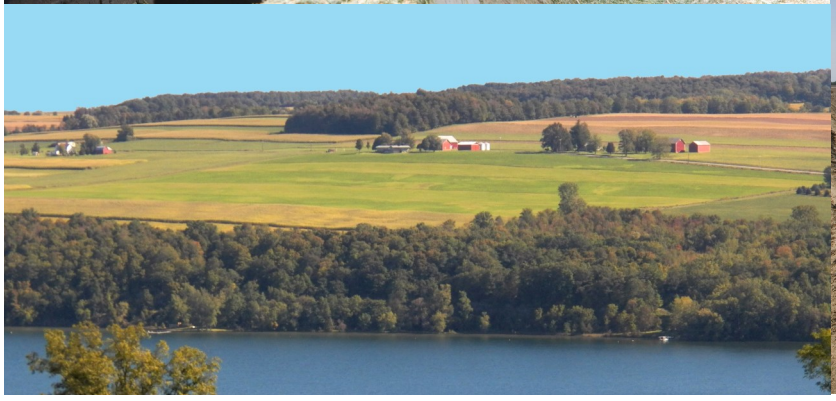
May 11, 2015

Cayuga County
Manure Management
Working Group

Recommendation Report

of the Advisory Committee to the Cayuga County Manure Management Working Group



Preface

We are pleased to present the recommendations of this report to the Cayuga County Manure Management Working Group for its consideration.

This project grew out of a countywide forum on manure runoff organized by Cayuga County Legislators Keith Batman and Michael Didio and held on October 29th, 2014. The forum, prompted by a number of manure runoff incidents that occurred in the winter of 2013-2014 in Cayuga County and across the State, was attended by more than 200 people. We were selected from among those who expressed an interest in participating in additional discussions. Our committee consisted of ten members, five of whom make their livings as farmers.

Our directive was clear. We were appointed to come together in a series of meetings beginning on January 6, 2015 and not to extend beyond mid-April to "…consider issues and activities associated with the storage, application, processing, and transport of manure within Cayuga County watersheds and recommend policies and guidelines aimed at minimizing the negative impact on water quality."

In pursuing our mandate we joined in more than 14 hours of dialogue over the course of eight meetings. Committee members and staff worked many additional hours individually preparing for meetings and reviewing draft recommendations. During several meetings we benefitted from expert contributions of guests from the Natural Resources Conservation Service, the New York State Department of Environmental Conservation, and Cornell University's PRO DAIRY Program.

Our deliberations resulted in the development of the 15 recommendations presented in this report and organized under four categories: 1) planning and research, 2) standards and practices, 3) compliance and enforcement, and 4) education and communication. Although we consider all of the recommendations to be very important, we have flagged five of them as "high priority."

We want to thank the members of the Working Group for giving us this opportunity to participate in the public conversation about an extremely important subject. We thank the Cayuga County Department of Planning and Economic Development and the Cayuga County Health Department for providing the staff required to facilitate meetings, take notes, and prepare the final report. We conclude this list of thanks by expressing our gratitude for the generosity of Cornell Cooperative Extension of Cayuga County and the Cayuga County Soil and Water Conservation District in allowing us to use their conference rooms.

We have endeavored to be independent, impartial, and as thorough as possible given the tight deadline and the busy schedules of everyone involved. Each of us came into this process with our own unique perspectives on what we considered to be the relevant issues. On numerous occasions we have had to reexamine those perspectives and even alter them after considering the viewpoints and experiences of others. We urge the Working Group to use the common ground we discovered as a foundation for future positive discussions about the right actions to take in responding to the public's concerns regarding manure runoff.

As challenging as it was to arrive at a set of wide ranging recommendations, we recognize that the hardest work is to follow, and that is the work of putting our report into action. Implementation of the recommendations will require the investment of significantly more time and resources by a variety of individuals and agencies, but we are confident that our fellow citizens including our governmental representatives are equal to the task.

The Advisory Committee to the
Cayuga County Manure Management
Working Group

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Introduction

Since the beginning of organized agriculture, farmers have understood the value of livestock manure as a soil amendment useful in improving farm production. By replacing soil nutrients, the application of manure to farmland contributes to increased crop yield. If not managed carefully, however, manure can contribute to pollution of water resources.

One of the essential nutrients provided by manure is phosphorus. Plants require phosphorus in order to store and transfer the energy necessary to maintain optimum growth and reproductive capacity. But although phosphorus is critically important, especially in lakes and streams, too much of it can cause deterioration of water quality.

Excessive amounts of phosphorus cause weed growth and make algae grow faster than ecosystems are able to tolerate. The presence of weeds and algae reduces water clarity and can deplete the water of oxygen, creating conditions harmful to fish and other aquatic plants and animals. Certain varieties of particularly toxic blue-green algae pose health risks to people and animals if they are exposed to large enough quantities of it. The use of larger amounts of chemicals may be required to treat drinking water from sources that are negatively affected by weeds and algae. This can not only raise the cost of producing drinking water but also increase the likelihood that the chemicals will react with other materials in the water to form byproducts that are potentially harmful to human health.[1,2]

Phosphorus loading of lakes and streams occurs by both surface runoff and subsurface transport (Figure 1).[3,4] These processes combine to make up the total stormwater runoff from an area. Surface runoff is the rainwater or meltwater that does not infiltrate into the soil, but rather moves downslope along the surface of the ground, potentially carrying dissolved phosphorus and phosphorus attached to soil particles, or "particulate phosphorus" with it. Subsurface transport is the means by which water that passes through the shallow soil layer continues moving through deeper material. Through subsurface transport it is possible for some dissolved phosphorus to find its way into lakes and streams.

Agricultural runoff is only one of the potential sources of phosphorus in water bodies. Other sources and pathways include:

- Urban, suburban, and nonagricultural rural land uses and activities – stormwater or meltwater running across paved and other hard surfaces transports phosphorus to water bodies via runoff or storm drains. Lawn and garden fertilizer, yard and pet waste, and some types of cleaning agents can contribute to phosphorus pollution if not used properly or disposed of correctly.
- Nonagricultural surface soil – During times of erosive rainfall, surface soil particles with phosphorus derived from decaying organic matter attached to them become dislodged, transported, and deposited in water bodies.
- Stream banks – Eroding soil and subsoil material from stream banks is a major source of particulate phosphorus in lakes and streams. The erosion of stream banks and the resulting phosphorus loading of water resources is accelerated by damaging or removing streamside vegetation.
- Wastewater treatment facilities – Wastewater treatment plants and improperly designed or malfunctioning septic systems discharge phosphorus into water bodies.[5,6]

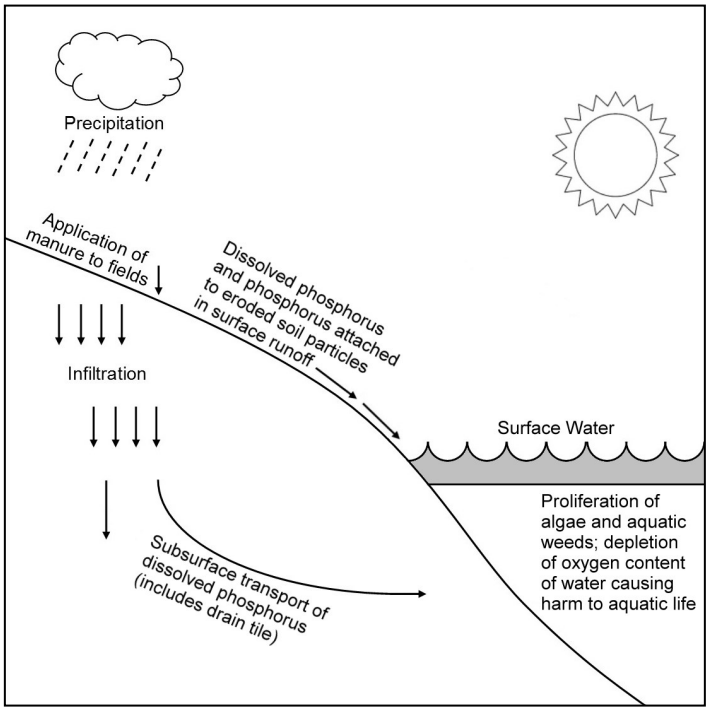

Figure 1. The manure phosphorus runoff process.

Success in the necessary reduction of phosphorus pollution will depend upon the implementation of a comprehensive program addressing all of its sources and pathways to receiving waters. The recommendations discussed in the following sections are offered to provide focus for activities aimed at improving the management of manure. But the Committee also hopes that its work serves as an example of what other groups investigating other sources might be able to accomplish.

Recommendations

I. Planning and Research

1. Prepare watershed management plans that include the minimum elements identified by the U.S. Environmental Protection Agency as critical for achieving improvements in water quality.

- HIGH PRIORITY -

The U.S. Environmental Protection Agency has identified nine minimum elements that should be included in watershed management plans in order for such plans to be effective as a means to improve and protect water quality. The nine minimum, or "key" elements are listed along the right side of Figure 2.

Watershed management plans incorporating these elements should be prepared for watersheds across Cayuga County so that the potential contributing causes and sources of pollution including runoff containing manure can be fully assessed and strategies to address them prioritized.

The Committee appreciates that rigorous quantitative analysis of data, some of which is not currently available, will be required to adequately address several of the elements above, so the establishment of a carefully designed coordinated program to collect and review data that engages all stakeholders will be necessary before any analysis can take place. Important data inputs that must be accepted as accurate and reliable by all stakeholders include:

- phosphorus loading of surface water at selected subwatershed outlets and other key points;
- phosphorus export from typical existing land use/land management practice combinations;
- natural "background" phosphorus export from undeveloped areas of various types; and
- predicted phosphorus export from lower impact land use/land management practice combinations that are not currently widespread but could feasibly be established.

2. Undertake studies and research projects aimed at estimating and comparing the environmental benefits and economic cost-effectiveness of alternative manure management practices.

While the importance of conservation practices to prevent excessive nutrient loading of water resources caused by runoff

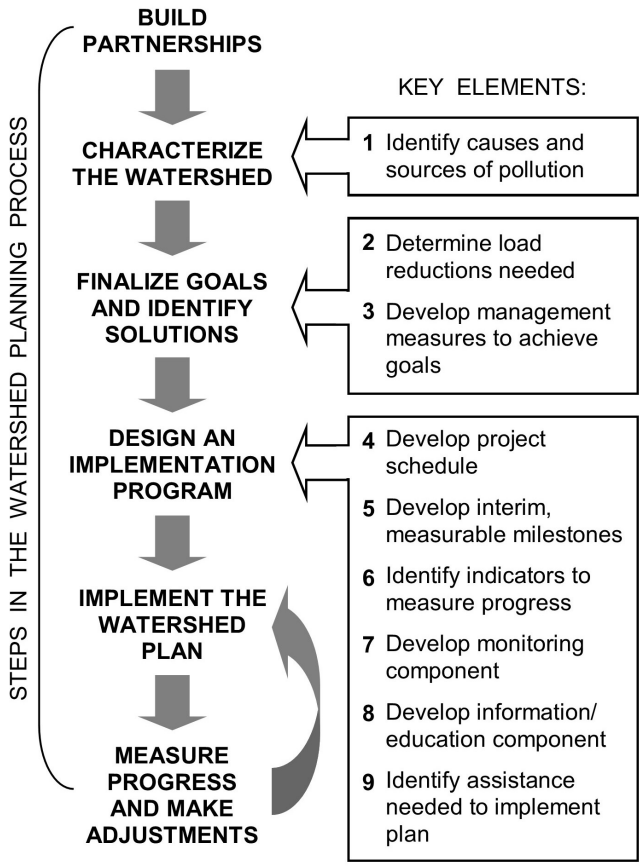

Figure 2. The nine key elements of watershed management plans and their places in the planning process.

containing manure is widely recognized and numerous government programs have been initiated to encourage the adoption of environmentally sensitive manure management measures at the farm level, information on the benefits and cost-effectiveness of the adoption of alternative practices is scarce.

In-depth analyses of manure management practices that compare anticipated benefits of various practices and the costs of introducing them, performing them, and supporting the changes resulting from them are needed. The results of such analyses would be tremendously valuable in helping farmers and natural resource managers make important decisions about which practices are the most efficient and would help reduce cost input as well as nutrient loading from agricultural lands.

II. Standards and Practices

3. Encourage all farms on which manure is applied to cropland to implement the Nutrient Management (Code 590) Conservation Practice Standard established by the Natural Resources Conservation Service (NRCS); Propose policies which would make compliance with minimum nutrient management requirements mandatory.

- HIGH PRIORITY -

Standards for the proper utilization of manure as a plant nutrient source are described by the Natural Resources Conservation Service (NRCS) in its Nutrient Management (Code 590) Conservation Practice Standard. State policy requires implementation of these standards on all farms with permits for concentrated animal feeding operations (CAFOs), as well as on other farms with animal feeding operations receiving state or federal cost share funds for manure storage and other related practices. In Cayuga County, however, numerous farms on which manure is applied to cropland are not classified as CAFOs and do not receive government cost share funds for nutrient management.

Since one of the most important intended purposes of the Code 590 Standard is to minimize the pollution of surface and groundwater resources caused by storm water runoff containing manure, efforts should be made to encourage wider implementation of it. Such efforts could include assisting farmers in voluntarily developing and utilizing conservation plans recommending nutrient management practices (BMPs) that are consistent with the Code 590 Standard. Compliance with the Standard could also be increased by expanding farmers' awareness and understanding of the best nutrient management practices through workshops and farm tours.

Opportunities to tighten federal and state policies and mandate compliance with minimum nutrient management standards on all farms on which manure is applied to cropland should also be pursued. The Committee believes, however, that such standards should be modified where appropriate to account for the operational constraints faced by smaller farms.

4. Clearly specify in standards supplementing the NRCS Nutrient Management Standard the field conditions which must exist and the management practices which must be followed in order for manure application on frozen, snow covered and/or saturated soil to be considered acceptable.

- HIGH PRIORITY -

The Nutrient Management (Code 590) Standard established by the NRCS specifies that applications of manure on frozen, snow covered, and/or saturated soil are allowable as long as such applications are made according to certain criteria and conservation measures referred to in the Standard. None of these criteria or measures however, explicitly require that manure application times, rates, and methods be adjusted according to actual conditions on the ground on any given day. Nor are the terms "frozen," or "saturated" precisely defined anywhere. These deficiencies allow the Standard to be interpreted in ways that do not support the reduction of manure runoff to the extent possible.

The Code 590 Standard requires that manure be applied in accordance with the Cornell University Nutrient Guidelines – a set of guidelines that includes a document titled *Supplemental Manure Spreading Guidelines to reduce Water Contamination Risk During Adverse Weather Conditions*. This document contains useful advice to farmers on what to consider when faced with the choice of whether or not to apply manure on frozen, snow covered, or saturated soil. The information presented in the *Supplemental Manure Spreading Guidelines* and similar resources can and should be refined and developed into more prescriptive standards.

5. Install and maintain conservation systems including but not necessarily limited to grassed waterways and vegetative barriers in areas of concentrated flow.

Surface runoff water often becomes concentrated in shallow channels through fields. These concentrated flows disappear after the water drains and the farmer tills the land, but reappear at or near the same location with the next heavy rain event. Areas of concentrated flow represent a particular problem for farmers since they are a significant cause of soil loss.

According to the NYSDEC, intense storms have become more common in New York. And if the predictions of Cornell University's Northeast Regional Climate Center (NRCC) are correct, we are likely to continue experiencing more frequent and larger precipitation events. We can anticipate, therefore, that the potential impacts of concentrated flow of runoff through agricultural fields will only increase in severity over time.

A grassed waterway (Figure 3) is a shallow channel designed to move surface water through areas of concentrated flow without causing soil erosion. Deep rooted grasses or other plant materials act as a filter, trapping nutrients.

Vegetative barriers are narrow strips of stiff, densely growing plants, usually grasses. These barriers cross concentrated flow areas at convenient angles for farming. They reduce the velocity of runoff water, causing deposition of sediments on their upslope sides. Reduced velocity also prevents scouring and the development of gullies.

A disadvantage of grassed waterways and vegetative barriers is that they take some cropland out of agricultural production. But they may be more effective per acre than other types of conservation buffers in reducing nutrient loading from agricultural land.

Farmers should employ conservation management measures such as grassed waterways, vegetative barriers, and any others recommended by nutrient management planners to minimize the impacts of runoff through areas of concentrated flow.

6. In cases where sheet flow can result in the transport of sediment containing manure off of farm property, intercept the flow by establishing buffer strips in which crop rotation methods that minimize erosion and increase organic matter in the soil are used.

Sheet flow, or the movement of storm runoff in a thin, continuous layer over a uniformly sloping ground surface, is not the predominant form of storm water movement in

Figure 3. Grassed waterway.

Cayuga County where most runoff is concentrated into channels. But where sheet flow does occur through areas where manure has been applied, the flow should be intercepted before finally leaving the farm via slopes, waterways, or ditches.

While buffers consisting of trees, shrubs, and grasses planted in strips permanently removed from active production may be very effective in filtering sediment and nutrients, many farmers cannot economically justify "giving up" the amount of farmland required to establish them.

Where erosion from sheet flow is a concern but the establishment of permanent vegetative buffers is not feasible, farmers should create wider buffer strips on which soil stabilizing and enhancing grasses, small grains or other appropriate plants are grown for at least part of the cropping sequence.

7. Incorporate surface-applied manure into the soil as soon as possible after application; Incorporate surface-applied liquid manure within 48 hours of application unless it is applied to growing crops or on soil with more than 30% plant residue ground cover.

- HIGH PRIORITY -

In its list of nutrient application risk reduction measures, the NRCS Conservation Practice Standard for Nutrient Management (Code 590) specifies: "Incorporate surface-applied manures or organic by-products if precipitation capable of producing runoff or erosion is likely within the time of planned application."

But the Committee believes that given the uncertainty of weather forecasts and the potential impacts of precipitation that might not be expected to occur for some time after application (e.g. 24 to 48 hours), manure should always be incorporated into the soil as soon as possible after application.

In cases where the risk of erosion and runoff is highest, such as when liquid manure is applied on soil with less than 30% plant residue ground cover, it should be required that the manure be incorporated into the soil within 48 hours.

III. Compliance and Enforcement

8. Focus compliance components of water pollution control programs more strongly on monitoring and penalizing repeat, uncooperative offenders.

- HIGH PRIORITY -

Water quality violations are relatively rare in Cayuga County, but potentially very dangerous when they do occur, so enforcement is still a major concern. The Committee believes that the most effective enforcement strategy is one that emphasizes inspections and enforcement actions that are timely and appropriate. It is important that the enforcement strategy provide for penalties that are severe enough to deter individuals and firms from flagrantly violating regulations, but not so severe as to deter those who make every effort to comply with regulations from continuing to engage in agricultural activities. After all, accidents and mistakes can occur from time to time even when farms with professionally prepared nutrient management plans work hard to follow them as carefully as possible.

NYSDEC staff have assured the Committee that they do not lack the resources necessary to ensure compliance with statutory and regulatory requirements. Even among many in the agricultural community, however, the enforcement strategy often appears to be too conciliatory. When farmers who always follow the rules as closely as they can hear about penalties that are assessed against violators who don't, the penalties often do not seem severe enough to serve as an adequate deterrent to future noncompliance.

The major threats to water quality in Cayuga County are those posed by repeat, willful, negligent and reckless violators. The NYSDEC has the latitude to adjust penalties based on considerations of the violator's culpability, cooperation, and history of noncompliance. Such penalty adjustment factors should be weighted more heavily than they currently are by officials implementing the compliance components of state and federal water programs.

9. Make the water pollution control regulations that apply to farms and the programs for enforcing them uniform and consistent across all watersheds.

Currently, depending on whether or not a farm is located in the watershed of a protected drinking water supply, it may be subject to special pollution regulations. Also, different special regulations may apply in different watersheds. Even when the rules are essentially the same, local compliance and enforcement vigor can be uneven. All of this creates confusing and inequitable conditions for farmers and an unfair situation for citizens who may not be provided equal protection under our water quality laws.

Standards should require the same of all farms on which manure is applied. Uniform standards would be easier to understand and comply with, and allow all farmers to operate on a level playing field.

Where compliance and enforcement activity is concerned, the Committee recognizes that while some flexibility in enforcement is necessary to account for the variability of local conditions, fundamental requirements must be consistently implemented. Violations of the same type and having similar impacts should prompt similar enforcement responses regardless of geographic location.

10. Strictly enforce regulations prohibiting direct, unrestricted access to streams by livestock.

Increased nutrient loading of water resources caused by the deposition of manure in or near streams is but one of the negative environmental impacts that can result from farm management practices that include providing livestock access to streams. When livestock gather near streams, soil can become compacted and stream banks can become degraded, leading to increased risk of erosion and sedimentation even after livestock move elsewhere.

On farms where livestock currently have direct access to streams, farmers should be required to fence livestock away from streams and provide off-stream sources of water if necessary.

11. Use fines collected from farms that have been found to violate water pollution control regulations to fund the establishment of state-of-the-art nutrient management practices on farms in the same region.

The financial incentives currently offered to farmers to implement conservation practices are inadequate. For example, the rental payments that farms may be eligible to receive for establishing stream buffers under the USDA's Conservation Reserve Enhancement Program (CREP) fall far below the value of the land that the buffers would occupy and take out of production.

Fines that the NYSDEC collects from farms that violate environmental regulations are deposited into the state's general fund to help finance the state's operations. These fines should be used instead to help finance programs related to offsetting the environmental impacts of noncompliance and decreasing the probability that similar violations will occur in the future.

The Committee recommends that fines collected as a result of enforcement actions taken against farms be deposited in a special fund such as the New York State Environmental Protection Fund (EPF) and targeted for use in helping to finance the implementation of agricultural practices that will reduce nutrient loading of lakes and streams in the same region.

IV. Education and Communication

12. Create and implement a public communications plan that includes the preparation and distribution of new materials describing the Water Quality Management Agency's purpose and membership; Expand and promote the role of the Agency's website as a clearinghouse for water quality related information and a portal to the websites of other organizations concerned about water quality.

The Cayuga County Water Quality Management Agency (WQMA) is an "umbrella" organization of groups that work together to coordinate activities to protect and improve the quality of water throughout Cayuga County (Figure 4). The Agency, staffed by County personnel, also serves to advise the County Legislature on matters relating to water quality.

Among the general public, however, there is little awareness that such an organization exists. In fact, many people believe that there is no coordination among the numerous groups that focus on water quality issues and no formalized procedures in place for them to share information and pool resources.

The potential impacts of manure runoff on water quality is a countywide issue that concerns a wide variety of government agencies, private associations, and other organizations. The ability of these groups to carry out shared activities would be enhanced if the WQMA was better known and its function better understood. Preparation and distribution of new materials describing the Agency, and expansion of its website as a clearinghouse for water quality related information and a portal to other resources would increase public awareness of the Agency and improve its ability to operate in a manner most responsive to the needs of the community.

Figure 4. Members of the Water Quality Management Agency listen to a presentation at its May, 2015 meeting

13. Build on existing programs to publicly recognize farmers who demonstrate a commitment to deploy progressive, innovative approaches to nutrient management; Conduct community forums in which stakeholders can meet to review progress in improving environmental stewardship, share success stories, and discuss ways of removing obstacles to greater success.

For a new agricultural practice to make any difference, it must be incorporated into the operations of individual farmers across a wide area. New practices spread through the agricultural community in a predictable pattern. A few farmers will experiment with an innovation shortly after they hear of it while others will take longer to try anything unfamiliar. When the more cautious farmers finally see how well new practices perform for their neighbors, then they adopt them as well.

There are several ways to increase the rate at which new, innovative, and environmentally friendly management practices become adopted and thereby take advantage of the benefits they provide as quickly as possible. One way is to reward early adopters by publicly recognizing and celebrating their accomplishments. This serves as an incentive for them to continue acting as trendsetters and good examples. It also

motivates others to take advantage of opportunities to become early adopters of even newer practices in the future. The Lake Friendly Farm award program of the Cayuga Lake Watershed Network is an example of a program that gives recognition to farms that follow environmentally sound practices. Similar programs from around the country should be investigated and local versions established.

Another way to accelerate the spread of new practices is to open more communication channels between and among farmers, agronomists, resource managers, and other citizens. This can be accomplished by sponsoring community forums where farmers with experience in reducing nutrient loading while at the same time maintaining farm profitability can share their wisdom with other attendees. One example of a regularly scheduled forum in Cayuga County which could be used as a model is the "Wednesday Moring Roundtable" which has been successful in bringing people together to discuss community issues and opportunities.

14. Create and distribute web-based resources informing the public on how to recognize when a manure handling practice is adequately accounting for potential environmental impacts and when it is not.

Staff of the NYSDEC have informed the Committee that the vast majority of complaints they receive from the public about agricultural activities turn out not to be cases of farmers failing to comply with regulations. With so much staff time taken up with the investigation of false alarms, the Department cannot be as effective as possible in ensuring compliance with laws and regulations to protect public health and the intended best use of the waters of the state.

A primary cause of the large number of unactionable complaints is the lack of knowledge among the general public about manure handling practices and how to recognize when such practices are being carried out properly. One solution to this problem would be to prepare and distribute web-based resources on manure handling and related nutrient management topics.

Nobody really knows if and when they will need access to such specialized information, so making it available online all of the time is preferable to conducting onsite training sessions or workshops that require advance planning, not to mention larger investments of time and travel by participants.

A well-publicized web site containing regulatory information understandable to the average citizen could serve as a useful "first step" for people who suspect that violations are taking place and allow the NYSDEC to perform its monitoring and compliance duties more efficiently.

15. Provide an environmental educator to teach middle and high school students about the critical role of agriculture in the food system and the relationships between water quality and farm activities including nutrient management practices.

Because agricultural and environmental issues such as those relating to the impacts of nutrient management practices are complex, citizens must gain a considerable amount of knowledge about them in order to confidently participate in public discussions of policies addressing manure management.

Public discussion about farming activities is especially challenging in communities where people have not had the opportunity to become particularly well informed of how food gets from the field to the table.

Programs that instill in young people an understanding of the importance of land use and environmental issues and allow them to explore such issues exist, but more are needed. One of the best investments in our future that we could make would be to fund an educator to lead middle and high school students in programs which would teach them about topics including the following three elements of the food system:

- Farm inputs (land, labor, equipment, seed, feed, fuel, fertilizer, etc.)
- Agricultural production (dairy, livestock grown for meat, eggs, fruits and vegetables, grain, etc.)
- Nutrient management (providing sufficient nutrients for crop and animal growth while minimizing the negative impacts of nutrient losses to the environment)

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