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Scales and associated data — What is enough for SEA needs?

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Abstract

The question of scale and data needs in SEA is explored, based on the assumption that SEA emerged to address multiple scales, larger perspectives and respond to new development paradigms, which determine new functions and expectations on SEA deliveries. Spatial and temporal scales in SEA are considered. This paper argues that other dimensions in temporal scales, which are crucial for SEA, may need to be considered: the generational time scale (the temporal scale across generations) and the decisional time scale (the temporal scale that is relevant for making strategic decisions). For example, the timing of data analysis in relation to the needs of decision-making at strategic levels is the most critical aspect which, if not met, may make data analysis redundant, waste time and limit the environmental or social benefits of SEA. The concept of SEA in its strategic sense is emphasized, in contrast with the EIA-based SEA concept, and its implications to SEA methodologies are discussed, including the understanding of baseline data needs in strategic contexts. A new lexicon for SEA, in a strategic sense, is suggested to help enhance a strategic culture in impact assessment.
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1. Introduction and background

Scale and data are interdependent — the more detailed the scale, the greater the expectation of more detailed data. Data is what enables description and analysis of past trends and current situations. Scale is used in this paper to mean the extent of spatial assessment or the time period considered, extent determining the size of the "window" to view the world (Goodchild and Quattrochi, 1997). Forecasts, and deduction of an expected future, can then be made based on observed and demonstrated trends. These are common principles that have influenced established

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knowledge and professional education over the years. Moreover, this has been further strengthened by the rigor imposed by project engineering and technology, which requires skilled manipulation of robust data to ensure precision.

Environmental impact assessment (EIA), in its wider sense, evolved under these principles. Earlier EIA professionals, often with biology, geography and engineering backgrounds, embarked on massive data collections to support deductive analysis in EIA of development projects, and ensure rigorous analysis at project detailed scales. As Bisset (1988: 60) stated: "EIAs are undertaken by engineers and technologically trained people who have an affinity for the use of quantitative aids in their work. This affinity is often carried over into EIA". This has influenced generations of professional minds and their EIA working practices, the same that, most likely, subsequently moved to undertake Strategic Environmental Assessment (SEA).

It should be remembered that in the early days, policy and wider planning issues were excluded from EIA because of difficulties in ensuring sufficient data to satisfy the then acceptable limits of uncertainty. This was an early argument against the application of EIA to policies, plans and programmes (Lee and Wood, 1978; Lee and Walsh, 1992; Wood and Djeddour, 1992), a concept somehow forgotten, but which is extensively present in literature until the early 1990s (Wood, 1988; Sigal and Webb, 1989; Dixon, 1993; Balfors, 1994). This barrier was overcome, with some acceptance that SEA often needs to deal with higher levels of uncertainty, and consequently less data, while others still appear to believe that strategic decision-making can be delayed until all relevant data is collected and the subsequent assessment completed.

In a changing world, where social and political uncertainties are prominent, professionals seem to have now a different perception on predictions, extrapolations and other future guessing exercises. Future expectations today look much more vulnerable than when the scientific basis for EIA was established. The need to upstream EIA into policy and planning levels, the new rationale for dealing with uncertainty, the challenge of emerging strategic decision approaches and sustainability paradigms led to the development of SEA, first coined in 1989, as stated in Box 1.

The mentioned "…likely to differ…" in the Box 1 citation calls for a change in gears namely in relation to scales and attitude towards uncertainty, questioning old paradigms, change of minds and concepts, always a hard move. When João (2005) writes: "Ironically….SEA can be done with missing data", and cautiously uses the "ironically" expression as if to excuse an extravagant statement given old paradigms, she is however quite right. What may be ironic is to expect SEA to resolve EIA's limitations when still using the same EIA tools, methodological approaches and paradigms.

This paper develops arguments to support João's statement and wishes to reinforce that it is not ironic that SEA can be done with missing data, if we are talking about an SEA with a truly strategic nature. Such an SEA has other concerns that relate to its specific purpose, before and beyond collecting data and demonstrating potential impacts. First and foremost SEA is (or should be)

Box 1

First time the 'SEA' term was coined

"The environmental assessments appropriate to policies, plans and programmes are of a more strategic nature than those applicable to individual projects and are likely to differ from them in several important respects…. We have adopted the term 'strategic environmental assessment' (SEA) to describe this type of assessment." Wood and Djeddour (1989)

Box 2

Different purposes of EIA and SEA

– EIA: find a solution for a problem
– SEA: help to understand, and to appropriately address, a problem

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concerned with understanding a problem and with exploring environmental, and sustainable, options in strategic decision-making that may help address the problem and meet intended objectives (Box 2). In EIA, the dominant concern is assisting the development of actions, by checking if a proposed solution is the most appropriate to resolve a problem from an environmental perspective (see Box 2).

To deliver its different purposes, SEA is focused on delimiting and understanding the context; engaging different perspectives in clearing the problems through dialogues and communication; and, searching for the optional ways that will create environmental and sustainable contexts within which proposals are sought. While EIA is carried out to help the environmental design of proposals; give a detail account of the current situation and its future evolution; support the evaluation of the proposal and its alternative solutions; and, subsequently, validate or reject the proposed project.

Linked to these different purposes is the difference in relevant spatial and temporal scales in SEA and in EIA (see João (2002) on how scales affect EIA). This paper argues that data needs in SEA are influenced by multi-spatial scale in SEA, but also by other types of temporal scales, which are critical for SEA. The generational time scale (the time scale across generations) is a fundamental premise in sustainable development and is crucial to ensure that future generations are within the scope of SEA, when exploring the opportunities and consequences of strategic policy and planning. The decisional time scale (the temporal scale that is relevant for making strategic decisions) is considered in this paper one of the most critical scales for the effectiveness of SEA, e.g., the timing of data analysis, in relation to the needs of decision-making at strategic levels. If these do not meet, and are not well articulated, the analysis of data may well become redundant, and eventually a waste of time, with hardly any environmental or social benefits.

The paper also argues that it is time to clear the overlaps between SEA and EIA, and to assume SEA as a different, outstanding tool, with different features from EIA, perhaps in relation to the scope of application but above all in relation to the context of application, the purpose, the focus and the conduct of SEA. A new lexicon for SEA, that may help make clearer the understanding on the legitimate and separate purpose and functioning of SEA and EIA, is advanced in this paper (Table 1, Section 5).

Section 2 discusses the multi-scaling issues that influence current perspectives and inherent challenges for SEA, followed by a discussion in Section 3 on perception and scientific thinking in SEA, and how these have influenced the evolution of SEA over the years. Section 4 introduces SEA in a strategic sense, calling for a new concept and a new practice in SEA that is more linked to strategic thinking, leading to the discussion in Section 5 on the needs and challenges regarding data and scales in an SEA that follow a more strategic sense. Section 6 concludes by raising questions that attempt to open the way for further debate.

2. Scales and perspectives — Challenges for SEA

Current world trends determine the contexts in which SEA is operating (Box 3). Globalized economic forces, as much as political, social and environmental tensions, from poverty to

Box 3

World trends that influence SEA contexts

– Globalized society
– New scales (multiple spatial scales, generational and decisional time scales)
– Participated processes
– Strategic approaches, integrated and innovative

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climate change and loss of biodiversity, are issues that require new scales of analysis, not only spatial scales but also temporal scales, including the scales at which the society is exposed to threats and risks. People now living in increasingly participative democracies are strongly concerned with their surroundings, and more and more influenced, in their behaviour and choices, by world tensions. The increased access to information and knowledge, and the right to participate, are likely to expand the capacity of a growing critical mass to influence the future.

These facts create a new reality for impact assessment: a multiple scale context, regarding the nature and timing of decisions – from policies with broad long-term perspectives, through planning and programme, to site-specific short-term project decisions – but also in terms of the spatial scales – ranging from global, across macro-regions, regions, municipalities and the more site-specific realities. Fig. 1 relates these multiple scales that set the context for the operation of impact assessment in its broader sense, including SEA, EIA, sustainability and integrated assessment, and whatever other expressions might be created, *inter alia*, to express the different views of scholars, government officers and consultants, regarding impact assessment approaches, from large pictures to detailed management.

This paper argues that understanding the context and getting focused should be the very first move in planning, policy or impact assessment processes. Getting focused has to do with understanding the real problem in its context, including finding the right scale(s) to define the problem and to analyze it, before major investments on data gathering are made. Sometimes the solution for a problem does not stand at the same level, or scale, at which the problem was defined. A weak or deficient analysis often results more from bad problem definition (Levitt and Dubner, 2005) than from lack of data. This requires an important step of understanding the problem, before attempting to resolve it.

If the above is likely true for any type of impact assessment approach, it is possibly even more for SEA. In SEA, it is not the data *per se* that matters, but what you need the data for. João (2005) addresses the question of what type of data is needed and distinguishes multiple purposes for which different type of data may be required. A sharp initial focus on understanding the problem, identifying driving forces and key issues must precede any massive data gathering. It can be argued that in SEA the purpose is not to provide a detailed account of an existing situation that will enable resolving a problem, but to identify the problem and to understand why, and whether, the problem is a problem (Vicente and Partidário, 2006).

Strategic insights in SEA are often overridden by the rational feeling that a situation must be well known before an analysis can be properly done. In conventional rational planning, bounded by a deterministic paradigm (rationalistic planning), this means that as much data as possible must be gathered up-front so that analysis can be done and problems identified. Moreover, often it is the symptoms, rather than the problems that get identified. The avalanche of data can easily disturb
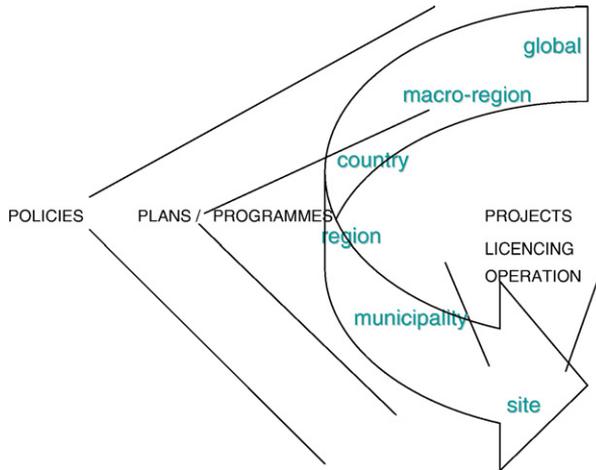
Fig. 1. Multiple scales and perspectives in impact assessment.

focus, also determining the loss of a broad, overall perspective, which are indispensable in strategic approaches.

Here it is argued that in SEA any spatial scale, from global to local levels, can be potentially used for impact analysis. The simpler explanation could be that, in SEA, policies, plans and programmes can be assessed by looking *inter alia* at their global, regional or local implications. An energy policy, plan or programme strategic assessment would probably need to consider the contribution to global climate change, as well as technological needs at regional level, and still consider the necessary resources and needs for implementation at local levels.

However, it can get more complex. The issue of scale is part of understanding and defining a problem (see Box 4) since, as discussed before, often the solution for a problem may lie at a different scale than where the problem was revealed. In SEA, there are probably multiple scales to be considered, as Partidário and Arts (2005) have considered in relation to SEA follow-up. This multiple scale context may determine the need for certain data that otherwise might not appear to be necessary, and which were not evident at first sight. However, using data to provide a detailed account of the situation at a multiple scale context might be a gigantic job, difficult to achieve within the resources normally available for impact assessment. Because of this complexity, various authors have argued that in SEA what may be important is to use SEA to help thinking in formulating the *right questions*. These questions are critical to help getting focused, and to find out what data is needed to respond to the questions (Box 4). But first, and before data is collected, the right questions need to be asked.

For example, in the case of an SEA in a tourism investment strategy in Portugal (Ecossistema, 2005), before collecting the data that would deliver the strategic impact analysis of development options, it was first necessary to understand what was intended and what were the critical constraints and opportunities for development. This was achieved through inquiries and dialogues, in close interaction with the discussion on the development concept. Specific and fast track studies were conducted to find out about critical aspects that were strategic in relation to the options to be made. Sustainability objectives were stated, discussions were conducted regarding development scenarios and questions were raised. By then it was clearer what data could be important, and at what scale, to help deliver the information needed to assist decision-making.

Box 4

Scale and data relationship

– Scale is part of understanding and defining a problem
– Data is what is collected to respond to questions

However, the assessment process was still far from being over. Further questions were raised because new strategic opportunities were meanwhile identified and required clarification. So more data was collected and additional studies were conducted as relevant.

With the emergence of strategic concepts into the impact assessment field, the relationship between data, rigour and analysis is now driven by different paradigms. The notions of perceptions, values, wider limits of uncertainty, long-term views and wishes, the dynamics of decision-making, are new questions brought up into the scientific arena (Kørnøv and Thissen, 2000; Hildén et al., 2004; Nooteboom, 2006; Vicente and Partidário, 2006). In open conference discussions, professionals now question the value of investments made on data collection and analysis, when so often key decisions are taken before data is fully collected, not to mention analyzed. If the purpose is to be effective and influence decision-making, timing is essential. The notion of significance is also crucial, albeit not related to the amount of data, but to the type and quality of data for what is needed. Hildén et al. (2004) explore the influence of different forms of planning into the effectiveness of SEA, and use 17 case studies in transport planning to draw several important conclusions on the role of SEA in strategic decision-making. The authors identify that "political will to use the information, integration, tiering and correct timing are crucial for environmental assessment to have an effect on the planning. The combined experiences of the reported cases and the workshop participants further suggested that the general organization of the assessment itself is a precondition for effectiveness" (Hildén et al., 2004: 523–524).

This paper argues that there are other additional temporal scales, as previously introduced, that should be considered in SEA: one is the generational time scale, measured in decades and centuries, the other, quite critical, is the decisional time scale, which may be measured in days, weeks, or months. The first – generational time scale – is relevant to expand the traditional temporal scales in impact assessment, often associated to the project, the programme or the plan time horizon. The second – decisional time scale – is increasingly more relevant to make sure SEA is effective, and efficient, in assisting strategic decision-making.

Often this decisional time scale is ignored in analytical and bureaucratic approaches to SEA and yet, it relates to the fundamental reason why SEA was ultimately created: to address decisions of strategic nature, which are fundamentally different from project's related decisions (Wood and Djeddour, 1989). To further explore this topic the next section reviews, albeit briefly, how doing an SEA in a *strategic* way, compares with an SEA that is essentially an EIA of a plan, programme or strategy.

3. Perception and scientific thinking on SEA

Much of the debate surrounding SEA could perhaps be explained by two major reasons:

- The first concerns the perception of SEA, by professionals and authorities, as a methodology to assist strategic decision-making, or alternatively, as a methodology to control and validate the environmental component of plans, programmes and policies.

- The second concerns the conceptualization of SEA as influenced by different forms of scientific thinking – notably rational determinism and strategic thinking – which ultimately determine the design of SEA, and the attitudes and perception of professionals.

Both reasons affect SEA methodological development, technical practice, and consequently, for what matters in this paper, scale issues and the demand on data in SEA. The first reason will be addressed as the perception in the practice of SEA – what is that professionals want, or expect, SEA to be – and the second as the scientific theory that moulds the practice of SEA – how is that SEA is, and can be, conceptualized.

3.1. The perception in the practice of SEA

Current literature presents SEA mainly in two ways (Fig. 2):

- As a new methodology to address strategic environmental impacts in a sustainability context, or better, that adopts an integrated approach to factors centred on environmental impacts, which may affect the sustainability of strategic decisions.
- As a new name for an existing methodology and practice, based on a standard EIA type methodology, albeit adapted to be applied to different levels of decisions, beyond basic project development.

As a new methodology SEA is perceived as a strategic instrument: SEA applies to decisions of a strategic nature, but SEA needs to be used strategically in relation to decision-making. This is what is argued in this paper to mean SEA in its strategic sense, and is related to the decision-centred model in SEA, presented in a previous occasion (Partidário, 2004). In the decision-centred model in SEA, there is a framework of key functions and activities in SEA (such as understanding the context, identifying critical factors, setting the reference framework, analyzing trends and opportunities, assessing options, defining planning, management and monitoring guidelines), but no established standard and streamlined process. Each case has its particularities and, once objectives are set, the specific SEA process is designed to fit the decision-making process, which is the object of SEA. The decision-making process leads the way and SEA is fully adjusted, increasing its flexibility and adaptability in relation to the strategic decision-making process (Fig. 3a).

In contrast, as a new name for the same methodology, SEA follows standard EIA practices, activities and processes (such as screening, scoping, assessment, mitigation, reporting and monitoring). SEA inherits the basic elements, and process of the EIA methodology, albeit looking at different levels of decision (policy, planning and programme). SEA is aimed at ensuring that environmental issues are considered in decision-making by assessing and validating the environmental quality of proposals in policy, planning and programme development. This follows the
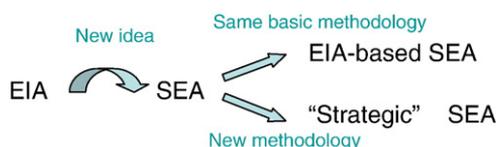

Fig. 2. Is SEA a new methodology or a new name for an existing methodology?

initial roots of SEA — when SEA was known as the EIA of policies, plans and programmes, and used the standard methodology of EIA (Fig. 3b).

Despite improvements and methodological adaptations, the fact is that many examples of SEA application still follow a culture of EIA, and its standard methodological approach, and hence it could be argued that a new name is used for basically the same standard practice (Fig. 2). Many Programmatic EIS in the USA serve as examples, as well as other cases that follow the European directive on the assessment of plans and programmes. The Dutch proposed SEA process (Dutch EIA Commission, 2005), the Asian Development Bank (2003) guidelines or the OECD-DAC guidelines on SEA (2006), are just a few examples of the continued use of an EIA-based approach in SEA. While it is recognized that most practitioners and authorities around the world have adhered to the idea and name of SEA (Dalal-Clayton and Sadler, 2005), practice still lacks the innovative methodological capacity of SEA as a strategic tool.

Here it is argued that SEA has the potential to be used strategically to enable the environmental integration and sustainability of decisions. This perspective on SEA has been perceived by many scientists in the impact assessment, planning and policy-making fields, and also by various professionals and authorities (Partidário, 1999; Sheate et al., 2003; HK-EPD, 2004). This calls on the exposure of SEA as a new methodology and examples of this approach are increasing (for example the approach to SEA as being adopted in some cases in Brazil, Lebanon, Thailand or South Africa).

3.2. The scientific conceptualization of SEA

Two key PhD thesis concluded in 2002 and 2003 (respectively Tabatha Wallington, Murdoch University, Australia (Wallington, 2002) and Olivia Bina, Cambridge University, England (Bina, 2003)) have made a significant contribution to the scientific knowledge on SEA, discussing underlying theories, concepts and advancing suggestions for reframing (Wallington), or reconceptualizing (Bina) SEA. While the angles they explored were different, their contribution is quite consistent in suggesting that SEA needs to move far beyond the practice of EIA. SEA basically needs to be strategic and evolve in the world of adaptive and strategic planning and management,
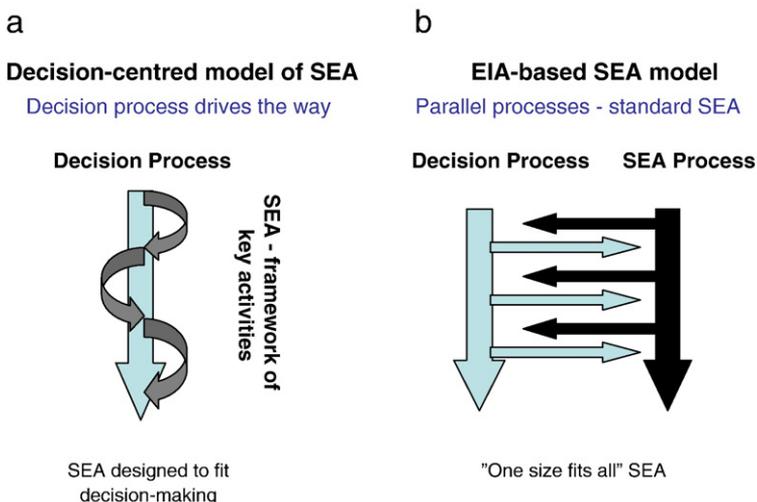

Fig. 3. The decision-centred model in SEA (a) *versus* EIA-based standard methodology in SEA (b).

much more based on organizational learning, institutional organization, dialogues and communicative tools. The work of Kørnøv and Thissen (2000), Nilsson and Dalkmann (2001), Leknes (2004), Hilding-Rydevik (2003), Nooteboom (2006) and others is extremely important in bringing up the SEA debate to levels of scientific theory.

Currently it is clear that there are two main schools in SEA: the EIA-based school and the policy planning strategic-based school. This distinction was suggested at least a decade ago (Partidário, 1996), and it now seems more evident than ever. The fundamental difference between the two schools lies in the nature of the approaches, the first being more based on the rational deterministic-planning approaches (Lichfield et al., 1975; McHarg, 1969) while the second is founded on the strategic view of planning (Friend and Jessop, 1969). While still far from demonstrated, current debates in SEA resemble the long existing debates between the rational-deterministic and strategic planning schools, well explained in Faludi (1987). Only the fact that the theoretical basis of EIA and SEA remains weakly developed hinders these debates from becoming more apparent.

Increasingly there are new initiatives that adopt a different methodology for SEA enabling SEA to achieve its intended original objectives of covering areas where EIA could not reach! That means, notably, changing from a rational-deterministic (or rationalistic) approach into a strategic approach, with all the inherent implications on the method that such change implies (Hildén et al., 2004).

4. SEA in a strategic sense — A different concept

This paper argues that: 1) to date SEA strategic potential has been limited by the strong influence of EIA, as previously discussed; 2) the new societal dynamics, based on stakeholders engagement, communicative planning, strategic perspectives, flexibility and adaptation to new sustainability challenges, creates new needs and challenges that call for different ways of dealing with data, scales and decision processes.

As Mintzberg (1994) argued, in strategic approaches in planning and policy-making the question is not about knowing what will happen in the future, but it is about knowing how to plan and guide actions that can help shape and build a desirable future. Making predictions about the future is a major challenge and a hard task, but assessing the future consequences of intended actions is probably even more difficult. In addition, planning and policy intentions are not always achieved or achievable for different reasons: lack of resources, changing priorities and development contexts, or even because the society, and the development players, do not always follow the politically established objectives. Under such uncertainty about the future, and as also mentioned by Sachs (2005), what is essential is to help shape the future and not to try to predict what will happen in the future.

This paper argues that similar principles should probably apply to SEA as well, considering that this uncertainty context is also the reality SEA faces. This means that in SEA it is probably not essential to get the full picture, or description, of what can happen in the future, and propose mitigation measures for action proposals that may never become effective, for reasons that follow those exposed above. What is essential in SEA is to establish a strategic context for assessment that will enable understanding of what are the problems and what can be the appropriate ways to address them, in other words, ways that help shape a sustainable future.

As suggested in the SEA decision-centred model (see Section 3.1 and Fig. 3a), SEA is structured around key activities that operate throughout the planning process. These include working with the planning process to establish a clear vision of what is a desired future, and the associated policy and planning development objectives to be met, attempting to integrate, to

the possible extent, what are critical environmental issues for sustainability. SEA should then help the planning process to decide on strategic directions, by reflecting on the opportunities and risks, or potential positive and negative consequences, of the possible directions, or strategies, that may lead to the desired future. These directions or strategies will eventually be implemented through actions. However, before actions get formulated, it is advisable to get a clear understanding of the strategy(ies) that have the highest chances of leading towards sustainable outcomes (and not only the sustainable objectives first identified). All this should be happening before action proposals get formulated. In fact, one of the key potential outcomes of SEA is to create a context for the sustainable design of the actions that will implement the strategy.

The process described in the above paragraph can be used to help distinguish the difference between EIA-based SEA, and SEA in a strategic sense. Differences are expressed in the motivation for SEA, as well as in the rationale and in the methodological approach that assist the application of SEA. Fig. 4 attempts to express this fundamental difference between an EIA-based methodological approach to SEA (Fig. 4a), and the strategic methodological approaches in SEA (Fig. 4b). In the EIA-based methodological approach the policy/planning/programmatic proposals lie at the centre of the assessment, the motivation being to assess the consequences of the proposals on the surrounding environment. In the strategic approach in SEA, the problem(s) to be resolved lie at the centre of the assessment. The motivation is to find the policy, plan or programme proposed strategy, or alternative appropriate strategic options, that have the capacity to resolve the problem(s), to meet the intended objectives of a plan, a programme or a policy, and to meet sustainable outcomes.

In Fig. 4a) the key focus of assessment is therefore the policy, plan or the programme itself, their proposals taken as intended actions, and the impacts it can have on the surroundings assuming all action proposals will be implemented, similarly to project's assessment. While in Fig. 4b) the key focus of SEA are the problems, or objectives, for which the strategy is intended,
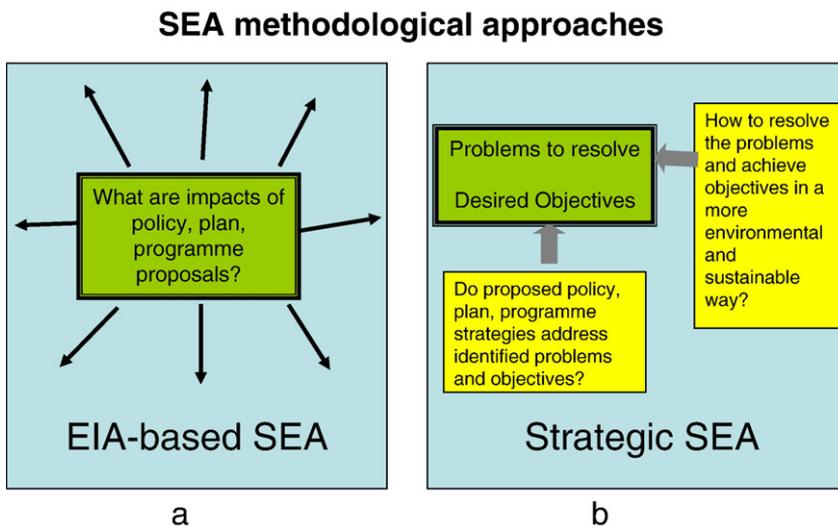
SEA methodological approaches

Fig. 4. SEA methodological approaches: (a) assessing the solution: impact assessment of the PPP outcomes; (b) assessing the strategy: impact assessment of the PPP strategy.

Box 5

Three main functions of SEA

1. Integration of environment and sustainability issues in strategic processes;
2. Assessment of opportunities and risks of strategic options;
3. Validation of the assessment of strategic processes and outcomes.

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and whether the proposed strategy is the most adequate, or if there are optional strategies that can better meet the objectives and resolve the problems. This is what is argued in this paper that should be the main focus of SEA in a strategic sense.

What therefore seems to be essential in SEA, as a strategic decision-making support instrument, is to help shape future development directions, and reflect on the opportunities and risks of making these choices, eventually searching for those strategic options that may avoid risks, meet opportunities and the intended objectives. SEA is meant to help thinking, formulating the right questions, facilitating the integration of multiple sectors and scales throughout the conception of a policy, a plan or a programme, adapting to the inherent decisional time scales, being strategic.

In order to be effective as a strategic decision-making support tool, SEA should perhaps follow integrative approaches. Several authors have been arguing for integrative approaches in SEA over the years (Partidário, 1999; Eggenberger and Partidário, 2000; Bina, 2003; Dalal-Clayton and Sadler, 2005; Sheate et al., 2003; UNEP, 2004; Nooteboom, 2006), but its implementation has been harder to deliver.

SEA in a strategic sense requires strategic thinking in decision processes, and amongst involved organizations. Establishing a vision, major objectives, targets and indicators for follow-up are typical ingredients in strategic approaches. But only if they can carry the flexibility and the strategic decision culture that can enable rapid adjustment to changing circumstances.

5. Data and scales issues in SEA — New needs, new challenges

Given possible variants of SEA, I always thought of SEA as an integrative and assessment tool that must be used strategically to help explain a given problem (Partidário, 1999; Eggenberger and Partidário, 2000; Partidário, 2005). Therefore, once the problem is identified, and the objectives of assessment are defined, SEA must get ready for a rapid, flexible and adaptive assessment. This includes: establishing the spatial and the temporal scales (generational and decisional time scales) that are strategically relevant and which will influence data needs; as well as the key relevant assessment activities that SEA will perform to assist decision-making, getting adapted to the dynamics of the decision process.

Three main functions can be attributed to SEA: integration, assessment and validation (Box 5) (Partidário, 2004). In the first two functions – integration and assessment – SEA needs to be innovative and find the right methodologies to be able to be applied strategically. This includes methodologies for selecting critical issues that are strategically relevant for a first analysis, and the associated relevant data. Therefore, it may need to be a fast move, depending on the decisional time scale to enable meeting the key decision moments (Partidário, 1996) when SEA input can make a difference. Only in its third function – validation – can SEA be more comparable to EIA.

This paper suggests that a different approach is needed in SEA, which explores its strategic potential. For that purpose new concepts and new terms can help to distinguish the different nature of such "strategic" SEA. Many concepts imported from EIA carry a too strong associated

Table 1
Proposed new lexicon for SEA

In SEA	Instead of, in EIA terminology
Context	Scoping
Critical factors	
Scan-scope	
Decision windows (in strategic process)	Project phases (from feasibility to design)
Strategic issues	Baseline
Clusters	
Drivers of change	
Context data	
Options	Alternatives
Opportunities and risks	Impacts
Guidelines (planning, management)	Mitigation measures

content to be able to serve the strategic purposes in SEA. Examples include the words "impact", "baseline" and "mitigation". All these are strongly associated to project issues and dimensions, and also to EIA functions and activities.

SEA requires specific terminology that enhances strategic thinking and culture in SEA and enable a fresh look into strategic assessment needs. A new lexicon for SEA is suggested to help establish a new mindset for more strategic approaches. Table 1 proposes this new lexicon. It shows the new terms that are suggested to be used in SEA as opposed to the terms typically used in EIA. In many cases more than one term is suggested and can be used — there is no reason why the same rigid steps of EIA need to apply in a strategic approach in SEA. The terms in the proposed SEA lexicon will be addressed next.

5.1. Context, critical factors or scan-scope

Understanding the policy-making and planning contexts is critical in SEA — what are the critical problems and opportunities, when and where are they happening? First thing in strategic assessment is to identify the critical factors, and links, that can be strategic to understand the context, identify and analyse the problem, and to identify the relevant scales that will enable an adequate assessment. SEA should favour a rapid and systemic assessment approach. Like in the strategic approach promoted by the Cities Alliance (Webster and Muller, 2006), rapid assessment should take no more than two months and use a scan-scope methodology, that quickly enable a focus (scan) on spatial areas (scope) and on substantive issues (scope) of particular concern. A quick scan of the policy and planning context is what is needed in SEA to have the first broad picture (scope), including the identification of what types of data may be needed, at what scale.

The context for SEA is influenced by the planning approach. Webster and Muller (2006) refer to the use of strategic thrusts in City Development Strategies as sets of cross-cutting interlocking actions (e.g. increased provision of affordable housing), delivered through a variety of modes (e.g. direct investment by government, private–public partnerships), that are designed to deliver maximum effectiveness in achieving the target, in as cost-effective manner as possible. "Strategic thrusts should be limited to no more than five, because no city can focus on too many initiatives. Each strategic thrusts in turn will contain several actions. Strategic thrusts need to be paired with few powerful indicators." (Webster and Muller, 2006: 10) This is an interesting way of organizing strategic thinking – few crosscutting interlocking actions, or sectors – that can then be organized to enable integrated approaches in SEA for sustainability.

5.2. Decision windows

In SEA it is not the policy-making or planning phases that matter, but those moments in the strategic decision process when critical decisions are to be taken and which can benefit from an SEA input. Partidário (1996: 47) referred to "checking points in the policy-making process that (...) allow assessment and review of whether and how all relevant factors and concerns are effectively being integrated". This concept was later referred to as *decision windows* in the ANSEA project (Caratti et al., 2004), to mean the decision moments which have a significant impact on the environmental consequences of the entire policy, programme or plan, in which environmental information and procedural regulation are most effective for conscious consideration of environmental objectives. However, as further developed by Partidário (2005), such decision windows should be identified as integration moments and not as impact or validation moments, as in ANSEA. Following from Partidário (2005), it is argued in this paper that decision windows deliver a capacity and a strategic opportunity to influence decision-making and ensure that the principles of sustainability and impact assessment are fully integrated.

These decision windows are critical to shape the SEA process, and need to be identified at an early stage to influence the organization of the SEA process, make it tailor-made to the decision process and ready for those critical decision windows. SEA help can then be brought in through the form of data, or simply through expert advice, to input key advice and information, stimulating ideas on opportunities and alerting to possible constraints, help thinking about actions and consequences of taking certain decisions. Data may then be needed to further explore such consequences, but possibly not all will be needed, or even known as necessary, at the same time.

5.3. Context data, strategic issues, drivers of change, clusters

Baseline means a detailed account of an existing situation, concerned with describing all relevant aspects. Therivel (2004: 38) statement admits that there is more data in baseline than what is needed for SEA to proceed: "Not all the baseline data must be available for an SEA to proceed". Therivel (2004) further indicates that SEA cannot describe the baseline environment in as much detail as project EIA. This is quite critical when considering the different actors in an SEA process, and the different expectations (see Section 3) each have of the relevant data. How much data is enough, and who will decide? EIA practice shows that in many cases it is hard to satisfy the data needs of quality review teams and public stakeholders.

In SEA this leads to a constant feeling of missing data, specially considering the broad scales and high uncertainty associated with SEA. In addition, baseline is normally related to a particular phase at an early stage in a standard process. However, for SEA in a strategic sense, it is more likely that additional context data is required as it proves to be necessary. To avoid this feeling of "lack of data", SEA should identify its context data needs in a way different from the baseline data concept. Many different approaches can be used for that purpose.

For example, in undertaking rapid assessment it is useful to identify and assess drivers of change (used for examples in the Bioscene project, see Sheate et al., submitted for publication; Partidário et al., submitted for publication) that are core to the process, such as population, biodiversity, technology or economic environments, from a futures-oriented perspective. These drivers of change are factors or situations that determine strategic direction, influence the analysis of possible futures and, ultimately, determine positive or negative environmental consequences. Out of these drivers, specific data needs can be identified.

Box 6

Possible clusters for SEA — depending on main trends

– Energy, carbon emissions and transport
– Biodiversity, poverty and natural resources
– Land-use planning and economic activities
– Employment, housing and mobility

Possible clusters for SEA (see Box 6), instead of traditional sector analysis, are advanced in this paper as a possible basis for SEA to stimulate integrated approaches in identifying trends and opportunities (instead of the evolution of the current situation in the absence of the policy, plan or programme). The concept need further development, but it was inspired on the concept of clusters in economic analysis, to relate things that evolve close together, that can be related to each other, and can provide more systemic and integrated explanations. Through cluster analysis, trends and opportunities can be better identified, and informal sector, "new" economic activities in technology and high-end business better understood. As Webster and Muller (2006) suggest, rather then specificity, it is more important that the overall magnitude, direction, and rate of change be understood. Clusters facilitate that understanding through an integrated approach of inter-related issues.

Some examples are suggested in Box 6, where different typical environmental or sustainability issues used in SEA are organized into clusters of inter-related issues, out of which context data could be identified. The causal links and inter-relations could enable a more integrated and advanced strategic analysis, exploring strategic thrusts in these clusters, with potentially significant value-added for SEA.

SEA should therefore not prioritise the need to have a more or less detailed account of the situation, but on understanding the key explanatory variables, or clusters of issues (as above) that paired with few but adequate indicators can help understand and analyse trends, trade-offs and scenarios. For example, in a city high growth scenario, when massive growth of population and economic activities are expected, it is likely that in the cluster energy, carbon emissions and transport, all these dimensions will increase, with severe consequences in terms of environmental degradation. Trade-offs could then be explored to enable a strategic opportunity on environmental issues, by acting in one dimension (e.g. policy and economic incentives for sustainable transport mobility) with positive consequences on the other two dimensions (e.g. reduced energy consumption and carbon emissions). This is a very simple example, but the potential of clusters could potentially enable other more complex systemic approaches.

Partidário and Arts (2005) explore the different scales involved in SEA follow-up, showing that when looking for the effects of SEA there are various dimensions, and scales, that need to be considered. The context within which SEA is operating is a multi-scale context and data may be needed at broader scales, even if the object of assessment is at a relatively local scale (local transport planning for example). Context data that informs strategic issues may be a concept to be explored in SEA to reflect the context of SEA.

Table 2 provides an example of how data needs can be different for different scales. In the development of the SEA for the transport logistics programme, two different scales of analysis were required: the strategy scale, on the concept of the whole transport logistics network, and the solution scale, on the proposals for each transport logistic network node. The scale at which the strategy is sought is the national scale, and the scale at which the proposed network solution is

Table 2
Critical factors and relevant criteria for assessment of strategic impacts as included in the terms of reference for the Transport Logistics Programme (Portugal)

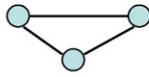|	Critical factors	Criteria
SEA of the strategy —the rational for a transport logistic network	Climate changes	Energy consumption Emissions (transport, production processes)
	Biodiversity	Fragmentation
	Land-use planning	Networks (infra-structures and transport activities)
		Distance and accessibility to production and distribution centres
		Induced territorial dynamics
	Economy	Iberian and international competitiveness
		Social inclusion and employment
		Environmental economic returns
	Governance	Institutional networks
		Coordinated entry point for logistic functionality
SEA of the proposed network solution — the impacts at network nodes	Physical environmental quality	Waste
		Air and water quality
		Noise
		Risks
	Relationship to cultural and natural resources (N and C Res)	Destruction of N and C Res
		Direct and induced enhancement of N and C Res
	Land-use planning	Alternative location
		Abandonnement of logistic sites
	Business model	Feasibility public–private partnerships
		Local economy
		Competitiveness and innovation — coherence with strategic direction.

Source: Partidário, 2006.

sought is the network node for the logistic platforms. Table 2 shows how these two scales can be associated to critical strategic criteria likely to be relevant for the particular purpose of assessment at the two different scales. The example provided was developed in the context of the terms of reference for the SEA of the transport logistic programme in Portugal. Fig. 5 also provides an illustration of this dual scaling, and its associated priority issues.

5.4. Options, opportunities and risks, and guidelines (planning and management)

It is also suggested that different terms are adopted instead of 'alternatives', 'impacts' and 'mitigation measures' (see Table 1) as these three terms carry a strong project EIA meaning. The terms 'alternatives' and 'impacts' are associated with a detailed description of an alternative or to the negative connotation implicitly associated to the word 'impact'. That is why strategic terms used in the strategic planning and management literature are suggested — options, instead of alternatives, and opportunities and risks, instead of impacts.

In the case of mitigation measures, the issue is also of strategic logic. In project EIA, mitigation is strongly associated with 'correction', through physical or through compensation (socio-economic) measures. Often mitigation ends-up being preferred to avoidance of negative impacts, for technical or economic reasons. Mitigation measures are incorporated at follow-up stages, at

Fig. 5. Methodological approach to SEA in the transport logistic programme in Portugal — the strategy and the solution.

construction or operation phases, thus avoiding the need to introduce changes to the project concept and design. This makes little sense in strategic SEA, since strategic decision-making does not normally unfold directly into construction or operation phases. There is no dead-end after SEA. On the contrary, a whole series of actions and initiatives follow an SEA: new policies, new plans, new programmes, and new projects (Partidário and Arts, 2005). There is still a whole range of follow-up opportunities to enable further choices that can lead to impacts being avoided. SEA outcomes should point towards options or directions that will lead to better environmental and sustainable solutions. In SEA we should therefore speak about guidelines for planning and management, useful indications that can lead future actions into the right environmental and sustainable paths, to help shape the future.

6. Conclusion

João's (2005) challenging statement that ironically SEA can be done with missing data has motivated a discussion in this paper on data and scale issues. The only point that could be questioned about João's (2005) statement is: if data were missing, and yet the SEA was done, was that missing data actually needed for the purpose of the decision that had to be made? The issue is thus perhaps not only on the relevance of the data, but on the decisional time scale for this particular data.

This paper has attempted to discuss the issues of scale and data in SEA by addressing current concepts of SEA, questioning EIA-based SEA on the grounds of its weak, or absent, strategic nature. The paper advanced reasons for why an SEA in a strategic sense is needed, why it is different from EIA-based SEA, and what that implies from the point of view of data and scale. A different strategic culture is needed to apply SEA in a more strategic sense, and a new lexicon has been proposed for SEA to help make that happen. It is hoped that this will help reduce the EIA culture within SEA.

I will close this paper by attempting to provide a response to seven questions on issues of scale and data in SEA that perhaps can help understand, and move research forward, on this critical field of data and scale in SEA:

1 In the context of SEA what does 'data' mean? — Data means any element that enables you to respond to critical questions and to move on in assisting decision-making by reducing uncertainty.

2 When is the right moment to decide what data is needed? — Any moment is a good moment to decide on data needs. There are moments of debate and brainstorming, moments of analysis, moments of interaction, moments of decision. In all these moments new data may need to be found, and a decision made on whether the data is really indispensable.

3 In SEA is there one right moment for gathering data? — Perhaps not, data should be collected when needed— incrementally. This approach questions the traditional concept of baseline, often associated to an early stage in a standard process.

4 When, if ever, should investment be made on significant data collection (e.g. baseline)? — Only if the decision culture, the tradition or the decision time scales of a particular case allow. In strategic contexts it is probably the exception rather than the rule, and likely to be only possible in countries that can afford.

5 Shouldn't data be an issue of collective effort together with the strategy development *per se*? — Absolutely, integration starts with team collaboration and interdisciplinarity, and that context is also needed when deciding on what data may be reasonably feasible and needed.

6 Is there a standard set of data for any standard scale? — It is easy to associate spatial scales to sets of data. However, temporal scales will certainly influence the data that can be relevant at any spatial scale.

7 How much data will be enough for SEA needs? — That will depend on far much uncertainty can be effectively managed within the decisional time scale.

The answers to these questions can be refuted as they remain at the frontier of the debate between EIA-based SEA and strategic SEA — a hot topic, as yet unresolved. The debate will remain between the capacity to be effectively uncertain while moving forward, and the comfort of gathering all the possible data before assessment is done (with the pretence that strategic decision-making will wait for the data!). One thing seems to be unquestionable: if SEA is not sufficiently strategic and influential, decisions will be taken with, or without, the information SEA can provide. Decisions that matter are mostly informal, and it is those informal decisions that should be the target of SEA. SEA need to be acknowledged as a continuous process, instead of a one-stage reporting exercise. It will then be easier to understand and manage data needs in SEA, and work under the inherent uncertainty of strategic decision-making contexts.

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