

A PRACTITIONER SURVEY OF CUMULATIVE IMPACT ASSESSMENT

R.K. Burris and Larry W. Canter¹

INTRODUCTION

Cumulative impact assessment (CIA) is an issue of growing importance in the worldwide practice of environmental impact assessment (EIA). Over 15 years have passed since the Council on Environmental Quality (CEQ) in the U.S.A. promulgated regulations (1979) requiring the consideration of cumulative impacts (CIs); such stipulations have also been included in the EIA requirements of numerous other countries and international organizations. However, the attention given to this issue both in the United States and elsewhere has been lacking. Numerous papers and reports have been issued on the concepts of CIA; unfortunately, actual case studies and the associated lessons learned have received only minimal attention. Accordingly, a questionnaire survey of EIA practitioners was conducted to ascertain information on the current state-of-practice of CIA. This paper summarizes the findings from the survey. Detailed information on the questionnaire, the respondents, and the survey results are available elsewhere (Burris 1994).

DESCRIPTION OF SURVEY

The questionnaire was sent to **225** practitioners from the United States and **225** practitioners internationally. The return rate of completed or partially completed questionnaires was 11 percent domestically (**25** respondents) and

¹ Corresponding author for this article is Dr. Larry W. Canter, George Lynn Cross Research Professor, Sun Company Chair of Ground Water Hydrology, and director, Environmental and Ground Water Institute, University of Oklahoma, 200 Felgar St, Rm 127, Norman OK 73019 USA; email: canter@ou.edu; fax: +405-325-7596. R.K. Burris is a graduate research assistant at the Environmental and Ground Water Institute.

13 percent internationally (29 respondents). The low return rate was probably a result of one or a combination of the following: (1) the questionnaire was quite lengthy and this was a deterrent to completion (several respondents commented on the length); (2) the mailing list was not sufficiently screened for current CIA practitioners (it was a composite of several current and dated lists); and (3) no follow-up was used to increase the response rate. Further, questionnaire completion required some **CIA** knowledge and experience, and several uncompleted questionnaires were returned with this notation.

The 54 respondents ranged from consultants to governmental agency practitioners to university professors. The 25 respondents from the United States included 12 persons from federal agencies, six from **EIA** consulting firms, four from academia or applied research laboratories, two from state agencies, and one from a private company. Five of the **12** federal agency persons were the **EIA** process liaisons for their agencies. The 29 international respondents included five persons from national agencies (one was head of the agency), eight from consulting firms, 15 from academia or specific **EIA** research centers, and one from a local agency. Eleven countries were represented by the international respondents (Australia, Brazil, Canada, England, France, Germany, Ireland, The Netherlands, Norway, South Africa and Sweden). A large majority of the 54 respondents had over 15 years of experience in **EIA** practice. Further, many are well known both nationally and internationally in the **EIA** field. All respondents have been involved in preparing and/or reviewing environmental impact statements (**EISs**) resulting from the **EIA** process. However, despite the expertise of the respondents, the results of this survey should be viewed as indicative of professional knowledge and experience related **to CIA**. A more comprehensive survey instrument and a larger number of respondents would be required to develop representative information regarding the state-of-practice of **CIA**.

The questionnaire had three parts: part **I** focused on general information and reporting practices; part **II** addressed technical issues and their application; and part **III** was related to transboundary/global issues. The three parts and the specific questions were developed based on a review of published **CIA** literature, discussions with several practitioners, and comparisons of selected **EISs** and environmental assessments (**EAs**) prepared in the United States and abroad. Examples of the reviewed literature include Canter and Kamath (1995); Contant and Wiggins (1991); Hochberg, Friday, and Stroup (1993); Kennedy (1994); McCold (1991); Peterson, et al., (1987); and Spaling and

Smit (1993). Questions from the survey solicited responses in both quantitative and qualitative forms, and related comments were invited. The focus of the analysis described in this paper will be on the comparison of responses from domestic and international participants.

GENERAL INFORMATION AND REPORTING PRACTICES

According to the summary information presented in table 1, the domestic respondents from the United States indicated generally greater attention to the concepts and documentation of CIs in EISs and EAs than did the international respondents. Two possible reasons for the higher percentage results from the United States are (1) a definition of CIs is included in the CEQ regulations, whereas in many other countries a formal definition of CIs is not contained **in** their law or regulations; and (2) internationally, CIA may be treated as an integral part of land management and regional planning processes; therefore, CIA may not be separated from this context and it is thus not highlighted in impact study reports. Despite the differences, it should be noted that the attention given to different components of CIA documentation (for example, including a written definition of CIs or presenting the CIA in a separate section) is clearly less than sufficient both domestically and internationally.

Figure 1 depicts the responses to questions 1a and 2a from table 1. The *concept* of CIs implies addressing CIs directly (that is, using the term *cumulative*) and/or addressing CIs indirectly (that is, **not** using the term *cumulative*). Question 1a provided the data on the total percentage of time the concept of CIs is addressed, and question 2a provided the percentage of reports out of the percentage of question 1a that indirectly addressed CIs. Therefore, according **to** this survey, CIs are directly addressed in less than one-third of domestic and international EISs and EAs with which the respondents were familiar. Written comments from both groups of respondents indicated that it is their judgment that inadequate and inconsistent attention is currently given to the concept of CIs in the EIA process.

With respect to presenting the CIA in its own document section (question 4a), respondents had varied experiences and opinions. **One** respondent stated that CIs are addressed under separate headings within each relevant technical area, while another respondent noted that the CIA is presented in an

individual section 100 percent of the time in EISs, and about 75 percent of the time in EAs with which he was familiar. A respondent from Canada noted that CIs are rarely discussed separately from the main analysis of environmental effects, and that this should be the case because CIA is an integral element of the EIA process. This lack of documentation uniformity and range of respondent opinions suggests the need for standardization of CIA documentation. In addition, without some general guidelines, reviewing EISs and EAs for CIA represents a difficult task.

Scoping has been suggested as a useful exercise for identifying and assessing potential CIs, and question 5a addressed this point. Although the use of scoping was depicted as occurring less than 30 percent of the time for both study groups, there was general agreement provided in written comments that scoping can aid in selecting environmental resources to be subjected to CIA.

Question 6a asked respondents to indicate if the CIA always addresses each specific environmental resource related to a project or action. Both groups indicated that a low percentage (10 percent or less) of resultant documents address each specific environmental resource. One respondent stated that CIs are usually addressed only for major categories—such as cultural resources, air, water, critical habitat. Another noted that only CIs related to significant issues should be addressed; otherwise, the resultant document would become “encyclopedic” with respect to CIA. One international respondent suggested that there is no need to address CIs for every affected resource if CI considerations are incorporated in the scoping process. Another international respondent stated that the approach used should depend on the type of project, the associated impacts, and the existing environmental conditions.

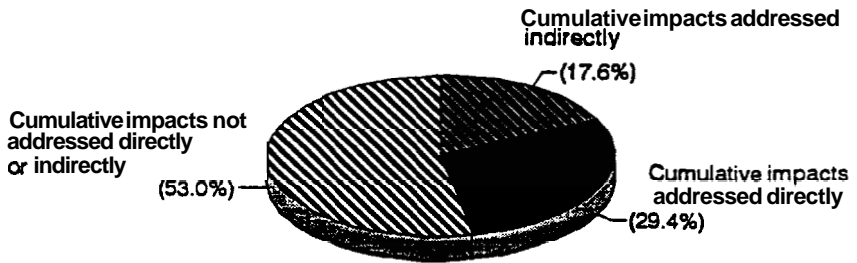
A key lesson derived from question 7a relative to defining significance is that there is not one broad-based threshold or range that can be applied in every significance determination. Therefore, both groups of respondents indicated that professional judgment plays a critical role in significance determinations. This perspective accounts for the survey results showing that fewer than 15 percent of the EIA documents typically include quantitative definitions of significance.

Table 1: General information and reporting practices

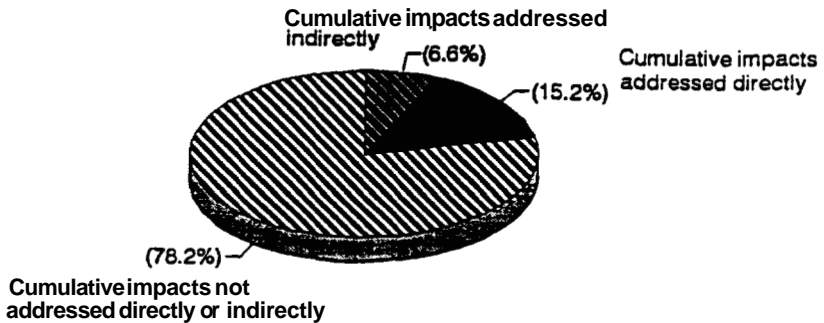
Selected questionnaire questions	Mean of domestic respondents	Mean of international respondents
1a. What percentage of the time is the concept of CIs addressed in the EISs and/or EAs produced or reviewed by yourself or your institution?	47%	22%
2a. What percentage of the EISs and/or EAs indirectly address CIs in relation to the total number of reports that address CIs?	38%	30%
3a. What percentage of the time is a written definition of CIs included in the EISs and/or EAs ?	30%	10%
4a. What percentage of the time is the CIA discussed in its own section of the EIS and/or EA ?	35%	10%
5a. What percentage of the time is the scoping process used in identifying and assessing CIs?	29%	17%
6a. Does the CIA always address each specific environmental resource of a project or action ?	4% yes	10%yes
7a. What percentage of the time is the term “significant” quantitatively defined in the process of assessing CIs?	13%	13%

Figure 1. Percentage of time CIs are addressed directly or indirectly

Domestic



International



TECHNICAL ISSUES AND THEIR APPLICATION

The goal of part II of the questionnaire, as summarized in table 2, was to develop information on the technical aspects of CIA—for example, application of various processes for CI accumulation, consideration of spatial and temporal boundaries, application of methodologies in the CIA process, and monitoring of predictions/forecasts from prior CI studies.

In response to question 3b in table 2, both groups of respondents noted that it is “important” to distinguish between the various processes of accumulation (additive— $A + A = 2A$; synergistic— $A + A > 2A$; and interactive— $A + B = C$); however, as noted in 1b, these processes are addressed in less than 50 percent of the documents with which the respondents were familiar. Reasons for this lack of attention were related to the difficulties in identifying CIs that are more “complex” than additive-type CIs.

Comments regarding the “processes of accumulation” included one domestic respondent’s statement that the processes need to be defined specifically for each project in order to avoid ambiguity. Another domestic respondent and many international ones also emphasized the importance of distinguishing between the processes; however, they also indicated the complexity and uncertainty associated with predicting such impacts. One international respondent noted the importance of defining these processes as an aid in establishing adequate mitigation and monitoring programs.

Questions 4b–7b asked the percentage of time that spatial and temporal boundaries are considered in the CIA process. Both groups indicated that spatial boundaries are included more often than temporal ones in the documents with which they are familiar. These results imply that more attention is given to **where** the CIs might occur than to **when** they might occur.

Respondents were also requested to list primary *difficulties* in defining spatial and temporal boundaries. Spatial boundaries difficulties included (1) the lack of pertinent information; (2) need for different boundaries for different technical/resource areas; (3) drawing the line on where impacts stop and who settles disputes; (4) incomplete understanding of linkages that may expand or confine the area; (5) lack of study funds, time to conduct study, and incomplete knowledge of the problem; and (6) determining a balance between the environmental components, boundaries, and jurisdictions of relevant controlling bodies.

Table 2: Technical issues and their application

Selected questionnaire questions	Mean of domestic respondents	Mean of international respondents
1b. Are the various processes of accumulation addressed in the EISs and/or EAs?	48% yes	39% yes
2b. How easy is it to identify the various processes of accumulation in a cumulative impact study: Additive? Synergistic? Interactive?	Easy Moderately difficult Difficult	Easy Difficult Difficult
3b. How important is it to distinguish between the various processes of accumulation or types of CIs in a CIA?	Imponant	Important
4b. Are spatial boundaries considered in the assessment of CIs?	96% yes	79% yes
5b. Are spatial boundaries specifically defined in the EISs and/or EAs?	92% yes	91% yes
6b. Are temporal boundaries considered in the assessment of CIs?	88% yes	16% yes
7b. Are temporal boundaries specifically defined in the EISs and/or EAs?	72% yes	87% yes
8b. Are specific guidelines or methodologies used in assessing CIs?	44% yes	48% yes
Yb. Are predictions or forecasts included in prior CI studies monitored by you or your institution for accuracy?	32% yes	42% yes
10b. How important is historic monitoring data in the assessment of CIs of future projects or actions?!	Moderately important	Moderately important

As for temporal boundaries, the respondents identified the following delineation problems: (1) defining where *short-term* ends and *long-term* begins; (2) determining what constitutes a *reasonably foreseeable future action* (a term used in the U.S.A.), especially for nonfederal proponents; (3) correlating old and current data for comparison (past data may be nonexistent, scarce, incomplete, or inaccurate); (4) possible absence of fundamental scientific and historical data; (5) determining a proper balance between the short-term interests (10–20 years) of planning authorities and long-term sustainability interests; (6) recognizing that spatial boundaries may shift over time; (7) insufficient study time and funding; and (8) uncertainty and lack of confidence in predictions.

Both domestic and international respondents mentioned the need to consider human health effects in spatial and temporal boundary determinations. The appropriateness of incorporating transboundary and global assessment concerns in determining boundaries at the planning and program level (or strategic environmental assessment level) was also noted. Finally, one respondent very appropriately stated that there should not be separate boundaries for CIA; there should be just one study area for the EIA process.

Both groups of respondents also indicated that specific methodologies or guidelines are applied in less than 50 percent of the documents prepared on impact studies (question 8b). Table 3 presents the results of perspectives on the types of methods useful in assessing CIs for particular environmental resources within the CIA process. The methods perceived to be the most useful by both groups of respondents were professional judgment (PJ), model: impact evaluation (MIE—denotes use of models), and case study (CS) or analog. It is interesting to note that the international respondents tend to perceive the usefulness of the types of methods to be somewhat greater than did the domestic respondents. This may reflect a greater emphasis on EIA methods in international practice, and thus greater appreciation of their usefulness.

Survey respondents were also requested to list separately the methodologies that have been used for specific project types and the environmental resource(s) addressed. The majority of the listed methods were the less complex, “traditional” EIA methods (e.g., simple or descriptive checklists and network diagrams) even though these methods, as indicated by table 3, were ranked by most respondents as only moderately useful. Some reasons for the popularity of simple methods are that they have been used for over

two decades in EIA practice, and practitioners may feel more comfortable with these "paper and pencil" methods than they do with computer models that incorporate various assumptions and produce quantitative results which may be unfamiliar.

Table 3: Usefulness ratings for types of methodologies

Type of method	Mean of domestic respondents	Mean of international respondents
Professional judgment (PJ)	4.0*	4.1
Model: impact evaluation (MIE)	3.9	3.9
Case study (CS)	2.1	3.9
Index: impact evaluation (IIE)	2.3	2.9
Interaction matrix (IM)	2.1	3.1
Detailed checklist (DC)	2.1	2.9
Network diagram (ND)	1.6	3.2
Simple checklist (SC)	1.6	2.3

*Based on a relative scale of usefulness ranging from 1.0 for least useful to 5.0 for most useful.

Finally, relative to question 10b, both groups of respondents indicated that historic monitoring data is "moderately important" in the assessment of CIs of future projects or actions. This importance level was also inferred in the responses from both groups to question 9b related to impact prediction monitoring. Monitoring difficulties that were identified included (1) lack of standard baseline monitoring data for comparison, (2) lack of funding and the possible high costs involved, (3) correlating monitoring results from actual conditions with predicted impacts associated with specific assumed

conditions, (4) the absence of standardized monitoring procedures for many environmental resources, (5) the absence of an “environmental watchdog” overseeing the quality and frequency of monitoring, and (6) the lack of coordination among various governmental jurisdictions with ongoing monitoring responsibilities.

TRANSBOUNDARY AND GLOBAL ISSUES

Table 4 summarizes part III of the questionnaire. According to question 1c, transboundary impacts are addressed in less than 20 percent of the EIA-related reports with which respondents were familiar. Addressing transboundary or global issues as a part of CIA is not always necessary; the need would obviously depend on project type, size, and location. Furthermore, the respondents indicated that time, budgetary, and political constraints may limit the attention devoted to these issues.

Question 2c probed the importance of regional or global issues and the associated percentage of time they were actually addressed in EISs and EAs familiar to the respondents. Although all the listed issues were classified as *moderately important* to *important* relative to being addressed, the fairly low percentages indicate the lack of attention given to these specific issues. Practical difficulties as to why regional and global issues receive limited attention were similar to the constraints listed above for transboundary issues.

Table 4: Transboundary and global issues

Selected questionnaire questions	Mean of domestic respondents	Mean of international respondents
1c. What percentage of the time is the concept of trans-boundary impacts addressed in the EISs or EAs produced or reviewed by your institution?	19%	14%
2c. How important is it to address the following regional or global issues in the assessment of CIs; what percentage of the time are the following issues addressed in the EISs and EAs produced or reviewed by yourself or your institution? Biodiversity? Acid rain? Greenhouse effect/climate change? Ozone layer destruction? Sustainable development? Available water supplies?	Moderately important: 15% Important; 9% Important: 7% Important; 4% Moderately important: 13% Moderately important; 23%	Moderately important: 22% Moderately important; 13% Moderately important; 20% Moderately important; 11% Moderately important; 25% Moderately important: 32%

SUMMARY AND CONCLUSIONS

The questionnaire results summarized in this paper show that all **54 EIA** professionals surveyed believe that CIA is an issue that should be an integral part of the **EIA** process. However, the statistics gathered indicate that the basic concept of CIs is addressed in less than one-half of prepared EIA documents with which the respondents were familiar. One possible reason for the limited attention is that **EIA** legislation and/or regulations often incorporate vague and unclear references to CIs, with possibly no specific definition included. However, most respondents indicated that scoping should be used for the early identification of CIs in the EIA process; they also suggested a focused approach for analyzing CIs on environmental resources.

The questionnaire results also indicate that as considerations moved from general documentation to defining spatial and temporal boundaries and applying methodologies, and then **to** assessing transboundary and global issues, the attention given to the latter subjects tended to decrease. Although the necessary level of analysis is project dependent, these results indicate that the majority of EIA-related reports that address CIs do **so** without applying specific methods (e.g., models and checklists) to predict CIs and provide a basis for judging their significance. Rather, heavy reliance is given to professional judgment.

Both domestic and international respondents noted that the attention given to transboundary and global issues is limited because of political considerations as well as timing and funding constraints. Although these issues may not be pertinent for every project, in some cases they can be; however, because of different “political” or “administrative” boundaries related to a project, these issues may **go** unaddressed, even though pollution and resultant impacts are not governed by these defined boundaries.

In conclusion, the questionnaire results showed that there is insufficient attention given **to CIA** in the **EIA** process relative to documentation, several technical or substantive matters, and the consideration of transboundary/global issues. Most respondents did **note** an increasing tendency to address CIs in more detail; however, because of practical constraints related to time, money, lack of expertise, and lack of coordination between governmental entities, CIA still does not receive the attention it should for effective project planning and decision making.

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