

ADDRESSING CUMULATIVE EFFECTS WITHIN IMPACT STUDY DOCUMENTS¹

by

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ABSTRACT

As greater attention is given to the incorporation of cumulative effects assessment (CEA) within the environmental impact assessment (EIA) process, it has been recognized that guidance is needed on the topics which should be addressed and where such information should be included within environmental assessments and environmental impact statements. This paper explores several choices for such inclusion along with topical guidance which can be utilized by both document preparers and reviewers. Current choices for incorporation include a separate chapter or the integration of the subject in individual chapters related to describing the affected environment, impact prediction and assessment, and decision making between alternatives for meeting identified needs. Either approach can be supported by technical appendices providing detailed information. Based upon several case studies as well as recent reports from the Council on Environmental Quality and the Environmental Protection Agency in the United States, and the Canadian Environmental Assessment Agency, a checklist of 12 topical issues for inclusion is described. These issues include, but are not limited to: (1) defining key terms and concepts; (2) clearly stating the rationale for the CEA boundaries (spatial, temporal, future actions, and impact indicators); (3) delineating cause-effect relationships via linked pathways; (4) summarization of the predicted cumulative effects; and (5) reasonable justification of the significance of cumulative effects and potential mitigation strategies for negative cumulative environmental consequences.

Key Words: CEA documentation, CEA communication, CEA guidance

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INTRODUCTION

While there has been considerable literature generated on addressing cumulative effects within the environmental impact assessment (EIA) process, less attention has been given to describing exactly how cumulative effects were actually addressed and assessed within the process.

A useful premise with regard to documentation of cumulative effects is that such considerations should begin upon the initiation of the study and not be left until the end of the process. Topics addressed herein include the importance of documentation, what topics (issues) should be addressed within an impact study document; and where such information should actually be placed within an environmental assessment or environmental impact statement.

WHY IS DOCUMENTATION IMPORTANT?

There are several reasons for attention to appropriate documentation of cumulative effects; the most fundamental involves complying with the spirit and intent of the National Environmental Policy Act (NEPA) to identify how environmental issues and impacts were incorporated in project planning and decision making. Additional reasons for the importance of this subject include:

- (1) the need to provide an "audit trail" of how the cumulative effects assessment (CEA) was conducted and incorporated within the EIA process;
- (2) cumulative effects are one criterion for determining if an environmental impact statement is needed following the conduction of an environmental assessment;
- (3) CEA is more technically complicated than dealing with the direct and indirect effects of a single proposed action, thus special attention needs to be given to the communication of information relative to such an assessment;
- (4) inadequate documentation can be a basis for a lawsuit filed against a proposed plan, policy, program, or project; in fact, it could be stated that CEA may currently be a technical "weak link" in the EIA process; and
- (5) documentation can identify necessary mitigation and/or monitoring needs, and point toward necessary follow-on agency coordination and collaboration for such mitigation and/or monitoring efforts.

WHAT TOPICS SHOULD BE ADDRESSED WITHIN IMPACT STUDY DOCUMENTS?

There is no standardized list of topics (issues) which has been enumerated to date regarding documentation of cumulative effects; however, based upon recent case studies and several reference materials, as well as a growing consensus on "good practice regarding CEA, several issues can be identified in the context of a checklist approach (Cooper and Canter, 1997; Council on Environmental Quality, 1997; and Hegmann, et al., 1999). Secondly, the U.S. Environmental Protection Agency has recently issued guidance for the review of NEPA documents relative to CEA (U.S. Environmental Protection Agency, 1999). This review guidance can also be used for identifying topics which should be addressed within environmental assessments or environmental impact statements.

Checklist of Issues

The following checklist of issues can facilitate the identification of topics to be addressed when documenting CEA within impact study documents:

- (1) The term "cumulative effects" should be defined so that the reader/reviewer will understand the basic concepts and principles related to cumulative effects per se; the definition in the Council on Environmental Quality (CEQ) NEPA regulations should be used as the basis (Council on Environmental Quality, 1978).
- (2) It is possible that several types of cumulative effects might be identified in a given environmental impact study, hence definitions should also be included on the types of cumulative effects addressed. Examples include additive effects from single actions, non-additive (biomagnification, synergistic, or countervailing) effects from single actions, additive effects from multiple actions, and non-additive effects from multiple actions. Therefore, for clarity, it is important to demonstrate the variety of such effects associated with the proposed action when considered in relation to past, present, and future actions.
- (3) The rationale for the utilized boundaries within the CEA should be carefully described. These include the spatial (geographical) boundaries for different impacted resources, ecosystems, and human communities; the temporal boundaries in relation to historical baseline conditions, current conditions, and the future time period for analysis; the types of actions addressed, including past, present, and reasonably foreseeable future actions within the spatial and temporal boundaries; and the selected impact indicators for the pertinent resources, ecosystems, and human communities. The policy and/or scientific rationale for the spatial and temporal boundaries, the included actions, and the selected indicators, should be carefully described in relation to the proposed project, policy, plan, or program.
- (4) The method or methods used to identify cumulative effects should be described along with the rationale for their selection. Three key types of methods include questionnaire checklists, interaction matrices, and/or networks which have been developed to address anticipated cumulative effects. Further, the environmental pathways by which the cumulative effects are expected to occur need to be displayed. Effective tools for demonstrating such pathways (or linkages) include cause/effect diagrams, which are also known as consequence diagrams or network analyses. The primary need is to display this potentially complicated information in a simplistic manner so that the reader/reviewer can understand the impact-causing factors and critical pathways in relation to the selected indicators.
- (5) The specific quantitative or descriptive approaches utilized for predicting cumulative effects should also be described along with the rationale for their selection. Such documentation would provide the reader/reviewer with a better understanding of the predictive tools utilized and the bases for their selection.
- (6) The results of quantitative or descriptive predictions of cumulative effects on the selected indicators should be summarized. This could be accomplished via tables with appropriate written discussions of the results, or via maps, along with spatial overlays, of different types of cumulative effects. Further, time-referenced figures could be developed to display the potential cumulative effects over different time periods. Further, it should be noted that this information provides the technical basis for the subsequent determination of effects significance and potential mitigation needs. Finally, the technical details regarding impact calculations and supporting qualitative literature should be included in appendices.
- (7) The significance of the cumulative effects should be clearly stated along with the criteria used for such determinations. The criteria could include, but not be limited to, regulatory standards or thresholds, environmental and natural resources

management policies or practices, and professional judgment. The significance information could be presented in a tabular format, with the table including codes associated with the bases for each significance determination. Further, those cumulative effects deemed to be highly significant could be targeted for mitigation and/or monitoring measures.

- (8) The identified mitigation (or compensation) requirements should be described along with governmental agency or project proponent responsibilities for implementing such mitigation activities. It is quite possible that multiple agency collaboration and cooperation would be needed, thus such arrangements should also be identified and described. Finally, estimates should be included as to the potential effectiveness of the mitigation measures, with the results focused upon describing the residual cumulative effects following implementation of the mitigation program.
- (9) In many cases, monitoring of selected impact indicators might be an appropriate follow-on for evaluating experienced cumulative effects and assembling information for mitigation and/or management measures. Accordingly, if such monitoring is determined to be necessary, the details of the monitoring program should be described, including the objectives, the responsibilities of various agencies and the project proponent, and the use of the collected information in cumulative effects management.
- (10) It is anticipated that a typical CEA will be limited in terms of time, budget, and scientific knowledge and experience. Accordingly, the results of the CEA would likely have many uncertainties. Such uncertainties resulting from study limitations should be identified and briefly described within the documentation process.
- (11) Scoping is a key process for the identification of potential cumulative effects. Therefore, a summary of the scoping process in relation to cumulative effects should be included along with the interagency coordination conducted during the process. It should be noted that the scoping process is not limited to cumulative effects, hence, a description of the overall scoping process and interagency coordination could be included as an appendix, with cumulative effects, as appropriate, described therein.
- (12) Appendices summarizing the technical details of the CEA should also be included. Further, the table of contents in the NEPA document should clearly identify the cumulative effects addressed. Topical indices which might be included in the document should also incorporate cumulative effects and related terms.

USEPA Review Criteria

The U.S. Environmental Protection Agency has published review criteria for cumulative effects within NEPA documents, including both environmental assessments and environmental impact statements (U.S. Environmental Protection Agency, 1999). The criteria will be primarily utilized for environmental impact statements, although environmental assessments may need to be examined as to how they addressed cumulative effects in determining if an environmental impact statement is required. The criteria basically ask the EPA reviewer to answer the following questions. These questions could also be utilized to plan how an impact study document will address the CEA. The questions are:

- (1) Have the resources and ecosystem components (including human communities) which are cumulatively impacted been identified?

- (2) Have the geographic and time boundaries been identified (justified) and are they sufficiently large?
- (3) Have all past, present, and future actions that contribute to significant cumulative effects been considered?
- (4) Is the condition of the environment (historical and/or current) used to assess cumulative effects accurately depicted?
- (5) Have the bases for significance determinations been adequately described (regulatory thresholds, environmental policies, professional judgment, public concerns, etc.)?

PLACEMENT OF THE DOCUMENTATION WITHIN AN IMPACT STUDY REPORT

Placement of the CEA information within an impact study report is a fundamental issue which needs careful consideration and planning. In the case of an environmental assessment, the cumulative effects considerations should be incorporated in a separate section of the fairly concise document. The fact that cumulative effects serve as one criterion for determining the significance of effects (or impacts) should be clearly described and placed within the context of the other criteria for significance determination (Council on Environmental Quality, 1978). If it is determined that an environmental impact statement is necessary, then more detailed work would need to be done on the CEA during the conduction of the impact study. If it is determined that an environmental impact statement is not necessary because of a "finding of no significant impact", then the information related to cumulative effects should be used to support such a determination.

For environmental impact statements prepared on projects, policies, plans, or programs, there are basically two options for addressing the CEA results within the document itself:

- (1) They could be addressed in a separate chapter of the impact study document along with appropriate supporting technical and related appendices.
- (2) They could be addressed in subsections within the substantive topics in an "impact chapter," with the subsections also referring to appropriate technical and related appendices. For example, when air quality impacts are addressed, attention should be given to the direct and indirect effects of the proposed action, along with consideration of the cumulative effects on air quality resulting from the proposed action considered in relation to past, present, and reasonably foreseeable future actions. Subsections of related chapters on describing the affected environment and decision making between alternatives will also need to include information related to the CEA findings.

As an alternative, the CEA results could be incorporated in a "stand alone" separate document and referenced in the environmental assessment or environmental impact statement. For example, the CEA could be incorporated in a separate chapter in other related regional or sectoral planning studies, with appropriate referencing in the impact study report. Further, the impact study documentation could summarize from such a separate document the appropriate topical issues as described earlier.

Various arguments could be made as to the desirability of one versus another of the above two options in an environmental impact statement. For example, one advantage of a separate CEA chapter is that the entirety of the subject is addressed in one complete segment. A disadvantage is that the information is not placed alongside the direct and indirect effects of the proposed action on specific resources, ecosystems, and human communities. Conversely, an advantage of using a sub-

section approach is that the cumulative effects are addressed along with the direct and indirect effects of the proposed action. However, one disadvantage is that the reader/reviewer does not get a composite perspective on the cumulative effects of the action in relation to all identified critical resources, ecosystems, and human communities.

The advantage of a stand-alone document is that the information contained in the regional or sectoral planning study could be abstracted and utilized in multiple subsequent impact study reports in the applicable geographical area. However, a disadvantage is that the information actually included in the impact study document could be limited, thus the reader/reviewer would probably need to review the stand-alone document to understand the technical arguments presented.

While there is no clear answer as to where the CEA documentation should be placed within an impact study report, it could be argued that the most appropriate approach is for a separate chapter, along with supporting appendices. Reasons basic to this approach include: (1) the opportunity for sequentially addressing the multiple topical issues described earlier; (2) a non-fragmented presentation which would facilitate readers/reviewers of the document in gaining a better understanding of cumulative effects and how they were incorporated in project planning and decision making; and (3) a more reasonable assurance of fulfilling the spirit and intent of NEPA.

OTHER OBSERVATIONS

Several additional observations could be useful in facilitating the incorporation of CEA within impact study documents. First, CEA documentation requirements should be included in any "terms of reference" or "scopes of work" (the details of the documentation would not be necessary, however, at a minimum, an outline of the topics which should be addressed should be included). This would help both the project proponent and the preparers of the document to ensure that the CEA information that is subsequently assembled is appropriate for the particular study.

In the preparation of an environmental assessment or an environmental impact statement, it must be recognized that there will be multiple audiences that might be interested in the reports. This also extends to the subject of cumulative effects within the impact study reports. In fact, because of the greater complexity of CEA and the relative newness of this subject in the practice of EIA, the need to recognize such audiences and to go the "second mile" in trying to communicate cumulative effects information should be obvious.

While specific topical issues appropriate in a generic sense for any CEA can be identified (such as those described earlier), it should be recognized that each impact study will have unique features or requirements and related cumulative effects. Therefore, a specific tailored outline to be addressed in the CEA documentation would be required for each study. This concept has been utilized for over two decades in EIA practice, with the provision of generic outlines in many regulations and guidance documents, along with the understanding that a specific outline, as appropriate, would need to be developed for the individual proposed project, policy, plan, or program.

As is the case with the general preparation of an environmental assessment or environmental impact statement, it is appropriate to cite utilized references for the CEA. Further, because of the newness of CEA, it could be stated that the need to cite utilized references is even greater.

Finally, communication of information on CEA can be facilitated by the use of three languages. For example, the language of "words" wherein the writer describes the concepts, process, findings, significance determinations, and resultant mitigation requirements and measures. There is no substitute for the language of words in an impact study document. The second language is that of "visual aids" coupled with the language of words. In this context, visual aids can include tables, figures, maps, photographs, and conceptual drawings; with each of these aids further addressed via descriptive

information. The third is the language of "models" used in conjunction with the language of words. In this case, models can refer to mathematical models or conceptual models such as cause-effect diagrams. Again, it is important that any utilized models be adequately described.

SUMMARY

To summarize, documentation is arguably the most important aspect of conducting a CEA within the EIA process. If documentation is not adequately addressed in an impact study document, difficulties can ensue with regard to gaining necessary public and agency approvals of the proposed project, policy, plan, or program. While the technical details are critical and must provide the foundation for CEA, summary documentation is what various readers/reviewers, including the general public, will utilize to form their opinions regarding the proposed action.

CEA documentation is more challenging than "traditional" documentation of the direct and indirect effects of a proposed action. Reasons for this greater complexity include the extensions of spatial and temporal boundaries; the requirement to address past, present and reasonably foreseeable future actions; and the need for selecting impact indicators for those resources, ecosystems, and human communities subject to cumulative effects.

Finally, there is a current need for the development of "regulations" relative to CEA practice. In some countries the term "guidance" is utilized in lieu of regulations. However, the central point is that such regulations, which should address a broad range of topics, should also include information on appropriate documentation of CEA within the EIA process.

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