Nutrient Management Regional Conference
March 13-14, 1996

Managing Nutrients to Prevent Pollution: Conference Summary and Recommendations for Action

Developed by the Nutrient Management Workgroup of the Chesapeake Bay Program Nutrient Subcommittee

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Introduction

This document summarizes ideas presented at the regional nutrient management conference "Managing Nutrients to Prevent Pollution" and brings forth recommendations for action. The two-day conference held on March 13-14, 1996 in Solomons, Maryland was sponsored by the Nutrient Management Workgroup under the Nutrient Subcommittee of the Chesapeake Bay Program and was administered by the Alliance for the Chesapeake Bay.

Under the 1987 Chesapeake Bay Agreement, the states of Maryland, Virginia, and Pennsylvania and the District of Columbia committed to reduce nutrient loads to the Chesapeake Bay by 40% by the year 2000. As a result, each jurisdiction is developing "tributary strategies" which outline the specific practices they will employ to achieve the nutrient reduction goal. Nutrient management, a pollution prevention practice that manages the timing, rate, and method of nutrient applications to the land, is included as a major component of the tributary strategies.

The conference was designed to encourage dialogue between planners, program managers, and the agricultural community on technical and policy issues surrounding nutrient management. It created an opportunity to learn about the latest nutrient research, consider new efforts to expand urban and agricultural programs, and discuss the role nutrient management will play in the meeting the Chesapeake Bay nutrient reduction goal. Plenary sessions provided an overview of nutrient management in relation to Chesapeake Bay Program concerns, policies, and strategies; various perspectives on nutrient management issues; and practical experiences implementing nutrient management on the farm. Concurrent sessions were held focusing on a balance of agriculture and urban, technical and policy nutrient management issues.

The conference featured strong attendance and participation from both the public and private sectors. Approximately 180 individuals participated, with representation from a broad range of public and private interests throughout the Bay watershed:

- Farmers and agricultural/agribusiness organizations such as Southern States Cooperative, Maryland Farm Bureau, Penn Ag Industries Association, and Delaware Maryland AgriBusiness Associations.
- Extension specialists and researchers from institutions such as Virginia Tech, Penn State, Delaware Valley College, St. Mary's College, and University of Maryland.
- Local agencies such as Carroll County Extension, Calvert Soil Conservation District, City of Baltimore Recreation and Parks, and Hampton Roads Sanitation District.
- State agencies such as Pennsylvania Department of Environmental Protection; Maryland Departments of Agriculture, Environment, and Natural Resources; Virginia Department of Conservation and Recreation; and Delaware Department of Agriculture.
- Federal government entities such as the Environmental Protection Agency, Natural Resources

Conservation Service, and U.S. Naval Academy.

- Fertilizer dealers, lawn care companies, and certified nutrient management planners and services such as Lawn Doctor of Glen Burnie, Nutrient Analytical Services Lab, Home and Garden Information Center, and Bio-Gro.
- Other private sector interests such as BFI Organics, Autrusa Compost Consulting, Royd Smith Realty, and Tysons Foods.

The opportunity for hearing different perspectives on issues surrounding nutrient management proved extremely beneficial and helped to reduce distrust and conflicts between various interests. The final discussion sessions provided an excellent forum for dialogue, coordination, and teamwork between public and private sectors, where participants identified specific issues that need to be addressed for future action.

This document provides recommendations by the Nutrient Management Workgroup as to how conference issues, concerns, and ideas may be addressed through future action within individual state and local nutrient management programs, as well as the Chesapeake Bay Program. Finally, this document provides a summary of the ideas collected from the six discussion sessions and attempts to categorize them into main subject areas. Many of the issues cut across various categories, and all the ideas should be considered within a holistic framework of nutrient management.

RECOMMENDATIONS FOR ACTION

Developed by the Nutrient Management Workgroup
of the Chesapeake Bay Program

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The following nine recommendations were developed by the Nutrient Management Workgroup of the Chesapeake Bay Program. Ideas presented by conference participants were analyzed by the workgroup and an action plan was formulated to address these issues. Under each of the nine items, a general recommendation is made describing the issue or need and how it should be addressed, followed by specific actions or steps that should be taken to incorporate these recommendations.

The workgroup will strive to ensure that as many recommendations as possible are incorporated into on-going and future activities of the Nutrient Subcommittee and the Chesapeake Bay Program, as well as state and local agencies and programs.

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1. Increase plan implementation by educating farmers on the value and benefits of Nutrient Management.

Clear, simple education should be provided for farmers to help them recognize the value and benefits of nutrient management planning. Educators need to be able to describe the impacts of nutrient management on the environment and how long it will take to produce observable results. Nutrient management plans developed by certified consultants should be implemented efficiently by farmers in order to reduce nutrient loads for agricultural lands. Nutrient management specialists and local government agencies providing technical assistance to the agricultural community should focus their efforts on "planting a seed" for future implementation through education.

Our goal should be to promote and increase efficient plan implementation by providing education and information to farmers. Jurisdictions are currently increasing farmers' awareness of nutrient management through educational activities such as field days, training sessions, cooperative extension programs, and formal technical training. The Nutrient Management Workgroup will continue its efforts to increase efficient implementation of nutrient management plans through exchange and promotion of successful education programs and curriculums.

2. Ensure that incentives are in place for Nutrient Management.

Incentives need to be developed and endorsed that will accelerate voluntary plan implementation by the farmer. Jurisdictions should consider supporting economic incentives such as tax credits or cost-sharing to encourage

landowners to implement nutrient management plans. In addition, non-monetary incentives such as simple and flexible plans, standardized maps between agencies where appropriate, and recognition for sound practices should be endorsed to make implementing plans easier and more rewarding. Efforts should be made to streamline the nutrient management process by reducing the required amount of time, effort, and paperwork for both those who write the plan and those who implement. Finally, incentives need to be pursued for nutrient management planners to ensure that adequate demand exists for both public and private sector planning. Current nutrient management programs lack adequate incentives for private consultants to write plans. This shortfall needs to be addressed to create an even playing field for private planners.

Maryland, Virginia, and Pennsylvania are offering free technical training and assistance to farmers and private sector individuals interested in nutrient management. The Chesapeake Bay Program provides cost-share funding for animal waste storage structures and other management practices with the presence of a written nutrient management plan. Under the nutrient management law in Pennsylvania, financial assistance will be made available for implementation of nutrient management plans in the form of loans, loan guarantees, and grants. In addition, the law provides technical and educational assistance to help farmers comply with requirements. The Nutrient Management Workgroup will continue to support specific incentives that will encourage both the writing and implementation of nutrient management plans, such as jurisdictional recognition programs, flexibility for plan formats, and coordination of nutrient management with other resource concerns (Total Resource Management).

Recognition of nutrient management efforts is provided through Virginia, Maryland, and Pennsylvania's certification programs. Reciprocal certification for nutrient management is being pursued between the three states, where reciprocity would minimize administrative burdens on applicants for certification and certifying agencies while assuring performance to respective standards and state regulations. The Nutrient Management Workgroup will continue to work on facilitating the certification process as much as possible and keeping the concerns of the private sector in mind while working within state-specific regulations.

3. Define the roles of the public and private sector and foster their cooperation in Nutrient Management planning.

Jurisdictions will need to develop a vision for the roles of the public and private sectors working together as a team in nutrient management. Current misconceptions and distrust between the public and private sectors, including both vendors and farmers, in agriculture and urban settings, need to be replaced with professional trust. Certified consultants from the private sector and government agencies need to continue working together in writing nutrient management plans. Transition of program outreach to the private sector certified consultants should be gradual and combined with sound continuing education and training, oversight, and spot checking for quality control of services provided by the public sector.

Certification programs have been developed by jurisdictions represented on the Nutrient Management Workgroup to certify the competence of both public and private sector individuals interested in writing nutrient management plans. The programs, which afford the private sector an opportunity for increased participation and training in nutrient

management planning, are up and running in Maryland and Virginia and are anticipated to start later this year in Pennsylvania. The workgroup will continue to pursue opportunities for dialogue and cooperation between public and private sectors through workshops, conferences, and specific nutrient management activities. The Implementation Committee of the Chesapeake Bay Program will be hearing various perspectives on the role of the private sector in Total Resource Management, which includes nutrient management, this October.

4. Establish adequate standards and accountability for Nutrient Management planners.

Suitable plan standards and criteria should be established and upheld for both public and private sectors to ensure the delivery of quality plans. Jurisdictions should provide organized training programs for planners that include basic training on nutrient management planning, plan content, interpretation of soil test results, and the basis for nutrient recommendations. Nutrient management programs should promote plans that are simple and understandable to the farmer, comprehensive in addressing all resource concerns, and coordinated with other conservation plans. Agencies should work together and share resource information as much as possible through actions such as using standardized field number references to create a uniform mapping base.

Plan definition, criteria, and standards for nutrient management were jointly developed and agreed upon by Pennsylvania, Maryland, and Virginia representatives on the Nutrient Management Workgroup. In addition, the workgroup established a Model Bay Area Nutrient Management Training and Certification Program to aid in the development of qualified nutrient management personnel by each jurisdiction. The model lays out criteria and core knowledge area components for Nutrient Management certification. Virginia, Maryland, and Pennsylvania have based their state certification programs on this model. Each jurisdiction will continue to use established criteria and standards in their continuing education programs that provide training for individuals desiring to write nutrient management plans.

5. Develop a tracking system for documenting plan implementation.

Tracking systems provide jurisdictions with vital tools to evaluate and assess their nutrient management programs. Current documentation for nutrient management focuses on the number of plans written. A regional tracking system should be developed that accurately records the level of plans implemented. Jurisdictions must work with the Bay Program Office to identify what types of information are needed for data collection. The tracking system should be able to track information where current gaps exist, such as accounting for both government and non-government plans as well as changes in operators on rented land. Landowner concerns about privacy and sensitivity of information should also be addressed.

The Nutrient Management Workgroup is working in conjunction with Chesapeake Bay Program staff to develop a report on BMP tracking. The report will outline how nutrient management progress is currently being tracked by each state. This information will be analyzed by the workgroup in light of Bay Program needs to recommend

changes to the tracking systems. Data-gathering efforts will be coordinated with modeling needs so that the tracking system may be linked to the Chesapeake Bay Program Watershed model.

6. Develop indicators of Nutrient Management impacts in the Ecosystem.

In order to promote nutrient management, we need to be able to demonstrate its environmental impacts on water quality and living resources. The agricultural community and the public should be provided with documentation on the impact nutrient management practices have made and when these visible improvements can be expected to show up in the ecosystem. Coordination of land and water quality monitoring and synthesis of research on water quality and nutrient management practices should be used to assess the complex relationship between nutrient management and water quality. We need to be able to quantify the nitrogen and phosphorous reductions resulting from nutrient management implementation. This will assist jurisdictions in deciding whether nutrient management can be cranked up to be the silver bullet for tributary strategies and if it can deliver the nutrient reductions projected by their tributary plans.

The Nutrient Management Workgroup will work toward a firmer scientific basis for demonstrating environmental impacts of nutrient management and will continue development of a series of environmental indicators. The workgroup has submitted as their priority research need a request for quantifying nutrient reductions resulting from nutrient management practices. If selected for funding by the Nutrient Subcommittee, the project would begin in 1997. In addition, the workgroup will encourage the use of monitoring and modeling as tools to assess the role and progress of nutrient management in meeting the Chesapeake Bay Program 40% nutrient reduction goal.

7. Develop markets for exporting excess organic nutrients.

The existing small scale marketing network for transportation of excess animal waste from highly concentrated livestock and poultry operations to other utilization areas is inadequate. An integrated management program for all nutrient sources in each county and watershed should be developed to identify crop nutrient needs, available organic sources, supplemental nutrient needs, and/or the excess wastes to be exported. In addition, tracking systems need to be instituted for manure markets that include private brokers who handle excess manure and show locations of excesses and deficits. Efforts should be coupled with farmer education that includes treating excess manure as a resource rather than a problem.

The Nutrient Management Workgroup will encourage developing ways for better information exchange on manure availability and sharing this information with localities and farmers. In addition, they will explore innovative options for facilities aiding in the transport of manure between supply and demand, such as regional manure storage "bank" facilities. Successful initiatives and technologies will be exchanged and promoted between jurisdictions, such as matching programs or manure brokerage programs that involve the matching and transfer of manure from points of excess to points of need within counties or regions.

8. Promote Nutrient Management in urban and suburban areas through concentrated efforts and partnerships with various stakeholders.

Policy and program managers need to work together with technical specialists to define and articulate what practices constitute urban nutrient management. Many efforts are already underway to market urban nutrient management. These practices should be recognized and partnerships formed with key groups who are implementing urban nutrient management to avoid duplication of efforts. Existing conservation and education programs should incorporate urban nutrient management outreach into their agendas. Potential stakeholders for nutrient management implementation such as homeowners, public and private grounds managers, lawn care services, and local governments should be targeted for education and training.

The development of a comprehensive urban nutrient management program in the Bay region is important in meeting the projected nutrient reduction goals. Jurisdictions should formulate their long-term plans and strategies for diverse audiences in the urban landscape. The program should include voluntary participation by the private sector in all phases of the program and address their educational needs.

Jurisdictions have already engaged in numerous efforts to form partnerships with public and private urban stakeholders in promoting urban nutrient management. Maryland has formed an advisory group of state and county representatives to define which practices qualify as urban nutrient management, identify potential sources of nutrients from landscaped areas, and discuss potential controls. In addition, they have sponsored nutrient management training for public grounds targeting lawn care services, grounds keepers for parks and golf courses, and homeowners. Virginia hosted similar workshops on turf and landscape management for lawn service providers, and has developed a recognition program for "nutrient management aware" fertilizer retailers. Pennsylvania has sponsored brochures, public announcements, and a citizen's workshop demonstrating proper soil testing, home lawn care, and Integrated Pest Management (IPM). Finally, the District of Columbia is emphasizing the training and use of nutrient management and IPM in D.C. community gardens and on public agency grounds.

The Nutrient Management Workgroup will be developing individual jurisdiction strategies for urban nutrient management and consolidating them into a comprehensive Chesapeake Bay urban nutrient management action plan. The workgroup will continue to pursue partnerships with the private sector and to include them in the strategy development process.

9. Identify information gaps and promote research in Agricultural and Urban Nutrient Management.

Nutrient management programs will remain credible and viable only as long as they continue to refine their knowledge by addressing informational or research gaps. Several key research needs have been identified and should be pursued in the near future as priorities for funding. Researchers should examine the balance of nutrient inputs and outputs at the farm level to determine acceptable limits and standards of performance which can be explained and taught to farmers. The lag in time and distance for delivery of nutrient reductions from nutrient

management activities to environmental response and observable water quality improvements should be included in studies. In addition, nutrient contributions from urban and suburban areas need to be quantified. Research should explore less common practices for reducing nutrients such as management practices focusing on animal nutrition or alternatives to nitrogen-based de-icers.

State agencies with technical assistance from academic institutions should continue to refine nutrient management planning criteria and application of advanced technologies in management of nutrient sources. Research-based information may include more detailed information on mineralization rates, phosphorous-based nutrient recommendations in the areas with high levels of phosphorous concentrations, and the use of precision agriculture and yield monitoring in crop nutrient recommendations.

The Nutrient Subcommittee has sponsored several research projects on nutrient management issues under the recommendation of the Nutrient Management Workgroup. These include:

- Mineralization and Availability of Nitrogen in Organic Waste-Amended Mid-Atlantic Soils. Gregory K. Evanylo, Virginia Polytechnic Institute and State University.
- The Relationship between Soil Test Phosphorous Level and the Concentration of Dissolved and Potentially Transportable Phosphorous in Field Drainage Water. Frank J. Coale, University of Maryland.
- Nitrogen Leaching from Established Turf. D.R. Chalmers et al.,Virginia Polytechnic Institute and State University.

In addition, the NSC Request for Proposals for 1997 Research includes topics on assessing the impacts of nitrogen-based de-icers on water quality and evaluating various animal feeding and nutrition practices on the nutrient content of manure. The Nutrient Management Workgroup will assure that findings and conclusions from all sponsored research are disseminated to the jurisdictions in a timely manner so that they may be applied to current nutrient management efforts. In addition, they will continue to identify research needs and studies required for improving nutrient recommendations and assessments of program impacts on water quality.

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The Nutrient Management Workgroup is dedicated to addressing as many of these recommendations as possible and has already moved ahead in many areas. However, practical limitations such as budgets, time, and resources may prohibit the workgroup from acting upon all the items immediately. The workgroup will review its progress toward recommended actions at the end of 1996 and will revisit any outstanding items for their 1997 Workplan. It should be noted that this set of recommendations may not include all the activities planned in individual jurisdictions that may address issues contained within the document.

To learn more about the Nutrient Management Workgroup and its activities in the Chesapeake Bay Program, please refer to Chesapeake Bay Area Nutrient Management Programs: An Overview, March 1996, EPA Chesapeake Bay Program. You may obtain this report and other information by calling the Chesapeake Bay Program Office at 1-800-YOURBAY.

Discussion Sessions: Topics and Questions

Participants signed up for one of six discussion sessions focused on various issues in urban and agricultural nutrient management. Groups discussed specific questions related to their topics and brain stormed various solutions and ideas in response. Following is a list of discussion session topics and questions. The summary of ideas generated from these discussions can be found on pages 11-15.

Session 1: Private Sector Involvement in Nutrient Management Planning

Questions:

1. How will private consultants remain competitive in providing technical assistance?
2. What are the barriers to additional involvement of private sector consultants?
3. How can we deal with the perception that private consultants connected with the fertilizer industry may not write the same kind of plan as the university nutrient management specialist?
4. What opportunities are there for private sector involvement in manure marketing?

Session 2: Plan Implementation by Farmers

Questions:

1. What incentives would help to accelerate voluntary nutrient management implementation by farmers?
2. How can we enhance the delivery and acceptance of nutrient management planning by farmers? Is it selling itself or do we need more incentives?
3. What is the extent of farmers' awareness of the detailed management plans written by certified consultants?
4. Does enhancement of the farmer's knowledge (through organized training programs) of plan recommendations, soil test interpretation, etc. ensure implementation of the plans?
5. How do we document implementation of nutrient management plans?

Session 3: The Role of Nutrient Management in Meeting 40% N & P Reduction Goals

Questions:

1. How can we improve "information management" related to the nutrient management program.....
   A) tracking Plan Implementation ?
   B) dealing with landowner concerns about privacy and sensitivity of information?
   C) creating a database that includes landowners who do not participate in government programs?
2. Can the existing nutrient management "infrastructure" deliver the nutrient reductions being projected in the tributary plans?
3. What issues does the Bay Program need to address regarding nutrient management and the year 2000 goal?

Session 4: Research Needs for Urban and Agricultural Nutrient Management

Questions:

1. Do we have an adequate technical/scientific basis for efficiency rates assigned to various nutrient management practices? Are there specific research needs related to efficiency and effectiveness?
2. How important are groundwater and delivery lag time issues with relationship to the year 2000 40% reduction target?
3. What recommendations would you make for increased or improved monitoring in either agricultural or urban settings?
4. Are there opportunities for expanded private sector involvement in research? Are there opportunities for more effective coordination among academic and governmental research efforts?
5. What are the current levels of technical implementation and education/understanding?
6. What are the methods for researching effectiveness of nutrient management at the farm level that consider the heterogeneity of the farm site?

Session 5: Technical and Policy Issues in Urban Nutrient Management

Questions:

1. What activities would you include as constituting nutrient management implementation by homeowners, public grounds managers, lawn care services, and other urban audiences?
2. Do we have adequate technical information required for development and implementation of urban nutrient management?
3. How can urban nutrient management be tracked and monitored?

Session 6: Marketing Nutrient Management to Suburbia

Questions:

1. Based on experience, what methods and techniques for reaching urban and suburban homeowners should the Bay program be promoting?
2. What should the approach be for public lands such as parks, and for private lands such as golf courses and business parks?
3. Are there opportunities for partnerships with the private sector that ought to be explored?
4. What is the appropriate role for the Bay Program in marketing nutrient management?

SUMMARY OF IDEAS FROM DISCUSSION SESSION

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The following is a compilation of suggestions and ideas generated by participants during the six breakout discussion sessions, categorized into main subject areas. This summary represents the views of all participants, some of which may be conflicting. The groupings do not correspond directly with the nine recommendations and ideas are not listed in any order relative to priorities. . The ideas presented are not necessarily endorsed by the Nutrient Management Workgroup or the Chesapeake Bay Program.

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Education

- Help farmers recognize the value of nutrient management planning to them as a product or service, as well as the need for nutrient management services such as soil testing.
- Help farmers recognize that nutrient management will require more work but has benefits.
- Explain to farmers and the public in a clear and simple way the impacts of nutrient management and how long it will take to see results.
- Ensure that education programs reach out to all sizes/types of producers with a wide variety of awareness levels.
- Planners should focus on education and information delivery, or "planting a seed" for future implementation, rather than immediate levels of implementation.
- Provide basic information about the planning service that will strengthen the planner's relationship with the farmer.
- Access farmers and disseminate information through endorsements from professional organizations such as the Crop Improvement Association and Farm Bureaus.
- Explain detailed nutrient management plans written by the planners (certified consultants) effectively to farmers with varying levels of awareness and understanding of nutrient management details.
- Emphasize the need for farmers to plan ahead and allow adequate time for development of plans.

Incentives

- There are currently little or no incentives for private consultants to write nutrient management plans. This lack of demand needs to be addressed.
- Internalize environmental effects by considering environmental impact when calculating costs and benefits to the farmer.
- Shift from free nutrient management planning by setting fees that must be charged by all sectors for plan development.
- Help farmers recognize that nutrient management will require more work but has benefits.
- Endorse economic incentives that would accelerate voluntary plan implementation such as tax credits or cost-sharing.
- Support non-monetary incentives for nutrient management such as simple and flexible plans, standardized maps between agencies, and recognition for sound practices.
- Reward or recognize farmers who operate in an environmentally sound manner (apply proper amounts of fertilizer/nutrients).
- Streamline the nutrient management process by reducing paperwork, time, and effort required.
- Make nutrient management simple and voluntary.

Public and Private Sector Roles

- Public and private sectors need to work together as a team in nutrient management with professional trust and eliminate the "us vs. them" attitude.
- Develop a vision for public and private sector roles and plan for a transition period to achieve these roles.
- Ensure that adequate demand exists for private sector planning through planned measures such as setting up fee schedules that are still affordable to farmers.
- Transition the role of public agencies to provide training, education, technical transfer, oversight, and spot checking for private agencies writing the actual plans.
- Ensure that the private sector can deliver quality plans that are comprehensive in addition to offering many options and services.
- The private sector will need to develop long-term relationships with farmers to foster trust and develop good working relationships.
- Address false perceptions that private industry is self-serving by promoting environmentally sound practices and programs that they are instituting.
- Some private industries may choose to provide nutrient management services such as soil testing or manure sampling for free as a value-added service.
- Expand private sector involvement in all aspects of nutrient management, including research, and engage them as partners in addressing current problems and meeting environmental goals.

Standards and Accountability

- Establish plan criteria and standards for both public and private sectors to meet.
- Ensure the quality of private sector plans through spot checking and oversight by the public sector.
- Promote plans that are simple and understandable to the farmer, comprehensive in addressing all resource concerns, and coordinated with other conservation plans such as erosion control or sludge application plans.
- Standardize field number references between agencies in order to create a good mapping base.
- Include follow-up with the landowner, plan evaluation, and periodic revisions or updates in the nutrient management planning process.
- Follow-up and continual visits by the planner will foster implementation.
- Foster implementation through existing programs and regulations for other resources that encourage or require nutrient management plans.

Documentation

- Recognize that the number of plans written does not always translate to direct implementation.
- Identify what types of information are wanted or needed for data collection and where gaps exist in the data.
- Develop ways to document implementation through surveys, random sampling or testing (soil tests or manure samples) on planned farms, feedback from farmers, and on-site follow-up visits.
- Create a database that includes landowners who do not participate in government programs through either mandatory participation in the database or incentives for voluntary participation.
- Address landowner concerns about privacy and sensitivity of information through reference to farms by GPS and/or HUP sites rather than owners' names.
- Structure the tracking system so that it will account for changes in operators on rented land.
- Coordinate modeling and data-gathering efforts so that the tracking system is linked to Chesapeake Bay Program models.

Marketing Excess Nutrients

- Promote successes in marketing and exporting manure (dairy manure in Lancaster Co., PA) and partnerships (Shenandoah Valley, VA).
- Develop program to educate farmers that excess manure can be a resource rather than a problem.
- Address issues such as timing of application, salinity of manure, and manure storage.
- Develop tracking system for manure markets that includes private brokers who handle excess manure and shows locations of excesses and deficits.
- Large private interests are needed to integrate the system.

Environmental Indicators

- Show farmers and public the impact nutrient management has and when these environmental impacts will show up in the ecosystem.
- Demonstrate effects of nutrient management (and other management practices) on water quality and living resources.
- Quantify reductions in nutrient loadings downstream resulting from nutrient management.
- Use monitoring and modeling as tools to assess the role and progress of nutrient management in meeting the Chesapeake Bay Program 40% nutrient reduction goal.
- Coordinate land and water monitoring to assess complex interactions of land use processes and water quality.
- Use reference farms, particularly hog or poultry operations, in a small watershed to study the relationship of nutrient inputs and outputs and their contribution to Bay loadings.
- Use areas with rapid groundwater turnover to assess effects of land use practices and effectiveness of management practices.
- Increase monitoring and develop tracking systems in urban areas to assess the effectiveness of urban nutrient management practices.

Research

- Document implementation efficiencies of nutrient management plans and nutrient reductions resulting from implementation.
- Examine the balance of nutrient inputs and outputs at the farm level to determine acceptable limits/standards of performance which can be explained and taught to farmers.
- Quantify nutrient contributions from urban and suburban areas (break out percent of impervious surface as a factor).
- Develop information to address whether existing nutrient management infrastructure can deliver the reductions being projected in the tributary plans.
- How will we maintain the Chesapeake Bay Program year 2000 cap (40% nutrient reduction) once it is reached?
- Identify future funding resources and what types of information need to be collected.
- Validate models, tracking systems, and assumptions in relation to current technical and scientific bases.
- Identify and analyze groundwater and delivery lag time issues and develop an information/education program for lag time issues.
- Provide information to farmers and develop best management practices that focus on animal nutrition.
- Document impacts of animal waste on water quality.
- Research options to minimize septic system impacts on water quality such as maintenance requirements, design criteria, and construction practices such as using grasses to capture nutrients.
- Assess the impacts of nitrogen-based de-icers and explore possible alternatives.

Urban Nutrient Management

- Define and articulate what practices constitute urban nutrient management.
- Target various groups who are potential nutrient management implementers: Homeowners, public and private grounds managers, lawn care services, non-agricultural lots used for livestock/horses, businesses, and local governments.
- Hold community demonstrations in public areas (parks and school grounds) and in conjunction with homeowners associations; private sector demonstrations at facilities such as industrial parks.
- Publicize nutrient management through mass mailings, public service announcements on television and radio, and special events such as Earth Day.
- Promote environmental education targeting youth through school programs.
- Incorporate urban nutrient management outreach into existing programs such as continuing education for professionals, managers, and employees, or training for master gardeners and garden centers.
- Use the Internet to disseminate information such as lawn and garden care facts sheets, research, and nutrient management program activities.
- The Chesapeake Bay Program's role in promoting nutrient management should focus on developing a message and a marketing plan that incorporates a long-term vision, identifies target audiences, creates an awareness among public officials/local governments, and focuses on specific tasks/activities for the public. Themes should be regularly updated.
- Build partnerships with key groups to support urban nutrient management.
- Target new homeowners through homeowners associations and realtors for distributing brochures on Bay-friendly lawn and garden care.
- Work with developers and homebuilders to promote Bayscaping and include nutrient management considerations in planning stages for new development.
- Encourage realties to include basic nutrient management and ecological information in realtor exams.
- Encourage local governments to change out-dated zoning specifications and adopt sound nutrient management practices on public lands.
- Engage businesses and private industry through education programs for new businesses, publishing nutrient management-related articles in business' newsletters, and seeking volunteers for environmental projects.
- Recognize the private sector/industry for sound practices such as nutrient management training for applicators through rewards, publicity, etc.

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