

FERTILIZER POLLUTION REDUCTION STRATEGIES

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Abstract

Sarasota County became interested in controlling pollution from fertilizers as a result of community concerns about red tide blooms over the last several years. The Board of County Commissioners asked staff to look at ordinances to control fertilizer usage such as the one passed in St. Johns County. After looking at the St. Johns County ordinance and talking with their staff and commissioners Sarasota County decided to pursue a different route. Instead of jumping right in and passing an ordinance, Sarasota County decided to establish a series of “Community Conversations” with four different stakeholder groups: industry, government, civic groups, and environmental groups to look at all options. The conversations were a series of facilitated meetings which worked through questions or exercises with the ultimate goal of developing a set of comprehensive recommendations to the Board of County Commissions. The details of the process, statistics from survey questions, and the final recommendations will be part of the paper.

Introduction

Driven by increasing water quality problems exhibited by red tide, red drift algae, blue green algae blooms, and the proliferation of emergent plants such as cattails, local communities have sought to reduce pollutant loading sources. Local governments around Florida have considered and/or passed local ordinances to manage the fertilizer component of pollutant loads. In Southeast Florida that focused on phosphorus loading, and in north and west Florida it has focused primarily on nitrogen loading. St. Johns County passed an ordinance in 2000 regulating fertilizer within the Guana River Basin which was experiencing problems due to the proliferation of macrophytes such as cattails. The vegetation clogged drainage ways and exacerbated drainage/flooding problems. The original ordinance was challenged and the ordinance was changed. This controversy lead a consortium of entities including the Florida Department of Environmental Protection (FDEP), the Florida Department of Agriculture and Consumer Services, the Florida Department of Community Affairs, water management districts, the University of Florida, IFAS, and numerous private industry partners to develop the *Florida Green Industries Best Management Practices for Protection of Water Resources in Florida* in June 2002, which is now referenced in their ordinance to guide fertilizer management.

After several years of problematic red tide blooms that adversely affected citizens and the tourist economy in Sarasota County, the Sarasota Board of County Commissioners (BCC) asked staff to review the St. Johns County ordinance and determine if Sarasota

County should do something similar. Staff reviewed the history of the ordinances in St. Johns, talked to staff and commissioners, and recommended a different path. The BCC passed resolution #2006-126 which established a policy that Sarasota County government should be a role model in the proper use of fertilizers, and established a “community conversations with public and private entities to include government agencies, fertilizer manufacturers and retailers, landscape maintenance professionals, environmental organizations, homeowners groups, and other stakeholders to develop a comprehensive community-based plan of action to reduce pollution from improper fertilization to improve water quality”. This paper reports the results of that process.

Discussion

The workshops began with two sets of meetings with each of the individual groups meeting independently. A total of 138 sign-ins reflects the attendance at the eight meetings. The first two rounds of workshops identified areas of agreement as well as some areas where agreement does not yet exist. The goal was to identify consensus items and lay them aside rather than spending valuable time discussing them. This, then allowed more time and energy to focus on items where difference of opinion existed. Next a task force made up of four representatives selected by each of the four interest groups met on January 20, 2007, and worked toward consensus on the remaining items. Finally a meeting of all interested stakeholders was held on February 24, 2007 in order to consider and endorse by consensus the results of the task force meeting. This paper reflects the findings of all the workshops and meetings.

The first two rounds of “community conversations” featured separate meetings with each of the four stakeholder groups (Fertilizer Industry, Citizens, Environmentalists and Governments.) A survey was used at the first meeting to gauge attitudes of the four independent groups and the results are discussed below.

FERTILIZER PROJECT - SURVEY RESULTS

1. Seriousness of environmental impact of fertilizer?

• Citizens	3.56	1 = very low
• Governments	3.25	2 = low
• Environmentalist	4.42	3 = medium
• Fertilizer Industry	<u>3.25</u>	4 = high
Average	3.62	5 = very high

On a scale of one to five, each group rated the seriousness of the environmental impact of fertilizer above the midpoint of 3.0. The environmental group had the highest impact rating of 4.42 while government and the fertilizer industry were the lower rating groups at 3.25. The overall average score was 3.62 which means the overall seriousness of all groups was nearly midway between medium and high impact.

2. How much higher or lower is your concern about fertilizer compared to the groups participating in this project?

	Citizens	Fertilizer Industry	Environmentalist	Government
Citizens	—	higher	higher	higher
Fertilizer Industry	higher	—	lower	same
Environmentalist	higher	higher	—	higher
Government	higher	higher	higher	—

The patterns of opinion regarding the relative level of concern between and among the four groups follow very predictable patterns.

Citizens — thought their concern was actually higher than all of the other groups, even the environmentalists. This may have occurred due to the presence of many environmentalists in the citizen group.

Fertilizer Industry — thought their concern was higher than the citizens, lower than the environmentalists, and about the same as the government groups. This seems to be a logical perception based on previously expressed interest and concern on this topic.

Environmentalists — felt their concern was higher than all of the other groups, which is also a logical pattern of concern.

Government — felt their concern was higher than citizens and the fertilizer industry, but lower than the environmental group.

3. Where do you think the responsibility for correcting fertilizer run off concerns should be? Participants were asked to divide 100 points between and among six stakeholder groups. There was a seventh category of “other” as well.

Average		Citizens	Fertilizer Industry	Environmental	Government
22.99	Citizens (application of fertilizer)	20.5	31.5	14.28	25.7
8.09	Environmentalists (education/advocacy)	9.8	11.6	4.28	6.7
21.56	Government (rules and regulations)	25.3	9.3	42.14	9.5
17.5	Fertilizer industry (products)	25.1	16.0	15.17	13.2
19.5	Landscape maintenance (application)	23.7	20.7	15.0	18.6
12.05	Homebuilders (design and installation)	9.5	9.2	15.0	14.5
3.86	Other	1.2	1.75	—	12.5

There were definite patterns identified in this attribution of responsibility. The homebuilders and the environmentalists are not expected to bear as much responsibility for addressing the fertilizer concern as the other stakeholders. Government and citizens were expected to take the lead in this matter, but this was primarily because citizens and environmentalists were looking for government to play a very major role. The most consistently high scores were given to citizens, the fertilizer industry and the landscape maintenance group. It would appear that a collaborative approach is obviously called for with governments taking the lead but other stakeholders bearing the responsibility for actual changes in how fertilizer is put into the environment

4. Where do you think the emphasis should be in terms of the types of actions necessary? Each group ranked nine different potential actions on a scale of very low to very high (or 1 to 5).

	Citizens	Fertilizer Industry	Environmental	Government	Average
• Education of fertilizer manufacturers	2.42	3.0	3.4	3.0	3.08
• Education of retail sales employees	3.0	3.86	3.5	3.64	3.50
• Education of fertilizer applicators	3.84	4.10	4.0	3.85	3.94 ↙
• Education of the general public	4.07	4.5	3.8	4.07	4.11 ↙
• Legislation to control application	3.38	2.3	4.4	2.53	3.15
• Changes in landscape design	2.53	2.63	2.8	2.85	2.70
• New product development	3.66	3.15	4.0	3.85	3.65
• Coordination between governments	3.30	3.36	3.1	3.14	3.25
• Other	3.07	3.35	3.8	3.46	3.42

Averages across the four groups show the highest priority on educational efforts. Education of the general public was the highest ranked action overall followed by education of fertilizer applicators. Environmentalists do want more emphasis on legislative controls, but this was virtually the only serious difference in the scores provided by the four groups.

These findings are also very consistent with the response to question number three, with the exception that governments received a lower priority in this question of actions to take. However, when you add in the changes in landscape design, which also falls into the area of government concern, then these patterns are very understandable.

5. What is the probability that all stakeholders will be able to reach a consensus on how to deal with this concern for fertilize use?

Citizens	2.53	Average 2.97
Fertilizer Industry	3.3	
Environmentalists	2.7	
Government	3.35	

1 = very low
 2 = low
 3 = medium
 4 = high
 5 = very high

The perceived probability of reaching a consensus on how to address this use of fertilizer is not as high as it could be with the average being 2.97 or just below the midpoint of 3.0. Citizens and environmentalists were less optimistic than the governmental and the fertilizer industry representatives.

6. Barriers and concerns related to fertilizers which should be addressed.

Rank		Citizens	Fertilizer Industry	Environmental	Government	Average
5	a. Need more scientific data	3.38	4.0	3.30	3.14	3.45
6	b. More best practice examples	3.58	3.6	3.57	3.0	3.43
11	c. Balanced media coverage*	3.75	3.65	3.61	2.16	3.29
14	d. Language barriers	2.0	2.85	2.92	2.33	2.52
13	e. More cost-benefit info	2.84	2.45	3.21	2.8	2.95
7	f. Better education materials*	3.53	3.9	3.5	2.66	3.39
10	g. Enforceable regulations*	3.23	2.55	2.53	4.85	3.29
9	h. More resources for programs	2.92	2.78	3.66	3.8	3.29
8	i. Better inter-government coop	3.0	2.9	3.57	3.8	3.31
2	j. Reduce lawn size (natural)	4.2	3.15	3.21	4.57	3.78
4	k. Better pollutant measurement	3.76	3.68	3.57	3.33	3.58
1	l. Better landscape design	3.92	3.63	4.21	4.16	3.98
3	m. More environmental-friendly fertilizers	3.91	3.05	3.38	4.0	3.58
12	n. Better landscape deed restrictions	2.55	2.63	3.35	4.2	3.18
	o. Other					

The top seven categories of barriers and concerns were as follows:

Rank		Score
1.	Better landscape design	3.98
2.	Reduced lawn size	3.78
3.	More environmental friendly fertilizer	3.58
4.	Better pollutant measurement	3.58
5.	More scientific data	3.45
6.	More best practice examples	3.43
7.	Better educational materials	3.39

7. How important is the need for citizen surveys and focus groups?

Citizens	3.15	Average 3.19
Fertilizer Industry	3.0	
Environmentalists	3.14	
Government	3.42	

The group averages in support of citizen surveys and focus groups were all slightly above the midpoint of 3.0 which means they all thought it was a good idea but perhaps not a vitally important one.

8. How important is the need for demonstration projects?

Citizens	4.69	Average 3.36
Fertilize Industry	3.61	
Environmentalists	2.28	
Government	3.28	

Citizens high score here stands out. Overall, there was a high level of interest in conducting demonstration projects, probably to validate various approaches to reducing fertilizer impact on the environmental, but also because this is seen as a good marketing tool.

Options and Alternatives

During the four stakeholder workshops, there was a structured discussion around twenty key questions. The following is a summary of this discussion with emphasis on the areas of agreement between the four groups.

1. Is it possible to apply too much fertilizer?
 - All four groups answered yes.
2. How much is too much (lbs. of nitrogen/1000sq. ft.)?
 - No one could definitely say how much was too much.
 - There was agreement on the factors that could influence the application of too much.
 - Each plant has different fertilizer needs
 - It depends on the type of fertilizer being applied. (slow release, fast release, synthetic, natural, etc.)
 - It depends on the condition of the soil. (Is it a mature soil or is it a new soil?)
 - It depends on the time of the year (i.e., rainy or not)
 - It depends on when it is applied in terms of when it did or will rain.
 - It depends on the customer's expectations. (I.e., whether willing to accept a little browning in the non-rainy season)
 - It depends on the application techniques used
 - It depends on the off-site impacts being experienced

- It may depend on whether the fertilizer company has a full range of fertilizer types to offer. (compost instead of synthetic)
 - There has been an academic study establishing general guidelines of 2 lbs./1000 sq. ft./year at the low end, 4lbs at the medium range and 6-8 lbs at the high end.
 - A new state study found that 1/2 lb./application was good, 1 lb./application causes some leaching and 2 lbs./application causes major run off.
 - Some environmentalists and citizens contend that any fertilizer may be too much.
3. Does it matter when fertilizer is applied in terms of the potential for negative environmental consequences?
 - All four groups answered yes.
 4. When is the best time and when is the worst?
 - Everyone agreed that the wet season was the worst.
 - There was also agreement that the spring and the fall were relatively the best times
 - Fertilizing in the summer can cause bug infestation, fungus, etc.
 - Older turf with microbes established needs less in summer while new construction, which does not usually add topsoil needs more fertilizer in summer.
 - Should fertilize when 1/2 inch of rainfall will fall. Two inches causes too much runoff.
 - On site retention ponds have some benefits but only 30-40% of N load can be reduced in this way.
 - Need to find ways to make retention or other pretreatment techniques more effective.
 5. Does it matter how close the fertilizer is applied to a waterway in terms of the potential for negative environmental consequences?
 - All four groups answered yes.
 6. How close is too close and which types of waterways?
 - It depends on the size of the yard
 - It depends on the slope and soil composition
 - It depends on the neighborhood design
 - It depends on how much pressure there is to maintain an unobstructed view of the water.
 - It depends on how much impervious surface is in the area
 - It depends on the type of fertilizer application used (a spreader with a knife edge can get closer with less problems)
 - The county has a 15 foot set back to any waterway
 - The industry set back is 3 feet with a deflector shield and 10 feet without one
 - Audubon International recommends 25 feet
 - In agricultural areas the set back can be 25- 50 feet.
 - South County has used plants other than turf in the first 20 ft. of buffer areas
 - Grants are available to try these different buffer approaches
 - It might be possible to establish community set back guidelines with specific criteria and then self-rating for a few years before the county would take over to apply the criteria as part of a set back ordinance.

7. Does it matter what kind of fertilizer is applied in terms of the potential for negative environmental consequences?
 - The general consensus to this question was yes, but there were a few provisos (see #8)
8. What kind is better and what kind is not so good?
 - All of the influencing factors previously mentioned apply to the question as well.
 - Florida soils are different than the rest of the country so national blends may not work here.
 - Slow release fertilizers are generally better but temperature and other conditions need to be considered.
 - There is no agreement on the use of animal or human waste with some feeling these are better because they are organic while others feel they are worse due to potential health problems.
 - Some emerging guidelines suggest 30-50% of any blend should be slow release and up to 1 lb. /1000 sq. / ft. is acceptable. Environmentalists may still contend that any fertilizer is not good.
9. Does it matter what kind of landscape design and guidelines are used in terms of minimizing nutrient run off into waterways?
 - All four groups answered yes.
10. What kind of landscape mix is needed to optimize absorption and minimize run off? What features should be considered?
 - Swales would be effective
 - Bio-retention areas are successful
 - Green roofs are useful
 - Reducing the percentage of impervious surfaces
 - Low impact design standards
 - Grouping plants by their water and nutrient requirements
 - Using more plants that need no fertilizer
 - Alternatives to impervious concrete such as stone or bricks
 - Roofs draining onto pervious surfaces
 - Increasing the tree canopy
 - Micro irrigation
 - Reducing lawn acreage
 - Controlling pet waste
 - Different types of grass, possibly
 - Paving blocks with holes in them for plants or grass
 - Incentive for developers or home owners
 - Plants with high rates of absorption
 - Right plant, right place, right time
 - Need to show the value of these changes
 - Could the value of homes actually increase by doing these things?
 - Need a sense of community ownership to make these things happen
 - Tampa Bay Water is a good source for best practices
 - Need to stress recreation and appearance concerns because we don't get our water from the Bay for drinking

11. Should one of the primary areas of improvement in water quality and clarity focus on educating all concerned on the best methods of applying fertilizer?
—All four groups answered yes.
12. If education is a high priority, who should be responsible for developing, delivering and paying for these education programs?
- One focus should be on school age children for their influence on their parents, as well as to prepare them to be better citizens.
 - Social marketing principles need to be applied because this is education we want people to act on.
 - Education and marketing at the neighborhood level is the key because this is where people can inform and influence each other.
 - Neighborhoods could actually compete to create the best water quality environments.
 - Education about emergency rules and regulations is also vital. Code enforcement and water restrictions have worked in the past and are still working.
 - Education should be a collaborative effort between all key stakeholders to ensure consistency of information and synergy of effort.
 - Should build on existing efforts of the "Green Industry" (i.e., education, fertilizer manufacturers and retailers).
 - There should be a thorough effort to find best practice education programs in order not to re-invent the wheel.
 - The County should probably take the lead.
 - A database is needed for who has been trained.
 - Condo associations should be a prime target for education
 - Individual homeowners should also be targeted
 - Perhaps every bill or marketing piece from a fertilizer company should be required to have some basic educational information attached.
 - This education effort should include a good cost-benefit analysis to show homeowners and condo associations how this will benefit them.
 - Perhaps every real estate transaction should be required to include a basic information package.
 - Government officials need to be educated on the importance of enforcing rules and regulations instead of bending to citizens who want special treatment.
 - Accountability should be included along with education in order to encourage people to learn and apply this learning. Report cards could be created for neighborhoods to use voluntarily at first and then by the County for enforcement.
13. Should there be more research on the impact of fertilizer on the environment?
—All four groups answered yes. (But not as an excuse to not act on what is already known).
14. Should such research be conducted by concerned parties separately or together?
- Separately and together depending on the situation
 - Need to research the real impact of development

- A comprehensive economic impact study is needed
 - Research should be as independent as possible (Universities should be involved)
 - There is a fertilizer tax that could be used to fund some future research
 - Need more research on landscape systems
 - Need to find the real research gaps and fill them
 - Also need to review the existing research, condense it and communicate it
 - Research should be collaborative and peer reviewed if possible
15. What percentage of funding for this research should come from the private sector versus the government or environmental sectors?
- All should be able to participate
 - It might depend on the project
 - Perhaps should consider funding from those who are impacted by fertilizer use such as the tourism and the real estate industry
 - Should determine all of the groups doing research now
 - There should be research criteria established and priorities set based on agreed to research needs
16. Do current development guidelines contribute to higher levels of nitrogen pollution than is desirable? How?
- All four groups answered yes.
17. Should serious attention be paid to developing low impact development standards?
- All four groups answered yes.
18. What are some of the best examples of low-impact development standards?
- Stopping urban sprawl (higher density with more green space)
 - Developing comprehensive sustainable committee guidelines
 - Minimizing turf
 - Buffer zone by waterways
 - Natural area preservation
 - More pervious surfaces
 - Tree ordinance to increase canopy cover
 - Irrigation systems only in appropriate situations
 - Right plant, right place, right time guidelines
 - Vegetating swales
 - Florida Yards and Neighborhood guidelines
 - Sarasota Estuary Programs
 - Less soil compaction
 - Green roofs
 - Soil fill with an acceptable pH
 - More shade for impervious surfaces
19. Do impervious surfaces contribute to the nitrate pollution situation?
- All four groups answered yes.
20. Should one of the priority actions be the consideration of encouraging more pervious surfaces in future developments? What are examples?

— Many suggestions were provided in previous questions and answers.

Conclusions

Seven primary topics evolved from this process:

- A. Public Education
- B. Licensing, Certification and Training for Fertilizer Applicators
- C. Design and Development Standards
- D. Water Setback Zones
- E. Application Timing
- F. Fertilizer Products
- G. Accountability Mechanisms

The topics were reviewed and recommendations made in small groups and then brought to the entire group for discussion and validation of the recommendations. Most decisions were reached by consensus with only two issues requiring a vote: size of setback zones, and application timing restrictions.

A. Public Education

1. The nutrient pledge should be sent to all citizens with their water bill. It should be used in the schools and featured in a television public relations campaign.
2. It was recommended that education programs should stress the need for balance in landscaping with emphasis on *Florida Friendly* alternatives. Turf has a place in a balanced landscape plan but deed restrictions should not require a fixed percentage of turf. The right plant for each situation should be stressed with emphasis on reducing the need for fertilization and watering.
3. Slogans such as “Nature is Beautiful” and “It’s Not Just About Grass” should be used to emphasize *Florida Friendly* landscaping.
4. Homeowners should be encouraged to get professional advice on landscaping from a certified professional or from *Florida House*, U of F Extension and estuary programs that stress landscape design.
5. It was recommended that more emphasis in public education be placed on knowledge about soil condition (i.e. compaction, pH and organic material) as well as the fact that off color or temporarily brown lawns aren’t always unhealthy lawns. People should be discouraged from wanting to ensure that their lawn is as green as their neighbor’s lawn.

6. Proper irrigation should also be emphasized in public education with due consideration of the nutrients present in reuse water as well as the irrigation techniques used. Impervious surfaces should be carefully avoided when watering with reuse water due to their potentially high levels of nitrogen and phosphorus. The County should consider ways to treat reuse water to create consistently acceptable levels of these nutrients.
7. A complete educational package for schools should be developed.

B. Licensing, Certification and Training for Fertilizer Applicators

1. All groups felt we should require a certification and training program, for anyone who commercially applies fertilizer, such as lawn care professionals, but also for property managers and representatives from homeowner associations who contract for these services. This should be a requirement in order to obtain what was previously referred to as an occupational license and is now call a local business tax. As part of fertilizer application training, it should be stressed that nitrogen and phosphorus should not be applied from July 1 to October 1 except in cases of damaged lawns or high-use athletic fields.
2. It was agreed that fertilizer companies should begin to move towards a system that provides all customers with a written record of the pounds of nitrogen and other nutrients applied per 1000 sq. ft.
3. Eventually all nutrient sales information should be computerized to produce an accurate estimate of the pounds of various nutrients applied per 1000 sq. ft. in Sarasota County.

C. Design and Development Standards

1. Representatives agreed that developers should be required to de-compact all soil by tilling at least 4-6 inches.
2. Ingress and egress routes should be limited to 25 percent of the building lot excluding the building footprint. All non-essential vehicles should be parked on the street during the construction phase.

3. All existing beneficial trees on building lots should be retained if possible. They should be protected during construction with a barrier at least 10 feet beyond the drip line of each tree.
4. There should be a fertilizer free buffer zone around all water bodies set at 10 feet from the water if possible. This should be accomplished with an area of shrubbery, plants and trees that require little or no mowing, watering or fertilizer.
5. Deed restrictions should not require any fixed percentage of lawn area for the total yard.
6. Golf courses should receive special consideration. New courses are required to meet standards set by Audubon International and the State of Florida. Sarasota County may need to augment these standards due to special circumstances such as golf courses on barrier islands (i.e. Longboat Key.) A review of Ordinance #2003-069 may be in order to ensure that existing and new courses are covered by applicable county guidelines on the use of fertilizers.

D. Water Setback Zones

1. The representatives in a breakout group recommended staying with the fertilizer industry setback standards of 3 ft. with a deflector shield and 10 ft. without a deflector for applications of nutrients near waterways. However, in a subsequent vote of all representatives, the vote was 6 for this standard and 6 against, which means a consensus or a majority was not reached. The science behind this standard should be verified, according to many representatives present. The county may need to review this standard to determine if larger setbacks are needed.

E. Application Timing

1. A majority vote of all participants (10 to 1) agreed that there should be no nitrogen or phosphorus applied to yards from July 1 to October 1, with the exception of damaged lawns or high use ball fields.
2. There was discussion on obtaining more research to determine the level of risk of applying nitrogen and phosphorus during the rainy season, as well as the feasibility of extending the restricted period to run from June 1 to November 1.
3. IFAS application guidelines should be followed throughout the year unless professional evaluations or tests indicate that special situations exist that requires a deviation from this standard protocol.

4. A special Sarasota County fertilizer blend without nitrogen and phosphorus should be developed and promoted for use during the rainy season.

F. Fertilizer Products

1. Both quick and slow release products have benefits for various situations in a sound landscape management program. The general public needs more information on the best use of these different products.
2. Sarasota County should ask the State government to require all fertilizer manufacturers to substantiate any performance and safety claims made for their products.
3. The County should require all retail outlets to give preferential shelf space to slow release products, perhaps a fixed percentage of space that increases over a three year period.
4. There should be an evaluation of various fertilizer products, perhaps provided by the University of Florida. This evaluation would consist of criteria and performance for fertilizers used in various circumstances and what blends are preferred in those situations, as well as guidelines on how to apply fertilizers in those situations. This could help homeowners when they are purchasing fertilizer products.
5. All labels should contain clear and consistent information that is presented in a very noticeable manner. Best and worst examples of labeling should be shown to fertilizer companies to encourage them to make necessary changes.

G. Accountability Mechanisms and Incentives

1. All fines collected should be earmarked for educational purposes.
2. The nutrient levels of reuse water should always be posted where people can review the information prior to applying fertilizer.
3. County regulations regarding fertilizer management for golf courses should not move forward until the FDEP releases Golf Course BMP Manual. (It was released in March 2007)