (article R-122-20 Code of the Environment).	A report is prepared every four years on the state of the spatial planning (article 189 No. 3 of Decree-Law No. 80-2015). Plans will be revised based on the need to adapt them to the medium—and long-term evolution of the environmental, economic, social and cultural conditions that determined their development (article 124 Decree-Law No. 80-2015) Spatial plans and programs may be revoked when the assessment of the evolution of the environmental, economic, social and cultural conditions determines that it is necessary (article 127 Decree-Law No. 80-2015)	SPIs must be updated periodically within a period not exceeding ten years (article 28 number 6 LGUC). Redesign criteria and indicators to be considered for the reformulation of such a plan or policy in the medium or long term, according to the follow-up criteria and indicators following the analysis of the results of the implementation of the SPIs.

3.3. Third Research Question: Does the SEA Process Require the SPIs to Include Offset Measures for Adverse Environmental Effects Produced by the Respective Instrument?

In France, the report presenting the environmental assessment that must be prepared for each of these instruments should contain measures intended to prevent, reduce and,

as fully as possible, offset the negative impacts of the instrument, as established in Article L104-4 of the Urban Planning Code [51].

Article R. 122-20 of the Code of the Environment of France requires the presentation of the report with measures to be taken under a hierarchical scale: first, avoid the negative environmental impact of the plan or programs on the environment and human health; second, reduce the impact of the effects mentioned above that could not be avoided; third, compensate, wherever possible, significant negative effects of the plan or programs on the environment or human health that could not be avoided or sufficiently reduced. If it is not possible to compensate for these effects, the responsible public entity justifies this impossibility.

In terms of offset in Portugal, the regulations of the SEA system establish the need to define this type of measure, as Article 6 of Decree-Law 232-2007 indicates that the authority responsible for the instrument must prepare the environmental report, which includes measures to prevent, reduce and as fully as possible eliminate any significant harmful effect on the environment resulting from the implementation of the plan or program.

Moreover, Law No. 31/2014 establishes the principle of responsibility, as it indicates that the land use instruments must guarantee an assessment prior to interventions with a relevant impact on the territory, considering the duty to restore or offset the damages that threaten the natural, cultural and landscape heritage (Article 3).

Article 12 of Law No. 31/2014 indicates that the State, Autonomous Communities and Local Entities must identify—in the spatial programs and plans—the territorial spaces to be rehabilitated and regenerated and promote appropriate actions to pursue those objectives, irrespective of whether the land is rural or urban.

Finally, in Chile, neither the regulations of the SEA system nor those of the spatial planning instruments explicitly address this type of measure. As seen above, the criteria for redesigning the instrument consider the need to modify or reformulate it, based on the follow-up criteria that control the plan´s results; it is not clear whether environmental aspects are explicitly included. If it were understood that they are included, it would still only lead to the conclusion that it is necessary to modify or reformulate the instrument, but there is nothing regarding measures for offsetting or even rectifying the adverse environmental effects caused by the respective spatial planning instrument (Table 6).

Table 6. Summary answer research question No. 3. Based on in-house research.

Does the SEA Process Require the SPIs to Include Offset Measures for Adverse Environmental Effects Produced by the Respective Instrument?		
France	**Portugal**	**Chile**
Environmental assessment report that must be prepared for each of these instruments should contain measures intended to prevent, reduce and, as fully as possible, offset the negative impacts of the instrument (article L104-4 Urban Planning Code). Requires a report with measures to be taken in a hierarchical manner in order to achieve the following: avoid the negative environmental impact; reduce the impact that could not be avoided; compensate, wherever possible, significant negative effects on the environment or human health that could not be avoided or sufficiently reduced. If it is not possible to compensate, the responsible public entity justifies this impossibility (Article R-122-20 Code Environment of France).	Authority responsible for the instrument must prepare the environmental report, which includes measures to prevent, reduce and, as fully as possible, eliminate any significant harmful effect on the environment (article 6 of Decree-Law 232-2007). Local entities must identify—in the spatial programs and plan—the territorial spaces to be rehabilitated and regenerated and promote appropriate actions to pursue those objectives, irrespective of whether the land is rural or urban (Article 12 of Law No. 31/2014)	Neither regulations of the SEA system nor those of the spatial planning instruments explicitly address this type of measures.

4. Discussion

The results reveal some differences and similarities between the regulations of the countries analyzed, starting with the SEA which aims to incorporate environmental variables into urban land planning in those countries.

According to the main institutional factor for the inclusion of SEA in each country, France and Portugal follow common standards set by Directive 2001/42/EC of the European Parliament and Council for assessing the effects of certain plans and programs on the environment [25]. This Directive requires the submission of an Environmental Report containing the information required in Article 5 and Annex I and is submitted when the environmental assessment is requested. Annex I contains not only measures to prevent, reduce and offset adverse effects on the environment, but also a description of the measures envisaged for monitoring, in accordance with Article 10 of the Directive, which is entitled "Monitoring" and, in detail, requires that the effects of the implementation of plans and programs important for the environment be monitored in order to, inter alia, promptly identify unforeseen adverse effects and allow appropriate remedial action to be undertaken, as indicated in that provision. On the other hand, Chile follows the recommendations given by the OCDE, [48] incorporating SEA in urban planning instruments.

Therefore, these three countries include SEA at the legal level in urban planning, following international trends that have found in SEA the way to incorporate environmental or sustainable variables into instruments such as land-use planning. This study deals only with binding plans. It is therefore the legal authority that determines what type of projects are permitted in regulated areas, which in turn are subject to an EIA.

All countries analyzed have considered environmental reporting. The French report requires monitoring of the effects of the instrument on the environment, human health, population, biodiversity, fauna, flora, soil, water, air, noise, climate, architectural and archaeological cultural heritage and landscapes. In similar terms, the Portuguese environmental report refers to biodiversity, population, human health, fauna, flora, soil, water, atmosphere, climatic factors, material assets, cultural heritage, including architectural and archaeological heritage, landscape and the interrelation between the aforementioned factors. The main difference between the two reports concerns noise, because the French report takes this into account, while the Portuguese do not.

In contrast to France and Portugal, the Chilean environmental report has a follow-up stage through indicators intended to assess the results of the plan, without specifying other issues as in the French and Portuguese reports. The difference is crucial because it may lead to the requirement being fulfilled incorporating only urban indicators (such as population growth, green areas, improvements in transport) but not environmental effects indicators, such as effects on groundwater [52] or wetlands [53], emission of atmospheric pollutants [54] and pressures on sustainability [55], among others, which are exacerbated by the fact that there is no environmental monitoring of these instruments, and, thus, revision is voluntary and discretionary, based on the rationale of the authority [56]. In fact, Reicher et al. [57] show empirical results in that sense, because indicators considered in Chilean environmental reports focus more on recording the urban-based outcomes of the Plan than the environmental impact or the impact on sustainable development.

Results show differences in the ability to reverse undesired, negative or different effects from those originally considered. According to Lee and Walsh [58], as is the case with the transport plan, an urban plan may also have an impact in the medium–long term. Therefore, the ability to correct them is an important issue to be normatively analyzed at the follow-up stage of the SEA. This ability may derive from the ability to modify the SPI because it opens up more alternatives for the public sector to respond to. In this sense, the three countries have adopted standards to modify the SPI; however, France contemplates an analysis of the Results of the Plan's Application (no later than six years), and Portugal's plans will be revised (every four years) based on the need to adapt and evolve in several areas.

In accordance with the regulations analyzed, France and Chile do not have norms to modify SPIs as a direct consequence of negative, undesired or different effects from those originally considered; however, Portugal, as established in Article 127 of Decree-Law No. 80-2015, has established that spatial plans may be revoked when the assessment of the evolution of the environmental, economic, social and cultural conditions determines that it is necessary.

Although France and Chile do not have norms to change the SPI, France and Portugal have standards that require public bodies to report on the results of applying the plan. In the French plans, a public authority is required to analyse the results of implementing the plan every six years. However, Baltazar et al. [59] describe, for France, that monitoring modalities are scarcely described in plans about mobility and SEAs as only a few indicators are defined without always being measurable, and no process to implement corrective actions is mentioned.

Portuguese Plans will be revised based on the need to adapt them to the medium- and long-term evolution of the environmental, economic, social and cultural conditions that determined their development. In contrast to other jurisdictions, Chile does not mandate that municipalities submit periodic reports on the implementation of this plan. Although its national policy (which is not binding and has no studies on its implementation [60,61]) establishes the need to make advances in environmental indicators. Additionally, there are regulations that set deadlines for modifying the instruments. However, in any case, spatial planning instruments in Chile tend to be immutable [56]. Despite the fact that they may be developed through creation, modification and amendment schemes, they do not have specific, simplified procedures, which has resulted in communal regulatory plans having an average age of 22 years [56]. Recently, through a 2018 reform, it was established that spatial planning instruments must be periodically updated within a period no greater than ten years, in accordance with the regulations of the OGUC.

Furthermore, in those reports on the results of plan application, the norms establish that several effects must be incorporated into the report. For instance, France considers the objectives set forth in Article L-101-2 of Urban Planning Code (protection of the natural environments and landscapes, the preservation of air, water, soil and subsoil, natural resources, biodiversity, ecosystems and green spaces, as well as the creation, preservation and restoration of ecological continuity, etc.); Portugal's regulations are a little less extensive in this regard, but it is clear that the plans will be revised based on the need to adapt them to the evolution of the environmental, economic, social and cultural conditions.

If it is not possible to modify SPI, it is possible to consider other measures to compensate for negative or undesired effects. The regulations on these issues include provisions that extend beyond this fundamental aspect. France and Portugal contemplate a hierarchical scale to cope with those effects that include prevention, trade-offs and even repairs. Firstly, in order to establish obligations, the legal systems of both countries state that authorities must ensure that the instrument does not have an adverse effect on the environment; if that is not possible, then those impacts should be reduced and, finally, the public entity must include compensation measures, in the event of an unsuccessful outcome. It is necessary to highlight that Portugal has articles that include the duty to restore or offset the damages that threaten the natural, cultural and landscape heritage and rehabilitate and regenerate territorial spaces.

In contrast to the aforementioned examples, Chile does not establish a hierarchy of measures in the event of adverse impacts, nor does it impose a duty to compensate for negative or unforeseen effects. As seen above, the criteria for redesigning the instrument consider the need to modify or reformulate it, based on the follow-up criteria that control plan results, and it is not clear whether environmental aspects are explicitly included. If it were understood that they are included, it would still only lead to the conclusion that it is necessary to modify or reformulate the instrument, but there is nothing regarding measures for offsetting or even rectifying the adverse environmental effects caused by the respective spatial planning instrument. Considering the three criteria in the research questions, it is possible to question the effectiveness of Chile's decision to incorporate environmental variables into the spatial planning instruments, given that there are no follow-up measures, nor measures to adapt the instrument or offset its effects. Given that Chile has declared in its national policy that it is necessary to measure and monitor urban environmental variables, and that, despite the implementation of SEA in Chile, there are still gaps preventing the incorporation of environmental variables into the spatial planning instruments [62], and

that an agreement was signed with the European Union to understand and implement its SEA best practices, and that, as noted above, it is important to establish a follow-up phase in order to ensure that the objectives of SEA are effective, it can be concluded that, having identified substantial differences between the European follow-up models analyzed and the Chilean model (considering features such as the possibility of modifying the instrument as a result of environmental considerations and adopting offset measures), it is important to adapt the mechanisms of the SEA system in Chile in order to equip the Chilean planning instruments with better possibilities for identifying and offsetting the adverse environmental effects they produce.

It is crucial to elucidate the pivotal aspect that arises from the third question to gain an insight into the adaptability that countries possess to negative or undesired effects. If the regulation does not provide for a monitoring phase (first question), nor for the possibility of modification of the SPIs in such scenarios (second question), the regulation may allow authorities to facilitate the implementation of corrective measures to offset the effects of these impacts. Morrison-Saunders et al. [19] stated that monitoring and managing trade-offs should be an essential element of sustainability assessment follow-up; it is insufficient to consider a follow-up stage if the instrument does not possess the ability to develop corrective actions to address the impacts it generates.

5. Conclusions

The incorporation of SEA as a tool for evaluating urban land planning is a practice that has been adopted by numerous countries [11] that have acknowledged that SEA procedures improve the quality of plans and programs [63].

However, the effectiveness of the SEA process in practice is considered a weakness [29,30,59,64–66], and some have explained that this is due to institutional reasons and the lack of collective grounds on key conceptual elements, refs. [31,66,67] within which the normative approach lacks analysis.

Therefore, this study on the follow-up stage of SEA to SPIs contributes to analyzing different institutional contexts, according to applicable norms, and how they could impact the comprehension of the follow-up stage in urban planning instruments. From a normative point of view, this study aims to examine in detail the various variables that can be adopted when following up on this type of instrument submitted to SEA, which will shed light on the possibilities for other countries to take follow-up action in the face of undesirable scenarios in the application of planning instruments. The gaps found in this research may also exist in the legislation of other countries, and this study makes a significant contribution to understanding how SEA is regulated.

This study has several limitations. We recognize that a normative approach is not sufficient to achieve effective SEA, as said Noble [68]. A detailed legal process, with maximum public participation and indicators of all kinds, could keep SEA critical and make it a formal legal requirement. There are other factors, such as applying SEA in a preparatory phase [64] or at an early stage [30,65]. Additionally, it is not possible with this study to test the causal relationship between efficient SEA or a better follow-up of SEA with its normative design. Future researchers may examine other normative analyses or develop comparative analyses between the law and empirical evidence.

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