
Developments in Water Management and Policy

Q&A¹

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Thomas Redick (Global Environmental Ethics Counsel, Clayton): Dr. Moore, the Gulf Restoration Network and a bunch of NGOs filed a lawsuit in Louisiana earlier this year saying the whole Mississippi TMDL² should be litigated into numeric limits just like they did in Florida recently to save that part of the world. So, we now have a 600-pound gorilla of litigation sitting in the middle of Mississippi Basin. Is that going to influence more limits? More trading? Will there be a boost to move this kind of program into other parts of the Mississippi Basin?

Richard Moore: I've been tracking this problem over the last 5 years pretty much. The idea of numeric criteria for watersheds has been promised for Ohio. I talked to Ohio EPA people a couple, 3 and 4 years ago and they said that it would be imposed on Ohio next spring or next fall. It's tied up in litigation. If numeric criteria are imposed on Ohio then we would have nitrogen limits probably 3 milligrams per liter, or as with water-treatment plants sometimes 1 milligram per liter. Three would be huge. On phosphorus, what they are talking about is taking it from 1 milligram per liter down to maybe 0.5. So, in Ohio it is much different, comparing the Ohio River Basin to the Lake Erie Basin, many of the water-treatment plants in the Lake Erie Basin are actually lower, so there is a different history of their regulations. With the Farm Bureau, there's a lot of litigation right now regarding even the ideal TMDLs. TMDLs are created by modeling too. There's been a lot of debate about how accurate the model has been.

¹Some of the audiorecording, from which this written record was prepared, was of poor quality, rendering it impossible to accurately represent dialogue. Every effort has been made to provide a faithful transcription.

²Total maximum daily load.

Hank Venema (International Institute for Sustainable Development, Winnipeg): Dr. Sharpley—a fantastic presentation. Just building on the points that you made that hydrology can overwhelm the system, that we are seeing this rapid uptake of tile drainage and no-till as well, it strikes me that there is a role for hydraulic storage in the system, that you need that buffering capacity. One of the assertions that we're making is that it actually would be acceptable to landowners if it wasn't a dead loss. If that land is taken out and put into hydraulic storage it would be a biomass-for-bioremediation area. You can get a zero-input biomass crop off there to offset the land taken out of production. Given your emphasis on the fact that hydrology can overwhelm all of our best intentions, do you regard that as a viable component here?

Andrew Sharpley: Yes I do. People are looking at enhanced wetlands, whether that is just to store nutrients or also to store water. In your area, that has been more critical because you can store water for later use when you need it. There's a double benefit. So yes, that is critical. I don't want to make the point that tile drainage and conservation tillage are bad. They are not. We need to think about adjusting management on implementation. We have to use tile drains, but we have to consider the hydrology and manage the nutrients we are using on that land a little differently from when it wasn't tile drained. But—storage of water temporarily for reuse or for mitigation—yes.

Bill McCutchen (Texas A&M University, College Station): Mr. Vester, you served on the EPA Advisory Board.

Ray Vester: Yes sir.

McCutchen: We've heard a lot about EPA regulations. With your experience and stature, will you share your feelings about the regulations that are being imposed and are they fair?

Vester: I served on that committee for a 2-year term with Jennie Popp, who is here. We made some great progress. When you serve on that advisory board you have a specific item that you are appointed to address. And we did it in a very good manner and I think we had a good response. For the last 8 or 9 years, I have been chair of the USA Rice Federation Environmental Regulatory Committee. EPA is not particularly my friend. I get along with them. I visit them every year. My personal opinion is that the problem in EPA is—first of all—we have people regulating industry who know nothing about the industry, particularly *vis-a-vis* agriculture and probably any other thing that they regulate. They don't understand what we do. They don't know what we do. Those in leadership positions don't care what we do. They are there for a purpose and with an agenda. Our committee dealt with water quality. Those with great writing skills wrote a paper with advice from some of us who just talked. We understand that regulations are often needed, based on sound science. I think with some EPA decisions, some of their models, aren't

based on sound science. We had a very strong science group on this committee of 29 who made that very clear. It was the opinion of this committee—and also my opinion from my experience with the rice industry—that you regulate from the community up, not from the top down. It's not easier to do, but it's more palatable to those whom you regulate. It takes leadership at the community level. As I said earlier, those who just want to be farmers, they can't just be farmers. You have to take the time to get involved at the grass-roots level to bring change. I was very impressed with Ohio's plan—what was accomplished. That made me feel very good: it can work. We sat in committee groups from this advisory committee and we had EPA staffers from different regions who sat in the peanut gallery and listened, and they would chuckle when we talked about what we thought ought to happen because they weren't interested in that. But, for industry's sake, for agriculture's, for the community's, I think the best plan is to do it from the ground up. If you get the people who are going to be regulated on board, if you get community leaders, if you get the leading agricultural people—the farmers who are the leaders in the community—on board, I think it's an addressable thing that you can accomplish. But we have to do it with sound science. Water-quality issues—I know it's coming down the pike, like a snowball headed you know where, because there's a demand, there's a lawsuit. We have to have information first. I know Arkansas is gathering information now because EPA has no information. Instead of assumptions, we have to have sound science. We have to have realistic numbers. We heard it this morning from Dr. Sharpley and others, of what we need to do and how we need to do it, but we have to be proactive. We as farmers, we as scientists, we as industry people, we have to be the ones who lead it.

Jozef Kokini (University of Illinois, Urbana): Mr. Vester, you are one of the few speakers that has actually talked about industrial uses of water. You talked about the paper-pulp industry in the state of Arkansas. We know the food industry consumes a lot of water. The ethanol industry uses a lot of water. So does the oil industry and many others. The statistics suggest that about 80% of the water being used around the world is actually used by agriculture, and I wonder what your thoughts are about the ratio of water that is being used by industry and the water-contamination issues that come from its utilization by industry.

Vester: I know that the fraction of agricultural use of water directly for crop production isn't that high of a percentage, but, even so, that percentage can be lowered and we can still do a quality job of production agriculture. We have waste. We have technology that people don't tend to want to use because it's new. Farmers are hard to get to change, okay? Just as industry is. And there has to be an effort on all fronts to change the pattern of what we do to adopt best practices. It may not be the simplest and it might not be the quickest, but what's best for the sustainability of crop production, for industry, and human consumption, I think that has to be at our forefront. Whatever it takes us to do—and I desire that it not be done by regulation. If you can do it through your agencies, through groups like this, I think you are going to have more success.

Audience Member: A question for Helen Jarvie. I'm curious about your perspective on the UK and EU versus US law, and implementation of policies. One perspective I've had is EU and UK laws work better than a lot of US policy because you don't have unfunded mandated problems. In the US a lot of law is passed without the funding to support that law. So, I'm curious: in your time here in the States what is your perspective of how we do things versus how you do things?

Helen Jarvie: From a water-quality perspective, there is a fundamental difference in approach in Europe. Our water law is subsumed within something called the Water Framework Directive, which has a strong ecological driver. So, the requirement is for the Member States in Europe to achieve good ecological status in our water bodies by 2015. Individual Member States are given quite a degree of freedom in how they go about defining the measures they enact to achieve that good ecological status. Essentially what the Water Framework did was to shift the emphasis in Europe from chemical criteria to biological criteria, and for the UK that was a significant shift in approach. Our water laws are now driving us towards ecological indicators. I think I mentioned that the UK has gone down the route of using diatom indices as a measure of ecological status. That's for convenience and those diatom indices are geared toward critical threshold phosphorus concentrations. But the difference is it's nutrient criteria, it's chemical criteria and total maximum daily loads, that are the drivers of change in water quality and water law. I'm not so familiar with this kind of legislation; perhaps one of the other panelists can help on the US side of things.

Audience Member: Identified by several of you were disconnects in the system. I think Helen identified the disconnect between our understanding of the nature of the legacy of nutrients for example, and the kind of project work we do that's short term whereas it can take a long time to have an impact. And the policy folks are saying, "Tell me something now. I want to know that what you did had some effect." Is there an example of a fix for that disconnect—any mechanism to give us hope that we're going to solve that disconnect?

Richard Moore: This may be a transition from what was just said, but I think that biological criteria are perhaps the best indicators. In the US most of the state EPA's are reliant upon the chemical criteria, which provide data more quickly. Biological criteria are better longer-term indicators.

Andrew Sharpley: I was recently on an NRC panel looking at tracking and accountability within the Chesapeake Bay Program; how successful has that been? We struggled as a group to find successes and I think that they are not at the Chesapeake Bay or the Gulf of Mexico scale. You have to go back to smaller scale and there are examples: Spring Creek within the Chesapeake Bay. We find success stories at a smaller scale; maybe some sea grasses are coming back. That's probably where the focus should go to demonstrate that

some of these things do work—like Helen was talking about between where the change has been and the water-body has responded. Don't focus on the large water body, but go back in scale.

Moore: To piggy-back on that—in the case of the Lake Erie algal bloom, a recent development is looking at the algal levels within the streams and rivers that go into the lake, rather than looking at Lake Erie as a whole. Looking at the smaller unit is more effective. I also want to say that Ohio EPA's surface-water division takes a more biological approach than most other state EPAs. It's common to hear them say that biological trumps chemical.

Deanna Osmond: EPA recognizes this and that's why they started the 319 national monitoring program protocol using paired watersheds, because they knew that if they got into smaller areas with a paired watershed approach they could show change much more quickly. Recently, I was at a meeting where the Oklahoma folks talked about successfully using paired watershed designs to implement conservation practices and actually show water-quality change. The small design is the way we are going to have to go to show change.

Audience Member: Further to the question on disconnects—we have multiple different ideas on what are the best management practices to implement. On a large scale or in terms of multiple different point sources, what resources or incentives might be needed for implementation? As you have alluded to, often there is a disconnect between what the farmer is doing and what needs to be done.

Osmond: We are struggling with this question because we recognize—or at least I recognize—that federal resources are dwindling and the federal resources we have are not available to do this. We are going to have to be creative and it's going to have to be a federal, state and local initiative with the private sector, including the farmers. Unless we all decide that this is a priority and work together, there aren't enough resources to fix it.

Vester: Another thing is we talk about solving problems black and white and, when it comes to agriculture, nothing is black and white. I've farmed as an adult for 44 years, but my first job on the farm was when I was 6 years of age, punching wire through a stationary hay bailer. I worked with my dad everyday on the farm that I wasn't in school, so I've seen this for 60 years and in that time no two years were alike. There's been no two things—in putting in a crop—that worked exactly the same as it did the year before. There always are differences and change. When you attack a problem on the farm, it's not black and white, it's gray. You hope that the farmer is getting to the point of controlling the nutrients. It may not be exactly the way it's formulated, but he has to do the things that the weather allows him to do, and that his situation allows him to do.

Sharpley: You are right, it does cost a lot of money and, a lot of times, implementation is only the beginning of it. Fencing, for example, costs a lot to maintain time-wise; there's a hidden cost. Efforts like "green" labeling denoting environmental stewardship—increasing prices by just a few cents—don't work unless everybody is invested, because the people who are driving it tend to buy the cheapest carton of milk and the cheapest cut of meat. I think it has been more successful in Europe. I notice when I go back to the UK that there is a greater awareness of labeling and people look at the sources of what they buy. There is a different approach, but it has been tough to get the public to pay for some of the services they are getting.

Jarvie: Something I have noticed in the UK, where there's been a series of farming catastrophes, is much more awareness about buying local produce and Freedom Foods and the like.

Moore: With regard to problems with budget, there's a lot of potential for cutting costs. We make stream measurements in the lab to fractions of a unit whereas with nitrate, for example, we want to know if the value is 8 or 10. Colorimetric assays could be done at the local community level by collecting water samples. If the local community embraces its own watershed, many inexpensive ways of cleaning it up are available.

Ralph Hardy (National Agricultural Biotechnology Council, Ithaca): What sort of benefit would there be from phytase-enriched feeds, for example, to reduce the necessary phosphate input thereby reducing phosphate in the manure? What about nitrification inhibitors, so you keep more of the nitrogen in the manure in the urea or ammonia state so you don't have the nitrates that will run off in tile drains and so on? What about leguminous cover crops? In terms of improving water quality, is there opportunity to integrate back into the areas you've been talking about or don't you see opportunity?

Sharpley: Definitely there is, yes. I mentioned cover crops, which are gaining wide acceptance. New plants are being looked at as cover crops that farmers could get some cash from. There is intercropping. I think phytase is used widely in the Bay Watershed; others here probably have more experience, but I think it was initially used as a cost-cutting measure because it reduced the need for costly calcium phosphate in feed, but it had the benefit of reducing the excretion of P quite dramatically. That's a win-win because it reduces feed costs and, at the same time, has an environmental benefit.

Osmond: All of these things are regional. A group of us in the southeast and south just looked at some of these products that you were talking about, and found that nitrification inhibitors actually didn't change the fate of nitrogen. Growing cotton in the south, we can't get our cover crop in early enough to make it have any value. A lot of these conservation practices have to be examined in the agro-ecological system that they are being placed in.

Moore: That is an issue that is going to come up with climate change as well in the sense of many genotypes have been selected as longer-season varieties, whereas by having a longer season you are more susceptible to the perturbations—ups and downs—in climate. Shorter-season varieties may help us through climate change as well as provide opportunities for cover crops. The same thing happens in Ohio: a lot of times we run out of season so we don't have time to put in a cover crop.

David Benfield (Ohio State University, Wooster): We are all taking responsibility for looking at water sustainability in agriculture and you have mentioned conservation practices related to that. We are trying to get the message out about being good stewards of the land as well as of water. But does the urban environment play a role in this, outside of agriculture, in terms of phosphorus and so forth?

Jarvie: I'm from a very densely populated little island, Great Britain, and, in our watersheds, urban influences are significant, particularly wastewater point sources. Very often, as you are scaling up to the watershed level the role of agriculture gets subsumed within a big point-source signal. It's different here but, for our watersheds, tackling point sources has been most important. By introducing better tertiary treatment facilities we've been able to dramatically reduce very quickly the phosphorus concentrations in our rivers. We still have a way to go because we have a very dispersed rural population and small, rural wastewater treatment plants are a big issue. I'm not sure that they are so much of an issue here, but, of course, the economies of scale are such that it's much more effective to target the big wastewater-treatment works and yet we end up with an agricultural watershed that does still have big point-source influences.

Vester: If I remember correctly from my 2 years on the EPA advisory committee, 25% of nutrients come from storm water. If you think we in agriculture put a lot of fertilizer on our fields, it's amazing what people put on their yards. Also, they put chemicals on that I have to have a restricted-use pesticide permit to buy. So, there is definitely a problem there that is not being addressed—25% of the problem.

Jarvie: This also goes back to the issue of hydrology. The hydrological connectivity of those urban sources to the stream network is efficient because you have paved surfaces, concrete, tarmac surfaces and a very efficient drainage network. Certainly in the UK, sustainable urban drainage systems are a big issue in terms of trying to promote retention ponds and to delay the delivery of that urban storm water into the river network.

Moore: During the low-flow season in the summer, the city of Columbus uses almost half the water coming down the Scioto River. The largest user of that water is Anheuser Busch. To do their upgrades in the city they have to worry about effects on the price of water. They don't want Anheuser Busch to go to another city, so they want to keep the price of water down. All of these things make it a very complex system.