Rapid assessment of climate change issues in Indonesia strategic environmental assessment (SEA)-KLHS

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Abstract. Strategic Environmental Assessment (SEA) or KLHS is becoming increasingly popular in Indonesia following the promulgation of government regulation No. 46 of 2016, concerning the procedures of its organization. The SEA, which was at first voluntary, is now mandatory before the integration into a regional spatial and a medium-term development plan. Therefore, this study aims to evaluate the extent to which climate change issues are addressed in the Strategic Environmental Assessment. Furthermore, several SEA documents that are very limited in Indonesia and only obtain on the internet were evaluated. The document consists of the Medium-Term Development Plan, Spatial Planning, and SEA in the mineral and energy sector. In addition, the study adopted a set of evaluation criteria used by Nadruz and Gallardo (2015) [1], which is a modification of the framework developed by Wende et al. (2012) [2]. The results showed that climate change issues in the SEA are still very diverse and not evenly distributed from various existing documents. Some SEA of the province medium-term development plan makes the issue very important while other documents do not. The SEA document of the mining sector contains 18 climate change criteria. Conversely, the spatial planning document contains 12-22 criteria, and the SEA for medium-term development plan contains 12-22 as well. From this study, it can be concluded that the issue of climate change still varies greatly in Indonesian SEA, and it is therefore not significant.

1. Introduction
The Strategic Environmental Assessment (SEA) or KLHS is an environmental protection instrument that recently exists in Indonesia but it is just less than a decade of implementation. It is a compliment to an existing instrument such as Environmental Impact Assessment (EIA), also known as AMDAL. The SEA follows the directive of Law No 32/2009 with regards to environmental protection and management. This is intended to be a series of systematic reviews that are comprehensive and participatory to ensure a sustainable principle is incorporated as a foundation into regional development and/or policies, plan, and/or program. It is one of the environmental damage prevention instruments among 13 others based on Law No 32/2009 [3].

Initially, SEA was voluntary, but now needs to be incorporated into many planning documents under Indonesian policy, planning and program following the provisions of Environmental Protection and Management law no 32/2009 article 15. It is compulsory for medium-term development plan (RPJM), Spatial planning (RTRW), Detail Spatial Plan (RDTR) both in districts and Provincial levels. Therefore, it requires more than 1000 SEA documents to be completed in futures, based on the number of districts and provinces. SEA differs from EIA in terms of its position in planning and programming levels. The function is to contribute to the decision-making.
process on the assumption that they are oriented towards a sustainable environment and to strengthen AMDAL facilitation, as well as to support new innovative approaches to policymaking.

In its implementation, the Government is required to make a SEA document to ensure that the principle of sustainable development forms the basis and integrated into the growth of an area and/or policies, plans, and/or programs. Furthermore, the Government is also required to implement the SEA in the preparation or evaluation of 1) Detailed regional spatial plans (RTRW), 2) long-term development plans (RPJP), and national, provincial, and district/city medium-term development plans (RPJM); and 3) Policies, plans as well as programs that have the potential to cause environmental impacts and/or risks [3]. According to the provisions, KLHS should contain an assessment of the carrying capacity of the environment for development since it estimates the impacts and risks.

Research on SEA in Indonesia is not yet extensively performed since the implementation is still at an early stage. Among other environmental instruments, SEA is considered the most recent, and the implementation is ongoing. The entire process is still under development and many regions do not yet have the documents. Therefore, the modern art of SEA is not fully understood in terms of process, content, public participation, and implementation. This study aims to investigate the different types of SEA and their respective sectors, as well as the procedures in addressing issues relating to climate change.

2. Materials and methods

2.1. Scope and study area

The methodological approach is a desk study that was performed from September 2018 to January 2019. Up to twelve SEA documents from a sector available on the Internet were analyzed. However, a document was excluded for prompt review due to its incomplete nature as it is only a progress report. This was a SEA document of Banten's medium-term development plan, which was downloaded from the websites of the respective agencies or NGOs.

![Figure 1. Map of SEA documents deployment in this study around Indonesia (September 2018 to January 2019).](image)

2.2. Samples collection

There is no official repository of SEA documents as for EIA documents, and therefore, an intensive search on internet was conducted. This was from available databases in relevant agencies and NGOs' websites such as USAID Lestari, and www.researchgate.net by using some keywords. However, these keywords was not limited to KLHS – strategic environmental assessment, RTRW,
RPJM, mining, and transportation. Only 12 documents were downloaded before checking the suitability to this study, and they were further grouped based on their sector in each region.

The SEA documents are classified as follow: two medium-term development plan (Aceh and Dumai), eight spatial planning (Katingan, Gayo Lues, Mimika, South Aceh, Southeast Aceh, Palangka Raya, Sarmi, and Pulau Pisang), and one SEA document in mineral and energy sector (Kendeng). The documents differ in terms of thickness, range between 93 to 185 pages, with no standard formatting and layout unlike an environmental impact assessment document.

![Figure 1a. SEA Documents in Aceh, Mimika-Papua, Palangkaraya, Pulau Pisang, Sarmi, Dumai, Banten, and Kendeng.](image1a)

![Figure 1b. SEA documents in South Aceh, Southeast Aceh, Gayo Lues, and Katingan.](image1b)
2.3. Data analysis
The SEA documents obtained online were analyzed following a framework of Wende et al. (2012) regarding the issue of climate change in Strategic Environmental Assessment. This is the only existing framework for climate change assessment in SEA to the extent of this study.

There are 29 categories of climate change issues on this framework, which were matched with all documents obtained before. It was manually performed and documents were carefully analyzed.

3. Results and discussion
The implementation of SEA in practice consists of, first, the stage of creation and implementation. The main activities conducted at this stage, include the assessment of the Policies’ influence, Plans, and Programmes on environmental conditions. Second, the quality assurance stage and the documentation of strategic environmental assessment. Third, the validation phase ensures that public quality assurance is conducted in a responsible manner [4]. At the first stage, many factors need to be considered such as climate change issues, carrying and environmental capacity, estimated environmental impacts, and risks.

3.1. Climate change scope in Indonesian SEA
Twenty-nine categories of climate change evaluation criteria were divided into fourteen groups, ranging from scoping, national goals, province goals, regional scale, till the relationship between biodiversity and climate change as the last category (Table 1).

Based on evaluation criteria, climate change issues in the SEA are still very diverse and not evenly distributed from various existing documents (11 SEA documents). Some SEA of the province medium-term development plan makes the issue of climate change an important one while others do not. The SEA document in the mining sector contains 18 climate change criteria. Furthermore, the spatial planning sector document contains 12-22 criteria, while the medium-term development plan contains 12-22 as well.

This finding shows that climate change issues in planning sector greatly plays an important role, particularly in medium-term development plan (RPJM) as Indonesia will reduce its GHG emission to 29% level voluntarily and up to 41% with the international partnership by 2030 [5][8][9].

All ten SEA documents have adopted adaptation measures of climate change and have their province goals for this issue. On the contrary, only the Mimika SEA spatial plan and the Dumai medium-term development plans, indicate mitigation measures for other aspects such as disaster relief in its SEA document.

High economic growth requires the use of large resources such as forest land resources. These resources are taken over for economic reasons, which changes the most important function of the forest. In addition, the Land Use, Land Use Change, and Forestry (LULUCF) sector emits GHG through processes of deforestation and degradation [5]. There are 9 documents of SEA that explain this issue in the sector of forestry/agriculture mainly, one that has very little explanation to this issue, category “0”, is a Spatial Planning SEA of South Aceh and medium-term development plan of Dumai. The others provide a good explanation of forestry and agriculture sectors related to climate change.

All SEA documents analyzed have both national and provincial goals related to climate change issues. One of which is low emission development strategies that is implemented in many planning scenarios of these SEA documents. However, three SEA documents of Gayo Luces, Pulau Pisang, and Dumai medium-term development spatial plan do not explain the relationship between climate and biodiversity change.

3.2. Public participation regarding climate change issues
All documents of 3 sectors explain public participation in SEA from the beginning to the end of
the process, especially public consultation in term of developing policy, plan, and program. However, it does not necessarily relate to public participation in the climate change issue. It is only in SEA of the medium term development plan of Dumai that states about public participation regarding the environmental problems in General.

SEA studies have recommended the area for conservation and mining in Kendeng Mountain. However, this is not implemented and workable due to the less institutional and substantial arrangement of the team members. It has also been influenced by less public participation in the process [6]. It is believed that public participation in the preparation of KLHS documents should be increased to improve the quality of SEA in Indonesia.

3.3. The cumulative effect of climate change
Cumulative effects are a significant environmental change that may result from the combination of individual minor effects of multiple actions over time [7]. The concept of cumulative effects can be explained by the fact that the sources of interference give a component of the multiplier effects of the ecosystem. In this study, climate change is seen both as a factor, which causes environmental and climatic changes with cumulative effects.

Almost all of the SEA documents explained the damaging cumulative effects to the climate and environment, except two, which were obtained from Southeast Aceh and Gayo Lues. In contrast, two other SEA documents on spatial planning in Central Kalimantan failed to explain the cumulative effects that caused by climate change, while 9 others understood these criteria well.
Table 1. The evaluation criteria of climate change issue in Indonesian SEA (*KLHS*).

| Evaluation Criteria | Mineral and Energy Planning | Spatial Planning | Medium Term Development Plan |
|---------------------|-----------------------------|-----------------|-----------------------------|
|                     | Kendeng                      | Katingan        | Gayo Lues Aceh              | Mimika Papua | South Aceh | Southeast Aceh | Palangka Raya Central Kalimantan | Pulau Pisang Central Kalimantan | Sarmi Papua | RPJM Dumai | RPJM Banten | RPJM Aceh |
| Scoping             | 1 Mitigation                 | +               | +                            | -            | +          | +              | +                              | +                          | -          | excluded   | 0            |
|                     | 2 Adaptation                 | +               | +                            | 0            | 0          | 0              | 0                              | -                          | +          | +          | excluded 0 |
|                     | 3 Opportunities             | +               | 0                            | 0            | 0          | 0              | +                              | +                          | +          | +          | excluded 0 |
| National Goals      | 4                            | +               | +                            | +            | 0          | 0              | 0                              | +                          | +          | +          | excluded + |
| State Goals         | 5                            | +               | +                            | +            | +          | +              | +                              | +                          | excluded + |
| Regional Scale      | 6 Goals                      | +               | +                            | 0            | +          | -              | -                              | +                          | +          | +          | excluded + |
|                     | 7 Regionalization methods    | +               | -                            | +            | +          | +              | -                              | -                          | -          | excluded - |
| Mitigation          | 8 Avoidance                  | +               | -                            | +            | +          | +              | +                              | +                          | +          | excluded + |
|                     | 9 Reduction                  | 0               | +                            | 0            | 0          | 0              | +                              | -                          | -          | +          | excluded - |
|                     | 10 Offsetting                | +               | 0                            | -            | +          | 0              | +                              | 0                          | +          | +          | excluded - |
| Adaptation          | 11                            | +               | +                            | +            | 0          | +              | +                              | -                          | +          | +          | excluded + |
| Climate Change      | 12 General principles        | +               | +                            | +            | +          | 0              | 0                              | -                          | +          | excluded 0 |
|                     | and strategies               |                 |                               |              |            |                |                                |                            |            |            |
|                     | 13 Objectives                | +               | +                            | +            | +          | +              | +                              | 0                          | +          | +          | excluded + |
|                     | 14 Factors                   | +               | +                            | -            | 0          | +              | +                              | 0                          | +          | +          | excluded 0 |
|                     | 15 Indicators                | 0               | +                            | 0            | -          | 0              | 0                              | -                          | 0          | +          | excluded + |
|                     | 16 Target                    | 0               | +                            | 0            | 0          | +              | -                              | 0                          | +          | +          | excluded + |
| Alternative to      | 17 Content related           | +               | +                            | +            | +          | +              | +                              | +                          |                        | excluded 0 |
| climate change      |                               |                 |                               |              |            |                |                                |                            |            |            |
|                     | 18 Spatial/Structural         | -               | 0                            | -            | +          | +              | +                              | 0                          | +          | 0          | excluded 0 |

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| Monitoring | Public Participation | Cumulative Effects | Large Scale Impacts Assessed | Long Term Impacts Assessed | Climate Change – Biodiversity relationship addressed |
|------------|----------------------|-------------------|-----------------------------|-----------------------------|-----------------------------------------------------|
| Transport | 0                    | 0                 | -                           | -                           | +                                                   |
| Energy     | 0                    | 0                 | +                           | +                           | 0                                                   | excluded + |
| Housing    | -                    | 0                 | -                           | -                           | 0                                                   | excluded + |
| Agriculture/Forestry | +                  | +                 | +                           | +                           | 0                                                   | excluded + |
| Monitoring | 0                    | 0                 | +                           | +                           | +                                                   | excluded + |
| Public Participation | +                  | +                 | +                           | +                           | +                                                   | excluded 0 |
| Cumulative Effects | 0                  | 0                 | -                           | -                           | 0                                                   | excluded 0 |
| Large Scale Impacts Assessed | 0                  | 0                 | +                           | +                           | +                                                   | excluded - |
| Long Term Impacts Assessed | 0                  | 0                 | -                           | +                           | 0                                                   | excluded + |
| Climate Change – Biodiversity relationship addressed | 0                  | 0                 | -                           | +                           | -                                                   | excluded 0 |
| TOTAL | +                    | 18                | 18                          | 18                          | 17                                                  | 12                                                  | 14 | 19 | 13 | 22 | 22 | - | 12 |

Source: [1],[2]
4. Conclusions

It can be concluded that the issue of climate change in Indonesian SEA documents is still very diverse. Some have only been covered to a relatively limited extent on the issue of climate change based on the criteria analyzed in the study. Future study on climate change issues should examine the implementation of Sustainable Development Goals in SEA documents especially SDGs no 13; Climate Action.

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References

[1] Nadruz V d N and Gallardo A L C F 2015 Climate change and the Brazilian Strategic Environmental Assessment practice. IAIA15 Conference Proceedings. Impact Assessment in the Digital Era. 35th Annual Conference of the International Association for Impact Assessment. P. 1-7

[2] Wende W, Bond A, Bobylev N, Stratmann L 2012 Climate change mitigation and adaptation in strategic environmental assessment, Environmental Impact Assessment Review 32, 88–93

[3] Jayakusuma Z 2011 Arti penting kajian lingkungan hidup strategis dalam perlindungan dan pengelolaan lingkungan hidup di Indonesia. Ilmu Hukum 2 (1): 154-167

[4] Nababan, R K 2017 Potensi PP KLHS Dalam Mengintegrasikan Pembangunan Berkelanjutan Dalam Penyusunan Kebijakan, Rencana, dan/atau Program. Ilmu Hukum 3 (2): 125 – 140

[5] Isnan W (2018) Kebijakan pengurangan emisi gas rumah kaca dari sektor penggunaan lahan dan perubahan tata guna lahan kehutanan (LULUCF). Info Teknis EBONI 15 (1): 29-39

[6] Sudarto P H, Hartuti P, and Bulan P 2019 The Powerless of Strategic Environmental Assessment (SEA): A Case Studies of North Kendeng Mountain Area, Central Java, Indonesia. ICENIS. E3S Web of Conferences 125: 02014

[7] Bragagnolo C and Geneletti D 2012. Addressing cumulative effects in Strategic Environmental Assessment of spatial planning. AESTIMUM, Giugno 60: 39-52

[8] Arinaldo D, Mursanti E, Tumiwa F. 2019. Implikasi Paris Agreement terhadap Masa Depan Pembangkit Listrik Tenaga Uap (PLTU) Batubara di Indonesia. Discussion Paper. Institute for Essential Services Reform (IESR).

[9] Wahyudi et al 2019 Potensi cadangan dan serapan karbon ekosistem mangrove dan padang lamun Indonesia. Intisari bagi pengambil kebijakan.