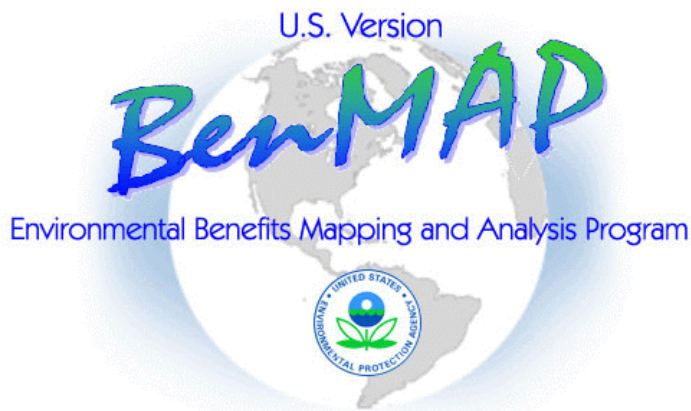


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BenMAP Fact Sheet

The United States Environmental Protection Agency's (US EPA) Office of Air has developed a state-of-the-art environmental and health impacts and benefits assessment model called BenMAP, the Environmental Benefits Mapping and Analysis Program. BenMAP is the US EPA's premier tool for estimating benefits associated with air pollution reduction strategies, and has recently been used in evaluating US EPA's Clean Air Non-Road Diesel Rule and the proposed Clean Air Interstate Rule. BenMAP runs on most Windows© based computers, and is publically available with a request to hubbell.bryan@epa.gov. BenMAP has recently undergone peer review and EPA is developing a revised version which incorporates responses to a number of peer review comments as well as other model enhancements. BenMAP currently estimates benefits from changes in particulate matter and ozone concentrations, but can be used for other pollutants as well.

BenMAP can be used for a variety of purposes, including:

- Generation of population/community level ambient pollution exposure maps;
- Comparison of benefits across regulatory options;
- Estimating health impacts and costs of existing air pollution concentrations;
- Estimating health benefits of alternative ambient air quality standards;
- Performing sensitivity analyses of health or valuation functions, or of other inputs; and
- Screening analyses

The key elements of BenMAP are 1) calculation of community-level population exposures to air pollution, 2) generation of incidence estimates for selected health effects, 3) pooling of incidence results from individual concentration-response functions, 4) valuation and aggregation of results, and 5) generation of maps and reports.

BenMAP combines air pollution monitoring data, air quality modeling data, census data, and population projections to calculate a population's potential exposure to ambient air pollution. Using these different types of data BenMAP can estimate population exposure for any particular

year of interest. Typically, users specify baseline and control air quality levels, and BenMAP estimates the change in population exposure. Given this change in population exposure, BenMAP calculates the associated change in health effect incidence using health impact functions derived from the epidemiological literature and pooling methods specified by the user. BenMAP then allows the user to place an economic value on these incidences using a wide range of valuation approaches from the economic literature. BenMAP can provide both the mean and distribution of benefits. BenMAP allows the user a wide degree of flexibility when conducting an analysis and reporting the results.

BenMAP is able to do the following:

- Spatially interpolate air quality data using a variety of methods including Kriging and Voronoi Neighbor Averaging. A unique feature of BenMAP is that it allows the user to use monitoring data, modeling data, or both, when interpolating;
- Estimate U.S. population to year 2025 based on county-level projections and 2000 Census block level data for over 250 age/race/sex subgroups;
- Estimate health effect incidence based on hundreds of supplied concentration-response functions or user-defined C-R functions;
- Estimate the economic value of avoided incidence based on hundreds of health effect-specific unit values, including both willingness-to-pay and cost-of-illness functions;
- Account for within- and across-study variability when estimating health effect incidence using pooling methods such as random/fixed effects weighting, averaging, and subjective weighting;
- Generate uncertainty distributions around incidence changes and valuation estimates using Monte Carlo methods;
- Generate maps, including absolute and change maps of future-year air quality and spatial occurrence of incidence changes;
- Quickly assess ““What if?”” scenarios based on user-defined reductions in monitored air quality levels.

BenMAP is a new and extremely powerful tool. It is a key component in EPA's drive to produce fast, policy-relevant analyses for decision-makers. Version 2.1, due to be released in Fall 2004, will add a number of new features, including an improved user interface; the ability to manage multiple databases of populations, health incidence rates, and air quality data; printing of reports and maps; estimation of benefits of visibility improvements; treatment of latency/cessation lags, adjustments to WTP estimates for income growth, addition of custom air quality metrics, enhanced portability of databases, aggregation of results for multiple pollutants, online help, and more. BenMAP version 2.1 will also allow for regional and international analyses by allowing users to load in custom population data, health effect incidence rates, impact functions, and valuation data.