Amendments

Improving Awareness & Advocacy of the Michigan Biosolids Program

Volume 14, Second Quarter June, 2010

MBT News

2010 MSU Agricultural Expo

The MBT will be have an exhibit at the 2010 MSU Agricultural Expo on July 20-22, 2010, **Lot 861** at the Ag Expo grounds on the MSU Campus. **We are extending this invitation to Biosolids Generating facilities to attend.** Information about the MSU Ag Expo can be found at http://www.agexpo.msu.edu/. We will be having an MBT meeting on July 22, followed by a pizza lunch provided by the MBT. **Please RSVP to mahoneys@michigan.gov if you plan to attend.** Hope to see you there!!

MBT 2010 Biosolids Fall Seminar

The MWEA Biosolids Committee has scheduled a one day seminar for October 14, 2010, at the Charlevoix Public Library in Charlevoix, Michigan. The draft title for the seminar is "*Septage to Biosolids".* The seminar will focus on Septage receiving, treatment, POTW impacts and concerns, and tours of the Big Fish Septage treatment Station and a site being reclaimed with biosolids. More information to come.

2011 Joint Conference

The MWEA Biosolids Committee has teamed up with the MWEA industrial Pre-treatment Committee to have a two day joint conference in September, 2011. The proposed location is the Radisson Hotel in Kalamazoo, with possible tours of the Coca-Cola Bottling Plant and St.Julian Winery in Paw Paw, as well as the Plainwell WWTP, and dinner at the Air Zoo. Topics covered will be relevant to both Committees, as well as breakout sessions to cover Biosolids or IPP specific areas.

Michigan News

Goodland Township Pursues Biosolids Ordinance

BY NANCY ELLIOTT 810-452-2601 • nelliott@mihomepaper.com

GOODLAND TWP. (Lapeer County) — Goodland Township Hall was the scene of a public hearing last week when representatives from the Michigan Dept. of Natural Resources and Environment visited on the topic of a proposed local ordinance aimed at regulating the land application of biosolids.

"We had a good crowd," said Goodland Township Supervisor Ron Cischke of the May 12 meeting. Three representatives from the DNRE heard opinions on both sides of the fence from the crowd of an estimated 45 people. That group included farmers, residents, firms involved with the application of biosolids as well as treatment plant managers.

At issue was Goodland Township's proposed ordinance which prohibits the application of sewage sludge to any land within 750 feet of a residence, commercial building, domestic well or surface water. It further prohibits land application within 2,500 feet of fields where root crops or other susceptible produce are grown for human consumption. It prohibits application within 3,000 feet of a municipal well or public water supply.

The proposed ordinance also proscribes limits for the injection of sewage sludge near habitation, surface water or fields. It defines slopes to prevent contaminating run-off. Violation of the proposed ordinance would be a municipal civil infraction resulting in fines.

Since biosolids come under the regulation of the state, Goodland Township's proposed ordinance was submitted to the DNRE for "approval and for authority to stringently regulate the land application of sewage

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sludge and sewage sludge derivatives within Goodland Township to protect the public health and safety."

"The DEQ does not have enough people to enforce their own rules," said Cischke. "This gives us a little authority to look at it, too." Cischke said the township has already witnessed and documented application violations.

"We've got pictures," he said. Some of those photographs were available during the public hearing. "If you've seen it spread next to your house, you wouldn't want it either."

According to the US Environmental Protection Agency "biosolids are the nutrient-rich organic materials resulting from the treatment of sewage sludge (the name for the solid, semisolid or liquid untreated residue generated during the treatment of domestic sewage in a treatment facility.) When treated and processed, sewage sludge becomes biosolids which can be safely recycled and applied as fertilizer to sustainably improve and maintain productive soils and stimulate plant growth."

While the EPA champions the safety of biosolids, others are not so sure. Questions have been raised about pharmaceuticals and other chemicals that could get into the public's food and water.

Cischke says that the DNRE officials at last Wednesday's meeting admitted they haven't found a good way even to test for pharmaceuticals in the sewage sludge. "We need to keep it out of the drains," he urges. "It goes back to 'what's in it?'"

In addition, the impact on wildlife is a concern to some. The odor from the land application of biosolids is a big issue to others.

Cischke and the township board are not seeking to ban the practice altogether, they simply want more regulation and the ability to monitor and enforce it at the local level.

"Let's use common sense. Let's inject it, and keep it away from water," said Cischke. Injection of the biosolids means turning the sewage sludge into the soil, rather than simply applying it to the surface.

Controlling the possibilities of water contamination is the other big facet. On low lands which have been treated with biosolids, Cischke says, the DNRE imposes a 38-month waiting period before crops can be harvested. "That tells you something," he said.

Cischke says he's not blaming the farmers who use biosolids, noting that the practice has been going on for 20 years. "The applicators are the biggest violators," he said.

Following the public hearing, the DNRE has 45 days to respond. They will return with approval, disapproval or a request for an amendment to the proposed ordinance.

On June 22, 2010, DNRE sent a letter to Goodland Township stating, after thoroughly reviewing your proposed ordinance along with the testimony at the May 12, 2010 public meeting, Goodland Township did not produce scientific evidence that the existing state regulations will result in unreasonable adverse effects on public health and the environment, among other findings, thus the Ordinance is denied.

Bay County, MI Officials Chart $30 Million Course to Cut Sewage Overflows.

Bay City, MI Times, 4-18-10.

BANGOR TWP. The Bay County wastewater treatment plant has launched a major improvement project that promises to practically eliminate sewage overflows to the Saginaw River. The work, totaling $30 million, began last week and includes construction of a 53 million-gallon retention basin to hold combined sewage and stormwater during heavy rain and snowmelt events. The new basin will be 15 times larger than the plant's existing retention capacity of 3.5 million gallons. The project is due to be complete by Oct. 1, said Tom Paige, assistant director for the Bay County Department of Water and Sewer, overseen by the Bay County Road Commission. This should greatly reduce or eliminate CSOs or SSOs in Bay County, said Ken Miller, department director, referring to combined sewer and sanitary sewer overflows. We have the opportunity to do something great here.

The Bay County plant had two overflow events in 2009, totaling about 10.7 million gallons, state records show. The Bay County plant serves townships with separated sewer systems, where sanitary waste and stormwater flows in separate pipes. Part of Essexville is on a combined system, where liquids flow through the same pipes. The West Bay County Regional Wastewater Treatment Plant isn't the only one that discharges to the Saginaw River. Nor is it the most frequent offender when it comes to overflows. Plants operated by the cities of Bay City and Saginaw have more problems with combined sewage overflows, state data shows.

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But the upgrades to the Bay County plant will include bringing on Hampton Township, which was previously served by the Bay City Wastewater Treatment Plant. Essexville also is joining the county plant. Essexville plans to construct a new pumping station to send wastewater to the Bay County plant. Once that pump station is operating, the treatment works portion of the city's existing plant will be demolished, said City Manager Dale Majerczyk. A 1.2 million-gallon retention basin will be maintained at the site for emergencies. The Bay County plant also will be installing two anaerobic digesters, fueled by methane from the digestion process.

The units are expected to reduce the amount of sludge left over from the wastewater treatment process by about 40 percent, or 2 million gallons per year. Normally, the plant has to pay for lime to stabilize the sludge so it can be used as biosolids, or fertilizer. The digesters will eliminate the need for the lime, and cut costs paid by the plant to have the biosolids hauled away, Paige said.

The project also will involve constructing a valve building on site and enlarging a chlorine contact chamber used for treatment. Pipes will be installed to connect Hampton Township and Essexville operations to the Bay County plant as well, including a pipe that will run under the Saginaw River, to be installed with boring equipment.

The Road Commission has hired Fleis & Vanderbrink of Grand Rapids for the project, a construction management company that's contracting out the work. Using a construction management process has allowed for flexibility, and hiring more local contractors, like Lee Wood Contracting Inc. of Essexville; Bilacic Trucking & Excavating of Au Gres; and J.R. Heineman & Sons of Saginaw, Miller said. The $30 million project cost is being split between the Bay County Department of Water and Sewer, Hampton Township and the city of Essexville. Low-interest loans and government grants are part of the mix. The costs will be paid back through rates. But officials in Hampton Township and Essexville have said they expect costs for residents to be lower or no higher than the cost of continuing to receive service from Bay City. Bay City officials have said they're mulling plans for the future of the city wastewater plant, which is in need of costly improvements and has raised rates for customers over the years because of a decline in industry use. Bill Kaiser, plant superintendent, could not be reached for comment.

Paige said plans for the new Bay County retention basin ballooned from 35 million gallons to 53 million gallons because of lower-than-expected bids, and a decision from state regulators that the basin could be built with a natural clay lining, rather than a more expensive synthetic material. "I think its a once-in-a-lifetime deal", Paige said of the project, which should allow excess sewage to be held on site during storm events, rather than being discharged to the river before full treatment can be completed. A basin totaling 53 million gallons will take up 18 acres, and was the largest footprint that would fit on the Bay County plant site, Paige said. In the event we need it, we will have it available, he said. That should reduce overflows.

The Bay County plant acquired 25.5 acres of land from Bangor Township for the basin, to mitigate 2.1 acres of wetlands impacted by the project, Miller said. The mitigation will involve putting a conservation easement on some property north of the basin and creating wetlands to the east of the basin. Miller, Bangor Township Supervisor Terry L. Watson, and Bay County Board Chairman Brian Elder say the project, which was put together in a year of planning, is a great example of what can be achieved through intergovernmental cooperation.

Hampton Township and Essexville also will become part owners of the plant, and have decision-making power when it comes to setting rates and making improvements. The two local governments have had disagreements over the years with rate increases imposed by the Bay City plant. Even with the new customers, the county plant will only be at 55-60 percent capacity, Miller said.

State investigates whether Big Crooked Lake was contaminated by 'biosolids' in recent storm

Published: Wednesday, June 23, 2010, 1:02 PM
Updated: Wednesday, June 23, 2010, 1:04 PM

Kyla King, The Grand Rapids Press
Mark Copie,r |The Grand Rapids Press

GRATTAN TOWNSHIP -- State environmental officials want to know if a lake in eastern Kent County was polluted after heavy rains washed in treated sludge that had been applied to a nearby farm as fertilizer.

Residents on Big Crooked Lake claim the ecosystem and water quality of the lake -- which is surrounded by homes and used for swimming, boating and fishing –

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may have been compromised by small amounts of fecal bacterial and concentrated nutrients in the sludge.

"The concern is they contain (fecal bacteria) in quantities we just don't want it in the water," said Ed Hawks, who lives on the 150-acre lake on Keystone Drive NE.

Their anxiety is understandable, but their perception is different than the reality, said officials from Wyoming's wastewater treatment plant where the treated sludge, known as "biosolids," came from.

Deputy Public Works Director Tom Kent said soil from many sources was forced into the lake on June 15 when Ada Township bore the brunt of a deluge that dumped 4.4 inches in six hours.

"Whether we were there or not, (bacteria) counts on that lake would be high simply because there is all kinds of influence on the soil from ... wildlife in the area," he said.

Still, the incident is under investigation, said Mike Worm, assistant district supervisor for the Grand Rapids district office of the Michigan Department of Natural Resources and Environment.

"We're looking to see if there was any sort of discharge," Worm said. "Regardless of whether it's been treated, you can't have material leave the site of application."

Worm said he is waiting for water samples to come back. He said the situation is "tricky" because runoff comes from many sources during a heavy rain.

"To be fair to the farmer, you don't usually do your farming practices when you anticipate three to four inches of rain," Worm said.

Wyoming's Kent said his staff took water samples.

"As far as we can tell, there's really no impact from that field. We did not identify any biosolids that are running off into that lake," he said.

Kent said the sludge is treated with a process called "pathogen reduction." And, he said the city had the necessary permits, followed all environmental procedures, even taking precautions like injecting the biosolids under the surface of the soil.

The biosolids were applied June 15 to about 30 acres of a 90-acre field at the Seif Family Farm. The farm -- a former dairy operation that now grows cash crops -- is part of Kent County's farmland preservation program, which pays owners of agricultural land to sign away the right to property development.

Kent said the biosolid application is part of a pilot program intended to allow farms in Kent County's preservation program to work with cities to dispose of sewage.

National News

Ohio EPA Wants to Ban Wintertime Use of Biosolids on Farm Fields.

Columbus, OH Dispatch, 5-31-10

State officials plan to ban farmers from spreading sewage sludge on their fields during the winter, a practice that fouls nearby streams. An Ohio Environmental Protection Agency proposal would prohibit spreading the waste on farm fields from Dec. 15 through March 1. A more-strict proposal that was scrapped three years ago would have extended the ban by nearly 45 days. The agency plans to discuss the ban during a public hearing at 10:30 a.m. June7 at the agency's Downtown offices, 50 W. Town St. The state says the proposal is intended to prevent incidents in which sludge that was spread on frozen farm fields runs off and poisons streams during sudden thaws or unseasonable rainstorms.

In February 2004, for example, thousands of gallons of Columbus sewage sludge ran off a Fayette County field and polluted Paint Creek. The city paid a $10,000 fine and agreed to inject sludge into the soil on farms instead of spreading it on the surface. The EPA first proposed a ban in 2007 but withdrew it after officials at sewage-treatment plants, farmers and companies that spread sludge complained that it was too expensive and unnecessary. Jacob Howdyshell, the EPA's sewage-sludge coordinator, said the agency spent the past three years working on a compromise that shortens the non-application period, which initially was proposed to run from Nov. 15 through March 15.

David Brewer, a sludge manager for Montgomery County's sewer systems, said the new proposal still

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would raise costs for public sewer systems that would have to either store sludge during the winter or pay to dump it in landfills. Brewer, who was involved in negotiations on the compromise, estimates the county would have to spend more than $1 million to construct a sludge-storage building."(The EPA) drew a big line in the sand," Brewer said. "They said, 'We're just not going to compromise anymore on winter (sludge) application. About 140,000 tons of sludge is spread on as many as 8,800 fields across Ohio each year, Howdyshell said.

An estimated 2,426 tons of the 36,809 tons of dry sewage sludge produced by Columbus treatment plants last year were injected into farm fields. Most of the remaining sludge was incinerated. Sludge that is injected into soil is less likely to run off during storms. Although the proposed ban applies only to sludge spread on top of fields, Howdyshell said injection will not work in the winter because the soil most likely will be frozen. Dax Blake, Columbus' sewerage and drainage administrator, said the city might incinerate more sludge during the winter or store it at the plants for use after March 1 when the ban would expire. "We don't think it's going to have much of an impact" on Columbus, Blake said.

EPA Standards for the Use or Disposal of Sewage Sludge; Part 503 Final Rules - Searchable Electronic Copy Available.

From ***Rick Stevens,*** stevens.rick@epa.gov

A new searchable electronic copy of the Standards for the Use or Disposal of Sewage Sludge; Final Rules (PDF), with preamble, ((40 CFR Part 257 et al.) issued on February 19, 1993 is now available at the EPA biosolids web page. The February 19, 1993 Federal Register PDF file is 348 pages.

Editors Note [SJH]: The February 19, 1993 Federal Register notice (print version) for the Part 503 sewage sludge regulations was converted to PDF format in 2009.

Research Short Story
Restoring with Biosolids or Building Houses

By Andrew Trlica, University of Washington

Because of release of carbon stored in soils and biomass from soils after disturbance to the atmosphere, land-use change is one of the major processes contributing to climate change. Reversing carbon losses through the reclamation of degraded land using biosolids as a soil amendment, has the potential to reverse this process. Carbon stored in soils reclaimed with biosolids also may be a candidate for carbon credits. Protocols already exist for projects involving reduced agricultural tillage or reforestation. Before a protocol can be developed, the magnitude of potential long-term soil carbon storage increases with biosolids reclamation needs to be quantified. In addition, an evaluation of the impact of biosolids application on disturbed land has to be compared to existing biosolids management practices and alternative land restoration practices, such as building subdivisions. This study was done to determine carbon storage on disturbed lands restored with biosolids and to evaluate the greenhouse gas emissions/sequestration of this practice in comparison to restoring land to homes using a life cycle analysis.

To quantify carbon storage on sites restored with biosolids, soil samples from 0-15cm and 15-30cm depths were taken from a number of surface mine sites reclaimed either with biosolids or using conventional reclamation approaches. Soils were collected from sites in British Columbia, Washington State, Pennsylvania and New England. We attempted to focus on sites with greater age since final reclamation (up to 27 years). Across all mines, sites reclaimed with biosolids stored a mean of 32.5 ± 3.2 Mg C ha^{-1} more carbon than conventionally reclaimed sites. Carbon storage from 0-30cm showed a significant positive effect for site age, biosolids application rate, and biosolids treatment (R^2_{adj} = 0.3, $p < 0.000$). That means that carbon storage generally increased as the sites matured, that adding biosolids always increased carbon storage and that increasing the application rate appeared to increase carbon storage. The average quantity of carbon stored in excess of storage using conventional restoration per metric ton of biosolids applied was 0.26± 0.03.

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A life cycle assessment was done using carbon storage values from the mine area in Washington State. The LCA estimated the net greenhouse gas emissions from the use of biosolids in reclaiming one hectare of degraded forest land in the Puget Sound region in comparison to development into subdivisions. The different restoration scenarios that were modeled included:

a) Conventional reclamation to forest and biosolids applied to wheat in Eastern Washington

b) Development of the land to low-density housing and biosolids applied to wheat in Eastern Washington

c) Using biosolids for reclamation with synthetic fertilizer used to fertilize wheat

The LCA included credits for soil and tree carbon increases. Values for carbon storage associated with the use of biosolids in wheat fields were taken from values at the WSU field plots in Boulder Park. It included debits for road building, home construction, energy use within the homes, and N_2O emissions from biosolids and synthetic fertilizer. Transportation related emissions were also included.

The results of the LCA showed that building houses (just about 2 houses per hectare) results in net emissions of 2,464 metric tons of CO_2 per hectare. In comparison, restoring the land to forest, either with or without the help of biosolids, results in a net carbon credit. Without biosolids, this credit is approximately 477 Mg CO_2 per ha. Adding biosolids to the equation results in an extra 62 tons of CO_2 per ha. The results of this study clearly demonstrate the benefits to the atmosphere of restoring disturbed lands to forests with the help of biosolids.

Algae Advances as a Green Alternative for Improving Water Quality.

USDA Agricultural Research Service.

A new study by the Agricultural Research Service (ARS) showed that algae could be used to remove nitrogen and phosphorous from livestock manure runoff and then dried and sold as a slow release fertilizer, according to the United States Department of Agriculture (USDA). The method could give resource managers a new eco-friendly option for reducing the level of agricultural pollutants that contaminate water quality in the Chesapeake Bay, the article stated.The study, led by ARS M icrobiologist Walter Mulbry, indicated that an algal turf scrubber (ATS) system recovered 60 to 90 percent of the nitrogen and 70 to 100 percent of the phosphorus from the manure effluents, according to the story.

Algae, already being eyed for biofuel production, could be put to use right away to remove nitrogen and phosphorus in livestock manure runoff, according to an Agricultural Research Service (ARS) scientist. That could give resource managers a new eco-friendly option for reducing the level of agricultural pollutants that contaminate water quality in the Chesapeake Bay. Microbiologist Walter Mulbry works at the ARS Environmental Management and Byproduct Utilization Research Unit in Beltsville, Md., which is located in the Chesapeake Bay watershed. In 2003, Mulbry set up four algal turf scrubber (ATS) raceways outside dairy barns in Beltsville. The shallow 100-foot raceways were covered with nylon netting that created a scaffold where the algae could grow.

For the next three years, from April until December, a submerged water pump at one end of the raceways circulated a mix of fresh water and raw or anaerobically digested dairy manure effluent over the algae. Within two to three weeks after the ATS system was started up every spring, the raceways supported thriving colonies of green filamentous algae. Algae productivity was highest in the spring and declined during the summer, in part because of higher water temperatures and also because the raceways provided snails and midge larvae ample opportunity to graze on the algae.

Mulbry and his partners harvested wet algae every four to 12 days, dried it, and then analyzed the dried biomass for nitrogen and phosphorus levels. His results indicate that the ATS system recovered 60 to 90 percent of the nitrogen and 70 to 100 percent of the phosphorus from the manure effluents. They also calculated that the cost for this capture was comparable to other manure management practices, around $5 to $6 for each pound of nitrogen that was recovered and around $25 for each pound of phosphorus that was recovered. Results from this research were published in *Bioresource Technology*.Read more about this research in the May/June 2010 issue of *Agricultural Research* magazine. ARS is the principal intramural scientific research agency of the U.S. Department of Agriculture.

Peak Phosphorus

It's an essential, if underappreciated component of our daily lives, and a key link in the global food chain. And it's running out.

BY JAMES ELSER, STUART WHITE | APRIL 20, 2010

FP Foreign Policy Magazine

From Kansas to China's Sichuan province, farmers treat their fields with phosphorus-rich fertilizer to increase the yield of their crops. What happens next, however, receives relatively little attention. Large amounts of this resource are lost from farm fields, through soil erosion and runoff, and down swirling toilets, through our urine and feces. Although seemingly mundane, this process cannot continue indefinitely. Our dwindling supply of phosphorus, a primary component underlying the growth of global agricultural production, threatens to disrupt food security across the planet during the coming century. This is the gravest natural resource shortage you've never heard of.

The root of this problem has previously been the subject of presidential concern. In a message to Congress in 1938, U.S. President Franklin D. Roosevelt warned that the phosphorus content of American agricultural land "has greatly diminished." This shortage, Roosevelt warned, could cause low crop yields and poor-quality produce, detrimentally affecting "the physical health and economic security of the people of the nation."

Phosphorus is used extensively for a variety of key functions in all living things, including the construction of DNA and cell membranes. As it is relatively rare in the Earth's crust, a lack of phosphorus is often the limiting factor in the growth of plants and algae. In humans, it plays an essential role in bone formation. Without a steady supply of this resource, global agricultural production will face a bottleneck, and humankind's growing population will suffer a serious nutrition shortage.

The world's reliance on phosphorus is an unappreciated aspect of the "Green Revolution," a series of agricultural innovations that made it possible to feed the approximately 4.2 billion-person increase in the global population since 1950. This massive expansion of global agricultural production required a simultaneous increase in the supply of key resources, including water and nitrogen. Without an increase in phosphorus, however, crops would still have lacked the resources necessary to fuel a substantial increase in production, and the Green Revolution would not have gotten off the ground.

Roosevelt's warning was prescient and stimulated agricultural engineers to find an effective, albeit temporary, solution. To satisfy the world's growing food demand, they mobilized global mining efforts in ancient, phosphorus-rich marine deposits. By 2008, industrial farmers were applying an annual 17 million metric tons of mined phosphorus on their fields. Demand is expanding at around 3 percent a year -- a rate that is likely to accelerate due to rising prosperity in the developing world (richer people consume more meat) and the burgeoning bioenergy sector, which also requires phosphorus to support crop-based biofuels.

Our supply of mined phosphorus is running out. Many mines used to meet this growing demand are degrading, as they are increasingly forced to access deeper layers and extract a lower quality of phosphate-bearing rock (phosphate is the chemical form in which nearly all phosphorus is found). Some initial analyses from scientists with the Global Phosphorus Research Initiative estimate that there will not be sufficient phosphorus supplies from mining to meet agricultural demand within 30 to 40 years. Although more research is clearly needed, this is not a comforting time scale.

The geographic concentration of phosphate mines also threatens to usher in an era of intense resource competition. Nearly 90 percent of the world's estimated phosphorus reserves are found in five countries: Morocco, China, South Africa, Jordan, and the United States. In comparison, the 12 countries that make up the OPEC cartel control only 75 percent of the world's oil reserves.

This fact could spark international tension and even influence how countries attempt to draw their internal boundaries. Many of Morocco's phosphate mines are in Western Sahara, a disputed independent territory that is occupied by Morocco and the site of growing international human rights concerns. Reflecting these concerns, U.N.-sanctioned export restrictions on phosphate and other resources are now in place, though the efficacy of the bans is incomplete. China, the country with the largest phosphorus reserves after Morocco, imposed a 135 percent tariff on the resource as part of 2008's complex series of events in which rising fuel and fertilizer costs led to rapid increases in food prices. The tariff effectively eliminated exports. Although the tariff was subsequently lifted as the 2008 food crisis faded, the imposition of this sort of trade

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barrier could become a regular occurrence as supplies dwindle worldwide.

The United States has only 12 phosphorus mines. The supplies from the most productive mine, in Florida, are declining rapidly -- it will be commercially depleted within 20 years. The United States exported phosphorus for decades but now imports about 10 percent of its supply, all from Morocco, with which it signed a free trade agreement in 2004.

The effects of this resource shortage will be felt long before the last phosphorus atom is extracted from the last mine. Increased demand for fertilizer and the decreased supply of phosphorus exports will result in higher prices, significantly affecting millions of farmers in the developing world who live on the brink of bankruptcy and starvation. Rising fertilizer prices could tip this balance.

Already, signs are emerging that our current practices cannot continue for long. Between 2003 and 2008, phosphate fertilizer prices rose approximately 350 percent. In 2008, rising food prices sparked riots in more than 40 countries. Although the spike in fertilizer prices was only partially responsible for the higher food prices, the riots illustrate the social upheaval caused by disruptions to the world's food supply. The 2008 food riots were only stopped by government promises of food subsidies -- a viable strategy only as long as governments can afford the ever-increasing costs of food support.

Establishing a reliable phosphorus supply is essential for assuring long-term, sustainable food security. We need to dramatically reduce the demand for phosphate rock by eliminating our wasteful practices. This will require a combination of low-tech and high-tech solutions, including efforts to prevent soil erosion, development of more-targeted methods of fertilizer application, and the creation of new, phosphorus-efficient crops, which produce a larger yield per phosphorus unit applied. Fortunately, unlike fossil fuels, phosphorus can be used over and over -- this is what occurs in natural ecosystems, where it is recycled innumerable times from its first mobilization from the Earth's crust to its eventual deposition into lake and ocean sediments.

If we fail to meet this challenge, humanity faces a Malthusian trap of widespread famine on a scale that we have not yet experienced. The geopolitical impacts of such disruptions will be severe, as an increasing number of states fail to provide their citizens with a sufficient food supply. This dark scenario need not, however, be our fate. If we are successful in rising to the phosphorus sustainability challenge, as well as other aspects of sustainable agriculture, we can look forward to a future in which families, communities, and countries are healthy and secure in their nutrition and where all live in a world with cleaner rivers, lakes, and oceans.

*James Elser is Regents' professor of Ecology in the School of Life Sciences at Arizona State University and co-organizer of ASU's **Sustainable Phosphorus Initiative**. Stuart White is director of the Institute for Sustainable Futures at the University of Technology, Sydney, Australia, and co-organizer of the **Global Phosphorus Research Initiative***

Calendar of Events

MBT Meetings

Thursday, July 22, 2010
MBT Biosolids Demo Plot Booth
MSU Ag Expo

Thursday, September 16, 2010
Johnson Wildlife Center, Cadillac, MI
10:00 a.m. to 12:00 p.m.

Thursday, November 18, 2010
Location TBD, 10:00 a.m. to 12:00 p.m.
Holiday Party

Other Events

MSU Ag Expo
July 20-22, 2010, Michigan State University
MBT Display and Demo Plot

MWEA/AWWA Joint Conference
August 10-13, 2010
Soaring Eagle Resort, Mt. Pleasant, MI

CONFERENCE HIGHLIGHTS

- Online registration at www.mi-wea.org
- Pre-Conference Seminars (August 10)
- Full Conference pricing includes 3 meals this year
  - Dinner (Tuesday) - Awards Luncheon (Wed) - Continental Breakfast (Wed) (hotel room does not include any meals)
- 2-days of Exhibits
- Water AND Wastewater Technical Sessions
- Women's Networking / Social Hour (for Women Conference Attendees Only – sorry, not a spouse event)
- AWWA Young Professionals and MWEA New Professionals Networking / Social Event
- Keynote Guest Speaker - Jim Sygo, Deputy Director - MDNRE
- Featured Speaker – John McCulloch, Water Resources Commissioner - Oakland County
- Special Guest Speaker and Picture Opportunity with Lloyd Carr, Former U of M Football Coach
- Attendee and Guest Activities (Bike Ride, Golf Outing, Canoe Trip)
- Awards Luncheon
- Annual Banquet