

CUMULATIVE EFFECTS ASSESSMENT IN ENVIRONMENTAL ASSESSMENT

Introduction

A conventional project and site-specific approach to environmental assessment has its limitations when it comes to assessing potential cumulative effects on environmental resources. This is because the impact of a particular project on an environmental resource may be considered insignificant when assessed in isolation, but may be significant when evaluated in the context of the combined effect of all past, present, and reasonably foreseeable future activities that may have or have had an impact on the resources in question. Cumulative impact assessment also provides valuable and important inputs as an element of SEA, particularly in monitoring of environmental sustainability impacts during CSP preparation and annual monitoring reviews. For these reasons, the explicit assessment of cumulative effects is now considered desirable in environmental assessment practice.

Cumulative effects generally refer to impacts that are additive or interactive (synergistic) in nature and result from multiple activities over time, including the project being assessed. The US Council on Environmental Quality defines cumulative effects as "the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." Cumulative effects

- (i) are caused by the aggregate of past, present, and future actions;
- (ii) are the total effect, including both direct and indirect effects, on a given resource, ecosystem, and human community of all actions taken, no matter who has taken the actions;
- (iii) need to be analyzed in terms of the specific resource, ecosystem, and human community being affected;
- (iv) cannot be practically analyzed beyond a reasonable boundary; the list of environmental effects must focus on those that are meaningful;
- (v) rarely correspond to political or administrative boundaries;
- (vi) may result from the accumulation of similar effects or the synergistic interaction of different effects;
- (vii) may last for many years beyond the life of the project that caused the effects; and
- (viii) should be assessed in terms of the capacity of the affected resource, ecosystem, and/or human community to accommodate additional effects.

Cumulative Effects and the Environmental Assessment Process

The process of analyzing cumulative effects is an enhancement of the traditional environmental assessment components: (i) scoping, (ii) describing the affected environment, and (iii) determining the environmental consequences. Generally, it is also critical to incorporate cumulative effects analysis into the development of alternatives for an environmental assessment, since it is only by reevaluating and modifying alternatives in the light of the projected cumulative effects that adverse consequences can be effectively avoided or minimized.

In many ways, scoping is the key to analyzing cumulative effects as it provides the best opportunity for identifying important cumulative impact assessment issues, setting appropriate boundaries for analysis, and identifying relevant past, present, and future actions. By evaluating resource impact zones and the life cycle of effects, rather than projects, the boundaries of cumulative impact assessment can be properly defined. Scoping can also facilitate the interagency cooperation needed to identify agency plans and other actions whose effects may overlap with those of the proposed action.

Determining the cumulative environmental consequences of an action requires delineating the cause-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern. The successful analysis of cumulative effects ultimately depends on the careful application of individual methods, techniques, and tools to the environmental assessment. The unique requirements of cumulative impact assessment (i.e., focus on resource sustainability, expanded geographic and time boundaries) must be addressed by developing an appropriate conceptual model using a suite of primary methods: questionnaires, interviews, and panels; checklists; matrices; networks and systems diagrams; modeling; trends analysis; and overlay mapping and geographic information systems.

In most cases, it will be beyond the scope of an environmental assessment to include a full-fledged cumulative impact assessment. However, it is important that environmental assessment, where appropriate, includes a preliminary assessment of the potential for cumulative effects and specific recommendations on the need for, and the conduct of, a cumulative impact assessment. The key issues in considering a cumulative impact assessment relate to defining appropriate analytical boundaries in time and space, identifying and predicting future resource use and impacts, and evaluating the significance of cumulative effects that are predicted to take place. The spatial boundaries are best defined flexibly to allow adjustments during the assessment process as the nature of linkages becomes better defined. The setting of temporal boundaries will be largely a function of data availability as well as the levels of uncertainty and confidence in prediction. A concern is to determine the minimum data requirements that will allow defensible and robust impact predictions. The criteria for judging significance of cumulative effects are not different from those for other types of environmental assessment, but threshold effects and irreversible changes in the use of critical resources will generally be key concerns.