

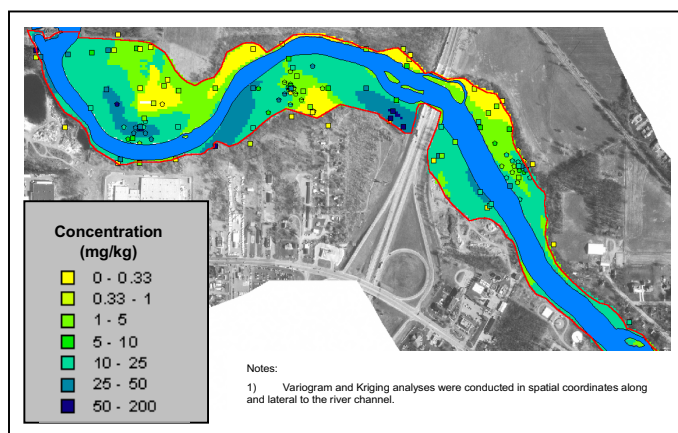
Environmental Statistics

Technical Note

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Geostatistical Inferences at Regulatory Decision Scale

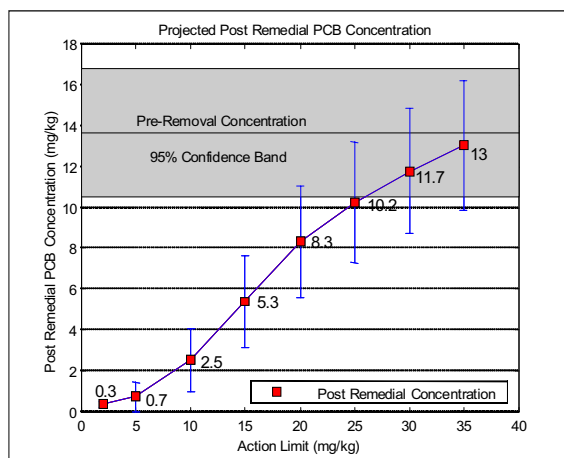
Although geostatistical methods are increasingly well known among environmental scientists, regulatory decisions and remedial investigations often fail to adequately consider uncertainty in the delineation of contaminant deposits. At times uncertainty may be estimated using point kriging, however, standard software methods apply to interpolated concentrations at scales that are much smaller than typical "exposure units". Commonly available geostatistical methods often do not provide any obvious means to evaluate the probability of success of remedial decisions.



Geographical information systems (GIS) software has increasingly been used to manipulate deterministic estimates of contaminant concentration, mass and volume to project performance of remedial alternatives at more meaningful exposure unit scales. Although these estimates are at a more meaningful scale, these deterministic methods disregard uncertainty in the spatial distribution of contaminant deposits, resulting in overly optimistic projections of remedial performance.

Less widely known geostatistical methods such as global block kriging and conditional simulation can be used to project remedial performance at the exposure-unit scale while providing direct estimates of the uncertainty in those projections.

Typical GIS analyses provide maps of contaminant concentration, and commonly available point kriging algorithms provide estimates of error in interpolated concentration. Global block kriging and conditional simulation methods provide decision makers with solid quantitative information such as the chart below which integrates spatial data to project the likelihood that particular action limits or cleanup strategies would produce desired remedial goals..



For more information or a reprint of the recent poster presented at the 2001 annual meeting of the Society of Environmental Toxicology and Chemistry contact John Kern at KERN Statistical Services, Inc..



415 NW Robert Pullman, WA
Tel: (509) 339-2489 Fax: (509) 339-2490

The *Environmental Statistics Technical Note* is intended to provide engineers and scientists with current information on statistical issues in the environmental sciences. For additional information contact www.KernStat.com or jkern@KernStat.com.