DOCUMENT RESUME

ED 352 416 TM 019 346

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TITLE Evaluating Major Program Thrusts: A Conceptual Framework of Evaluation Considerations and a Case Study of Synthesizing Evidence from a National Reporting System.
INSTITUTION Louisiana State Univ., Baton Rouge. Cooperative Extension Service.
PUB DATE Nov 92
NOTE 11p.; Paper presented at the Annual Meeting of the American Evaluation Association (Seattle, WA, November 5-7, 1992).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Case Studies; Conservation (Environment); Data Collection; Environmental Standards; Evaluation Methods; *Groundwater; *National Programs; *Program Evaluation; Research Reports; State Programs; *Synthesis; Water Pollution; *Water Quality
IDENTIFIERS Cooperative Extension Service; National Water Quality Initiative; Water Quality Analysis

ABSTRACT

The analytical process used in building a compendium of examples of accomplishments by the National Water Quality Initiative (NWQI) of the Cooperative Extension System is presented and discussed. Lessons learned are cited, and recommendations for future efforts to synthesize evidence on major program thrusts are made. The NWQI is focused on protecting the quality of the nation's groundwater and surface water through encouraging voluntary actions by farmers, ranchers, householders, and the general public. It has been reported that approximately 650 full-time equivalents of professional extension resources have been allocated annually (1989 through 1990) to the initiative. Statistical information in fiscal year 1989 and 1990 reports was analyzed and synthesized to compile summary tables for all states and detailed tables for each state. In addition to this quantitative data, qualitative data from narrative portions of the reports were content-analyzed and summarized. Limitations in the reporting system and in the water quality reports were identified. The following types of indicators were selected to be tracked in the future: (1) rates of pollution; (2) rates of use of potential contributors to pollution; (3) extension-promoted practices to reduce potential contributions to pollution; and (4) extension strategy and activities to induce or accelerate adoption of such practices. One figure illustrates program components, and one table lists the planned indicators. (SLD)

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EVALUATING MAJOR PROGRAM THRUSTS: A CONCEPTUAL FRAMEWORK OF EVALUATION CONSIDERATIONS AND A CASE STUDY OF SYNTHESIZING EVIDENCE FROM A NATIONAL REPORTING SYSTEM

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Paper presented to the Extension Education Evaluation Topical Interest Group of the American Evaluation Association Annual Conference, Seattle, Washington, November 7, 1992.

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Program Plausibility

The construction of a plausible and sensible model of how a program is supposed to work is a prerequisite to sound programming. Bickham (1987) equates program modeling with program theory in evaluation. According to Wholey (1987), construction of the program model involves identification of resources, activities and outcomes of a program and the causal assumptions that connect these. Assessing a program to see if it follows a defined logic provides evaluators with evidence that a plausible program exists.

As programs are planned and undertaken to achieve desired objectives, the sequence of events and the underlying activities which would lead to the accomplishment of these objectives often are not laid out as a specific design. Thus, even if the desired objectives are achieved, it is questionable whether the achievement resulted from the program. Ensuring that a plausible program exists lends confidence to a decision to evaluate the results of the program.

Program plausibility and evaluability is a legitimate concern for evaluators. This concern is magnified in the case of programs which are broad-scoped and permit program deliverers and/or partners considerable flexibility in program planning, implementation, evaluation and reporting.

Cooperative Extension System Programs

A prime example of the concern for program plausibility and evaluability is programming in the nationwide Cooperative Extension System (CES), a three-way partnership of federal, state and local entities, focused on needs and issues of society and based in the research-teaching complex of state and territorial land grant colleges. In comparison to programs of straight-line agencies, CES programs are diverse and generally not governed by specific national objectives and goals. This diversification is a major strength of extension education but presents significant obstacles to national evaluation/reporting where aggregation of data and similarity of objectives are being sought (Heckel, 1981). Particularly susceptible are major national and state program thrusts which specify broad parameters and allow a great deal of programming flexibility to account for state and local conditions, respectively.

As a specific example of lack of program plausibility, assessments of water quality program efforts in three states – Maryland (1989), Virginia (1990) and Louisiana (1990) – pointed up what Wholey (1987) identifies as two major problems inhibiting the use of program evaluation by key policy makers, managers and staff. These were (a) lack of definition of the problems to be addressed, the program intervention, the expected outcomes of the program, or the expected impact on the problems to be addressed, and (b) lack of a clear logic of testable assumptions linking expenditure of program resources, the implementation of the program, and the resulting impact. Having discovered that there was no plausible program in place, the staff in these states constructed program logic models, turning the evaluation exercise into a program design effort.

At the federal level, the current connotation of the term major program thrust is a national initiative or, alternatively, a base program. National initiatives are the CES's commitment to respond to important societal problems of broad national concern with additional resources and significantly increased effort to achieve a major impact. Base programs are the major educational efforts central to the mission of the CES and common to most Extension units (Extension Service, USDA and Extension Committee on Organization and Policy, 1990). National initiatives and base programs provide a programmatic framework and direction to state Extension Services as they try to integrate national needs and issues with state and local needs. Currently, seven national initiatives and six national base programs comprise the national extension program. Additionally, in response to specific needs, special funding is provided for programs.

At the state level, major program thrusts usually include some or all of the federal program thrusts and may also cover unique and specific programs significant to states.

Usually, major program thrusts in the CES are broad in scope, technically and programmatically complex, may involve several disciplines, potentially be planned and implemented at a number of program sites across the country for the benefit of multiple audiences, and at these program sites, encompass a breadth and depth of program efforts tailored to site-specific needs. This great diversity of program environments and characteristics have, over the years, made it difficult for CES program leaders to evaluate and/or report program outcomes which would satisfy legislative and public accountability needs. The task is made easier when major program thrusts are centrally directed, coordinated and monitored, such that evaluation and/or reporting systems procedures can be standardized. This type of evaluation planning gives program coordinators/evaluators a degree of control over evaluation/reporting methodology, enables aggregation of quantitative outcome data from multiple program sites and lends to the observed results and conclusions drawn some measure of confidence and generalizability. Another viable option which provides control to program evaluators is national and/or state impact studies focusing on specific programs.

Typically, CES programs, except for those that are specially funded, do not have a prescribed evaluation/reporting system to report program outcome. State Cooperative Extension Services have reporting formats established for counties to report to state programs, and the Extension Service-USDA (ES-USDA, the federal partner) suggests formats for states to follow in reporting on national programs. Over the last eight years (1983-91), ES-USDA prescribed to state Extension Services a reporting procedure which included (a) a narrative description of accomplishments and (b) a quantitative expression of impact or outcome using key indicators. States reported on programs significant to them. Therefore, a variety of programs were reported on and, even with programs common to a number of states, there was considerable diversity of key program indicators and measurement units. It was only in a few national impact studies of significant programs that ES could provide a description of the programs as they were conducted across the country and program impacts that occurred as a result of the effort.

Synthesizing State Reports on CES's National Water Quality Initiative

The purpose of this paper is twofold: (1) to present and discuss the analytical process used in building a compendium of examples of accomplishments by CES's National Water Quality Initiative, as reported during FY 1989-91, and (2) to cite lessons learned and make recommendations which could be useful in shaping future efforts to synthesize evidence on major program thrusts.

CES's National Initiative in Water Quality is focused on protecting the quality of the nation's ground water and surface water. Launched in 1988, the Initiative is an extensive, nationwide effort to encourage voluntary actions by farmers, ranchers, householders, and the general public. This extensive, continuing, broad-scoped, focused effort involves statewide water quality programming by every state/territorial Extension Service in the country. It has been reported that approximately 650 Full-time Equivalents of professional Extension resources have been allocated annually to the initiative.

Improved Program Support (IPS) funds to strengthen the capacity of State Extension Services to deliver water quality programs were provided annually, from FY 1989 through FY 1991. The initiative has five program components, namely Nutrient Management, Pesticide Management, Animal Waste Management, Drinking Water/Wellhead Protection and Public Policy Education.

The goal of the Initiative is to prevent/reduce the impairment of water through judicious use of crop nutrients, pesticides, and animal wastes in agricultural operations; protection of drinking water supplies; and collective actions by citizens at the local level to sustain the quality of surface and groundwater resources. Collection of direct evidence of protection/improvement of water quality generally requires extensive resources and long time periods. Therefore, intermediate indicators are used in reporting examples of water quality program accomplishments. These indicators are represented in Figure 1.

ES-USDA prescribed a format in July 1989 for state/territory Extension Services to use in providing annual reports on their water quality programs. The format was designed to obtain statistical and narrative information on program processes and accomplishments. Statistical information was requested on specific practices in the fine program components. These practices are shown in Table 1. Besides these quantitative impact measures, narrative accounts of program delivery were to be provided in annual reports.

Electronic copies of annual reports when received by ES-USDA were entered into an annual accomplishments data base. A search-retrieval program was used to retrieve and print hard copies of the reports for review and analysis.

Quantitative data analysis. Statistical information in the FY 1989 and 90 reports was analyzed and synthesized according to the steps presented below. Information for 1991 was not included in the analysis because these data were unavailable at the time the analysis was done.

1. Five data categories were established: nutrient/animal waste management, drinking water/wellhead protection, staff training, educational methods and materials, and educational contacts. Pesticide management was omitted because virtually no information was found in the reports on the prescribed practices.

2. For each data category, a set of quantitative data items was identified; the data items were either prescribed by ES-USDA or empirically developed. For example, nutrient/animal waste management had 10 data items corresponding to the practices prescribed in the ES-USDA guidelines format. Some of these items and measurement units were:

soil testing - number of tests, number of acres
soil nitrate testing - number of tests, number of acres
nutrient management plans - number of plans, number of acres

Appropriate data items in the categories of staff training, educational methods and materials, and educational contacts were constructed as the reports were reviewed. For example, data items under educational methods and materials included on-farm demonstrations and tests; workshops, seminars, conferences; audiovisual materials (videotapes, slide tapes, exhibits); etc. Educational contacts data items included different types of audiences such as farmers, householders, youth, etc.

3. A dBase file was created for the designated data items, numbers entered, and detailed reports retrieved for each state.

4. Summary tables for all states and detailed tables for each state comparing 1989 and 1990 information by data categories and data items were compiled.

Qualitative data analysis. Narrative information retrieved from the 1989-91 reports was content analyzed to identify and describe examples of progress and accomplishments. This analysis was clustered around the quantitative data items in the several data categories, and the information entered into WordPerfect files. The information was summarized as needed, in order to report and highlight significant findings.

Limitations of the Reporting System

There are inherent limitations in utilizing data from the non-directive reporting system that CES had during the period of analysis, 1989-1991.

1. The validity, and consequently, the generalizability of quantitative data is affected by incomplete data and/or estimates.

2. Quantitative data items (names and measurement units) in reports that do not correspond exactly with the labels given to data items established for summarization purposes are subject to the interpretations and judgments of individual data analysts.

3. Content analysis of narrative qualitative data may be affected by data analyst bias for inclusion in summary reports as examples of educational impacts.

Limitations of Water Quality Reports

Limitations were found in the water quality reports submitted by states. These limitations led to the following conditions and/or assumptions which affected the compendium of examples of accomplishments:

1. Reports from only 31 states in 1989, and from only 44 states and the District of Columbia in each of 1990 and 1991 were found to be present in the respective electronic databases.

2. The quantitative data on Extension program impacts requested by ES-USDA were missing for most pesticide management practices and for some nutrient management practices.

3. If state Extension Services did not report relevant data in a category/item, it was assumed that one or more of the following conditions existed: (a) the state Extension Service did not conduct programs in the category/item; (b) the state did not have a viable system for collecting data for reporting in response to the ES-USDA guidelines; (c) the state did not gather the particular data sought; and/or (d) the state chose not to include the requested data in its reports to ES-USDA.

4. Different measures were used to report numerical data. For example, an indicator like soil nitrate testing was variably reported as number of tests, number of producers, number of crop acres affected, or a combination thereof. Depending on the range of possibilities, aggregation across states reporting on a particular item was virtually impossible. It was also difficult to interpret this kind of disparate information.

5. At times, only general statements were made and actual quantities of the impact measures were not reported. For example, a statement such as "354 producers in 35 counties reduced rates of nitrogen fertilizer application" omitted the extent of reduced fertilizer application and, therefore, could not be included in the analysis.

In view of the above limitations, and learning from the experiences gained in synthesizing 1989-91 reports, ES-USDA's 1992-95 water quality planning and reporting system has been re-designed to acquire comparable data from all state Extension Services on predetermined impact indicators. When summarized, these may provide an indication of national program accomplishments.

Plans for Reporting Accomplishments of the National Water Quality Initiative, FY 1992-1995

The current 4-year Plan of Work of CES (FY 1992-1995) entails comprehensive, national or multi-state reporting of program plans and accomplishments of the National Water Quality Initiative. This is in contrast to the present state-by-state, selective reporting for FY 1989-1991. During FY 1992-1995, state Extension Services will report program plans and accomplishments within defined geographic areas where, currently or potentially, there is an unacceptable extent of water contamination which is being addressed through one or more of the 5 program components described above.

In the defined geographic areas, the following types of indicators will be tracked in regard to the 5 national program objectives: (a) rates of pollution (e.g., of domestic-use wells), (b) rates of use of potential contributors to pollution (e.g., pesticide application rates), (c) Extension-promoted practices to reduce potential contributions (e.g., recommended crop rotations), and (d) Extension strategy and activities to induce or accelerate adoption of such practices.

These four types of indicators have been chosen to represent and to encourage the development and implementation of a program logic for each of the five program components of the Water Quality Initiative.

As far as possible, common variables will be tracked across similar water quality programs implemented by state Extension Services addressing similar types of water quality problems. Indicator data supplied by the state Extension Services to Extension Service-USDA should allow for substantial cross-state analyses on numerous variables of interest to national policy makers, legislators, and Extension administrative and program leaders.

The intent of the new approach to reporting accomplishments described above is to more fully meet requirements for program accountability and strengthen program management of the national Extension Water Quality Initiative.

Implications and Recommendations

The ES Water Quality Team has made progress toward increasing the quality and useability of state/territory plans of work and accomplishment reports. Almost 80% of states/territories participated in multi-state audioconferences. A series of information sheets were distributed with positive results. Water Quality staff of the state Extension Services are found to be generally in agreement with and supportive of the national indicators selected.

The ES-USDA review of FY 1993 Plan of Work Updates is well underway. Conference calls have been held with several individual states to clarify data needs toward finalizing their POW Updates for FY 1993.

Despite these efforts, it is not yet apparent whether the new system for national planning and reporting will be successful. ES's new system cannot be successful unless state Extension Services are aware of its nature and basis for approval of federal funding of state Extension Service water quality programs.

In order to be successful, the new systems must reverse the track record of FY 1989-1991, which had severe limitations as noted above. In each of the years FY 1989-1991, ES received no Annual Report from several of the state Extension Services. Reports from the territories were not received.

Only about 100 statements of accomplishment could be gleaned, from the three years of reporting, for inclusion in a published compendium of examples of accomplishments. Of these, only about 50 were sufficiently complete – in narrative and/or quantitative description of accomplishments, and Extension's role in bringing them about – to merit inclusion in a publication (for external distribution) of selected examples of Extension Water Quality Initiative accomplishments. These 50 selected examples came from about one-half the state Extension Services. About one-quarter of the state Extension Services supplied most of the useable examples of program accomplishments. (The publications will be available for distribution in January 1993.)

About one-third of the state Extension Services have submitted their FY 1993 POW Updates. The ES Water Quality Team is expending a great deal of time on the process of reviewing submitted 1993 POWs. It has been found necessary to request one or more re-submissions from each state Extension Service prior to ES approval for federal funding. Indicator data of the POW Updates submitted thus far are often far from complete and often contain data of questionable face validity. This requires a considerable amount of negotiation and re- negotiation on the part of ES with the state Extension Service. Of course, there is a range of quality of reporting, with some state Extension Services' first submissions of POWs being close to adequate. Only a few states have included success stories and exemplary data in their submissions.

The great deal of time and attention given by the ES staff to education of the State Water Quality Coordinators regarding the planning and reporting systems, review of submitted POWs, and requests and repeated requests for corrected submissions, cannot overcome or compensate for lack of sufficient attention to POW and AR preparation by some of the state/territorial Extension Services.

ES should reinforce to State Extension directors, agriculture and natural resource leaders, and water quality coordinators that more needs to be done to operationalize the 1990 agreement between ECOP and ES-USDA. The agreement was that, in return for ES narrowing the focus of its requests, states would provide high quality reporting in response to the indicators that ES identifies.

ES should issue a policy pronouncement to state Extension Services that would serve to strengthen the notion that, when it comes to national plan of work and accomplishment report submissions, the image should be one of the Cooperative Extension System, not a "commonwealth of independent states." Such a policy pronouncement will serve as the "other side of the equation" to an effective ES program leader role in working with state counter-parts to build a national reporting system that provides for national accountability and improved national program management.

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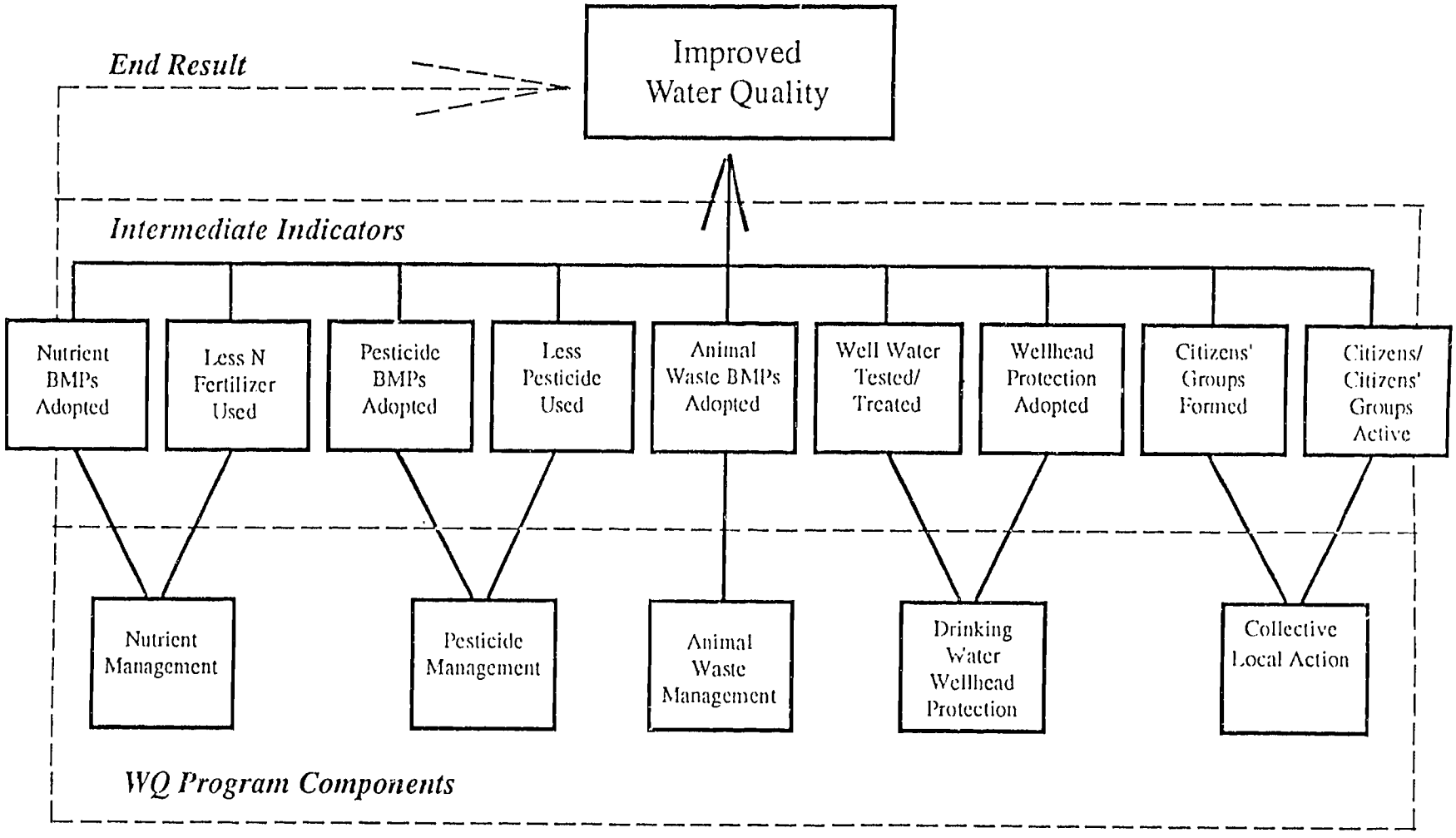

Figure 1. Extension's National Water Quality Initiative End Result and Intermediate Indicators of CES WQ Programs

Table 1. Indicators Prescribed by ES-USDA for Planning and Reporting Impact of National Water Quality Initiative, 1989-91

Nutrient Management (number of farms, number of acres, percent of total crop acres, crops)

- o Soil tests to determine fertilizer rates
- o Appropriate nutrient credits from animal wastes/crop residues
- o Storage and application of manure as a nutrient source
- o Manure testing for nutrients and spreader calibration
- o Recommended rates of nitrogen fertilizer application
- o Timing fertilizer application
- o Banding or injecting fertilizer into crop rows
- o Use of legume-based crop rotations
- o Use of irrigation scheduling
- o Net reductions/increases in application of nitrogen by crops(s) (pounds per acre/total tons)

Pesticide Management (number of farms, number of acres, percent of total crop acres, crops)

- o Use of scouting information to decide pesticide applications
- o Selecting pesticides on water quality risk
- o Selecting short half-life pesticides
- o Selecting low leachability pesticides
- o Pesticide applications on biological modeling
- o Selecting pest resistant crop varieties
- o Rotating crops to hinder pest establishment and survival
- o Tillage methods and/or planting dates to deny pest habitats
- o Timing pesticide applications to protect natural enemies of pests
- o Net reductions/increases in application of pesticides/active ingredients (pounds per acre/total tons)
- o Pesticide selections that minimize water quality risks

Drinking Water/Wellhead Protection

- o Number of wells tested for bacteria/nutrients/pesticides
- o Number of wells tested for the first time
- o Number of wells tested regularly on schedule
- o Number of domestic wells disinfected
- o Water treatment devices installed
- o New wells drilled/constructed and utilized
- o Wells closed due to contamination
- o Use of least toxic household products
- o Safe disposal of toxic household/farmstead wastes
- o Scheduled septage maintenance

Public Policy Education

- o New toxic/hazardous waste collection systems organized
- o County groundwater vulnerability maps prepared
- o Groundwater management districts established
- o Comprehensive solid waste policies adopted
- o Solid waste management programs improved
- o Policies/programs adopted/implemented to improve private waste disposal systems
- o Policies/programs adopted/implemented to improve community water systems
- o Landfill sitings and designs improved