Accelerating NEPA Decision Making (Newsletter)*

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The National Environmental Policy Act (NEPA), CEQ Guidelines, and lead agency implementation handbooks specify what is to be done, but not how to produce a technically sound and legally defensible environmental impact assessment. The Government Accountability Office report to Congress on how the BLM and Forest Service process mining NEPA documents listed insufficient data and inadequate data analyses among the major reasons for delays and increased costs. Regulatory agencies, regulated industries, and the public benefit from use of advanced data analytic tools that ensure consistency, predictability, and timely processing of NEPA documents. These tools directly address GAO critical issues of sufficient data and analytic suitability and robustness.

Insufficient data concerns are resolved by collecting physical, chemical, and biological variables at the same time and location. Locations and frequency depend on the environmental concerns specific to each project. Abundant data allow analyses that make decisions easier and better justified; the costs are recovered by completing the NEPA process more quickly.

Characterizing existing environments requires more than ranges and average values. Quantifying variability with seasonal and spatial patterns provides insights into ecosystem dynamics. Regression and principal components analysis quantify relationships between explanatory and response variables (numerically and visually) reveal relationships of explanatory variables in time and space.

Results of existing ecosystem characterizations can classify the project environment by its similarity to other projects; familiarity of past and current projects provide regulators with valuable insights. Also, knowledge from similar projects can be used with Bayesian statistical models to support predictions of future conditions and increases insights into cause-and-effect relationships of explanatory and response variables. Bayesian models can also address cumulative impact concerns more quantitatively than do other approaches.

Environmental data are rarely collected at regular intervals. Dry stream channels, site access blocked by deep snow, and similar constraints result in

variable time between data collections. This variability cannot be handled by statistical time series models developed for financial and public data. Applying appropriate time series models to baseline and compliance data produce objective quantification of temporal variability of variables of interest and support forecasting under different alternative scenarios.

Statistical characterization supports comparison of each alternative's future environment. Mixed effects models incorporate named variables (e.g., season, size, site ID) with measured variables (e.g., stream flow, temperature, environmental chemistry, species abundances and locations). This gives regulators technically sound and legally defensible justification for their decision and assures that each alternative is equally evaluated.

Quantifying inherent variability and relationships among physical, chemical, and biological variables is the basis for making sound decisions while allowing future data to objectively determine if planned methods to avoid, minimize, or mitigate potential adverse impacts are effective.

We all have adapted to technological changes in writing (from manual to electric typewriters, to dedicated word processors, to microcomputers), in communications (rotary dial telephones to push buttons phones, fax machines, overnight delivery of physical documents, e-mail, cell phones), and navigating in our vehicles (paper maps to GPS receivers that talk to us). There is no reason to not take advantage of advanced statistical models appropriate for environmental data to better inform planning and permitting decisions, particularly when the situation is controversial, sensitive, and likely to result in an appeal or lawsuit.

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