Impact significance in sugarcane industry EIA

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Abstract

Impact significance determination is recognized as a critical EIA activity, but also as being poorly understood and having highly variable practice. A good impact significance determination helps to allocate resources efficiently when designing mitigation measures, as well as make explicit the value basis for decisions, two vital characteristics to support decision-making aimed at achieving sustainability. To explore this matter, we have selected the sugarcane industry in the Brazilian state of São Paulo – a sector that adopted sustainability requirements in its marketing strategy, and a region with a robust EIA system. We evaluate the impact significance determination in 26 recent Environmental Impact Statements (EISs) of Brazilian sugarcane mill projects, seeking to identify (a) if impact significance is determined and how and (b) if mitigation measures are associated with identified significant impacts. The analysis indicated that impact significance is presented in 18 cases, however, there is little detail on the criteria adopted in all of them or how the significance determination was made. Nine EISs do not present mitigation measures for all identified medium and high significance impacts. The results show that more consistent procedures for impact significance determination are required for the majority of cases, and the proper linkage between significant impacts and mitigation measures must be established. These improvements are fundamental for an effective and transparent analysis of the contributions each enterprise can deliver to sustainability.

KEYWORDS: sugarcane industry, impact assessment, sustainability assessment

1 Introduction

Determination of impact significance is a core task in impact assessment, as it is what indicates to decision-makers whether the impacts may be considered acceptable (Glasson et al. 2012). Significance determination is connected to all the previous tasks of EIA, as the process is composed of successive approximations of what is supposed to be important for the project context (Weston 2000; Sadler 1996). Hence, it is reasonable to say that determining significance is what gives sense to all the choices made earlier in the process, so that Beanlands and Duinker (1983) call significance determinations 'the very heart of EIA'.

A good impact significance determination helps to allocate resources efficiently when designing mitigation measures, as well as to make explicit the value basis for decisions (Wood 2008).

Some practitioners has been arguing that assessments should not only aim at avoiding harmful effects, but positive impacts must be pursued, so that every project could result in a positive contribution to sustainability (Gibson *et al.*, 2005; João, Vanclay and den Broeder, 2011). For this purpose, it is crucial to establish a clear connection

between impact significance and management options, respecting the mitigation hierarchy – impact avoidance, minimization, offsetting and enhancement.

Seeking to explore the consistency and transparency of significance determination in EISs and the linkage between significance determination and mitigation planning, in this paper we review a sample of Environmental Impact Statements (EIS) of Brazilian sugarcane mill projects in order to evaluate: (a) if impact significance is determined and how; and (b) if mitigation measures are associated with identified significant impacts.

The sample is comprised of 26 recent EISs. Since the early 2000s, the sugarcane industry has experienced expansion of demand for ethanol fuel production and consequently new mills and the expansion of existing ones have taken place. Considering also the efforts made by the industry and the government to attach a sustainability label to sugarcane ethanol (SMA et al. 2007; UNICA 2014) , as well as new requirements for EIA, this is an interesting sector to be analyzed.

2 Methodology

The sample of 26 EISs of sugarcane mills was analyzed based on the research questions and criteria presented in Table 1. A content analysis of the relevant chapters and sections of the documents was performed (Krippendorff 2013). The sample includes the environmental licensing processes filed after the publication of São Paulo State Department of Environment Resolution SMA 88/2008, which introduced new requirements for environmental licensing specifically for the ethanol sector.

Table 1 – Research questions and criteria for application

Question	Description of the criteria
1. Do the EISs describe impact significance and the method adopted for its determination?	Search for methods of determination of impact significance and results of the determination.
2. Are there explicit links between significant impacts and mitigation measures?	Moderate and high significance impacts are selected and compared to the proposed mitigation measures. If the relation between impact and mitigation is not clear, descriptions of both of them were analyzed to check whether they are compatible.

3 Results

In Brazil, EISs are usually prepared by private consultancies on behalf of project proponents, following guidance issued by the governmental environmental agency. The 26 EISs in the sample were made by 7 different consulting companies (Figure 1). Two consultancies are responsible for over 50% of the EISs examined. The G consultancy produced 9 EISs, and the F consultancy produced 7; consultancies A and E developed 4 and 3 respectively, and consultancies B, C and D developed 1 EIS each. As for the project purpose, 23 studies assessed the impacts of the expansion of current mills, and 3 were prepared for new developments.

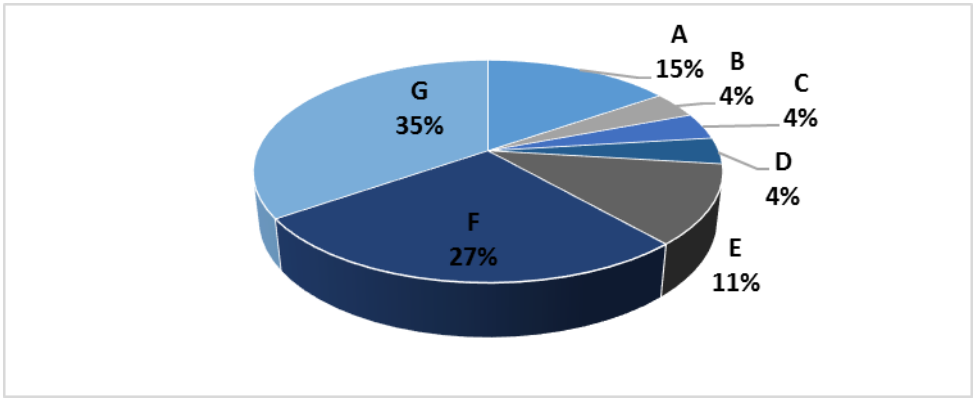

Figure 1. Share of 7 consultancies in the preparation of EISs analyzed (n = 26)

It was found that determination of impact significance is not featured in all studies, despite the general regulations on EIA (Conama Resolution 1/86), which explicitly require environmental impacts to be identified and predicted, as well as "the interpretation of impact importance". In 7 EISs, all made by the same consultancy (F), the significance is not included in the impact analysis, as shown in Figure 2.

For the 19 EISs that declare impact significant, the number of impacts whose significance was ranked as "moderate" or "high" ranged from 5 to 19 (Figure 2). Out of a total of 297 such impacts, 252 are described as adverse and 45 as positive.

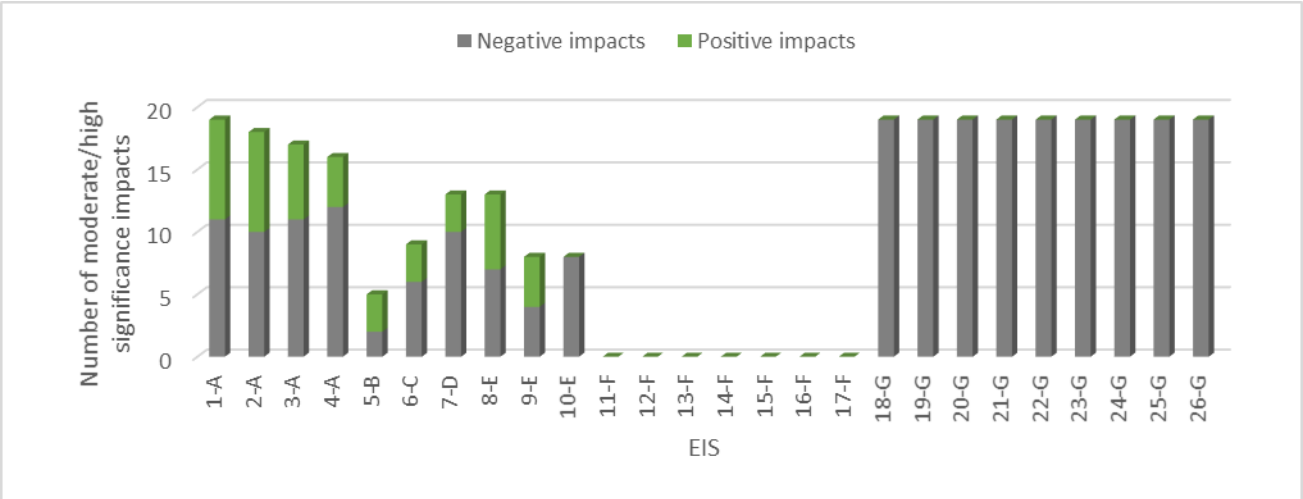

Figure 2. Number and nature of impacts classified as moderate or high significance, in 26 sugarcane mills EIS

The description of the methods adopted to define impact significance is very brief in the EISs examined. In all documents where significance is stated, ranking was made considering various impact characteristics (such as magnitude and duration), but no explicit rule for combining such characteristics is described, with the exception of consultancy B, which provided a matrix for each combination of magnitude and mitigation efficacy (being both defined as low, medium, high, resulting in a 3 column and 3 line matrix). In the other cases, there is an indication that professional experience of the team is the main factor for defining significance, without detailing the criteria to the reader of the EIS.

Another interesting aspect of the sample is that impact significance does not have the same meaning in all studies. For consultancies A, B and C, significance is determined in relation to the residual impacts, so the determination considers that mitigation will be effective. In the EIS made by consultancies D and G impact significance is assessed before considering the results of mitigation measures. Consultancy E, which produced 3 EISs, adopted an approach similar to D and G in 2 of them, while in the third one it applied both models, presenting “significance before mitigation” and “significance after mitigation”.

It is expected that the identification of significant impacts will trigger the need to consider adequate mitigation. An analysis of each of the 297 impacts regarding the presence in the EIS of measures to mitigate significant impacts resulted in the distribution showed in Figure 3. For 227 impacts, or 77% of the total, there was clear connection between the impact and mitigation measures proposed. For 48 impacts (16%), EISs have indicated that no mitigation measures can be adopted, which is often applied to socioeconomic issues, including impacts described as increases in municipal tax revenue (17 mentions), land use change effects (9 entries), reductions in air pollution due to replacement of gasoline by ethanol (9 mentions), and work and income opportunities (5 cases). Other 8 cases where mitigation measures are inexistent include positive impacts: contributions to mitigation of greenhouse gases emissions and improved farm income and property value. It is also possible to find impacts that could be best taken as objectives of the projects - increasing the supply of ethanol and sugar for the domestic and foreign market and diversification of the national energy matrix (that has 3 mentions).

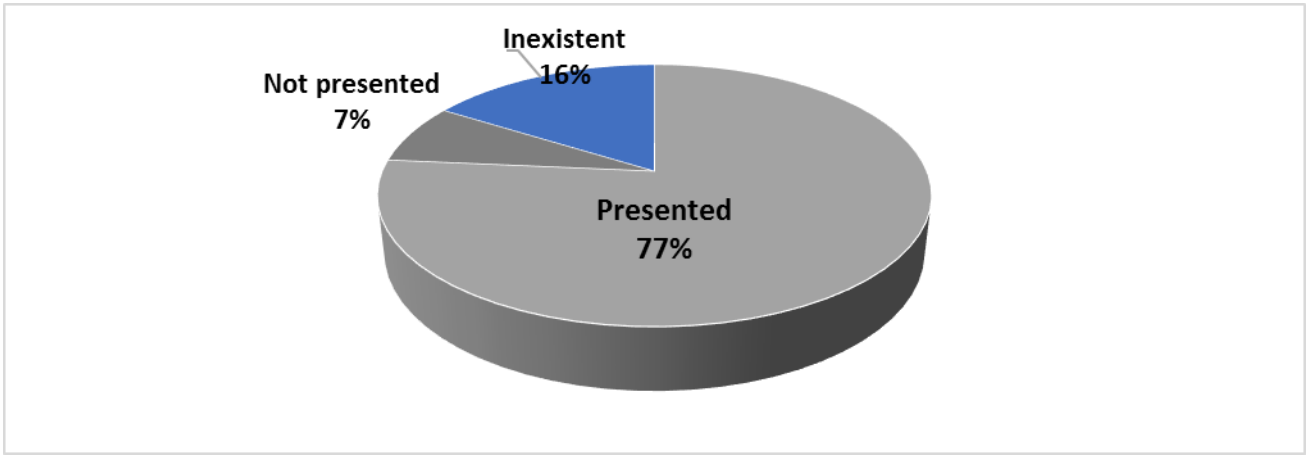

Figure 3. Percentage of impacts classified as significant that have been associated with mitigation measures (preventive or corrective for adverse impacts or enhancing for positive impacts) (n = 297)

All of the cases in which mitigation measures were not presented for identified significant impacts (22 cases or 7%) were from the same consultancy (G). In the 7 EISs made by this consultancy, an identical matrix was presented for significance determination, despite the changes in impacts and management plans. So, in these EISs management plans were presented, but that they were not clearly linked to the identified significant impacts.

From the 26 EISs, only 10 were consistent, presenting discussions on mitigation measures for all the moderate and high significance impacts. These reports were prepared by consultancies A, B, C, D and E.

4 Discussion

The results demonstrated that 19 of 26 EISs examined present the significance of impacts. Professional judgment is the approach for determining significance. No mention to perspectives of stakeholders regarding impact significance could be found in the reviewed EISs. This result is consistent with other studies that found that significance determination is simple and pragmatic, instead of being supported by transparent rules (Lawrence 2007; Wood 2008). The finding that almost one third of the EISs did not present any significance determination show that this practice is not fully recognized in the analyzed context and that the State environmental agency does not enforce this requirement of the regulations. Different applications for significance determination in the EISs also demonstrates variability in practice - a full picture should provide impact significance for both unmitigated and residual impacts, and this was found in just 1 EIS.

Lack of transparency about the definition of and method of determining significance and the absence of a clear indication of what was considered important impairs the quality of EIA – it is not possible for a reader, including the analysts reviewing the documents in the environmental agency, to understand the basis for the determination or to what extent the baseline and context where useful for framing the management plan. This lack of transparency is a communication problem and reveals a structural problem in EIS preparation (Weiss 1989).

Regarding the connection between impact significance and mitigation measures, only 10 in 19 EISs have featured it clearly. Once the impacts were defined as moderate or high significance, specially for the negative impacts, it is hardly acceptable that an EIS does not present any action to deal with them or any explanation about it. This result indicates that the analysis of impact significance has not been fed back to the definition environmental management plans.

5 Conclusions

In this paper we found that impact significance is determined in 73% of an analyzed set of 26 EISs prepared for ethanol projects in Brazil, and most of them are not clear about the methods adopted to determine significance. Mitigation measures clearly connected to moderate and high significance impacts were found in only 10 EISs. The results indicate that improved transparency in significance determination and proper linkage between identified significant impacts and mitigation measures must be established.

Those improvements are fundamental for an effective and transparent analysis of the contributions each enterprise can deliver to sustainability (Gibson *et al.*, 2005; João, Vanclay and den Broeder, 2011).

Improvements in the relationship between significance determination and the mitigation measures proposed would not be merely communication improvements –

they would be advances in technical argument for the design of appropriate management and monitoring programs. The disconnection may also lead to overestimation of a measure, which may cause unnecessary economic costs, or undervaluing that may lead to social and environmental costs (Lawrence 2007; Morrison-Saunders & Arts 2004; Wood 2008; Weiss 1989). Both are unwanted in sustainability scenarios, and represent ineffectiveness and inefficiencies of the EIA process.

6 Acknowledgements

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