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Photo by Laila Racevskis

## Introduction: Looking Back, Looking Forward

To begin the session, Brenda Rogers, county extension director of Manatee County, welcomed the group and informed us that tourism, agriculture and construction drive the county's economy. She also said that the county sells extra water to Sarasota. The water comes from a reservoir, which has caused some political disputes

We then met Dr. Charles Vavrina, one of five regional extension directors in the state. Dr. Vavrina also welcomed us.

Dr. Mohammad Rahmani, of the Food and Resource Economics Department at UF, presented an in-depth review of phosphate mining and some of the possible future uses of mined lands. He reviewed phosphate mining in Florida, which began about 120 years ago. ■

### Florida Phosphate Mining Facts

- Meets 75% of U.S. phosphate demand 25% of world phosphate demand.
- The first commercial phosphate operation was in 1889.
- The depth of overburden in the area is 15 to 50 feet.
- In 2000, \$1.13 billion-worth of phosphate fertilizer was exported.
- There are more than 100,000 acres of phosphate mined lands in Central Florida.
- Each year, 5,000 to 6,000 acres of land are disturbed for phosphate mining
- A dragline can mine up to 15 acres per month.
- Since 1975, mined lands have had to be reclaimed and restored by recontouring and vegetation.

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# The Problem of Clay:

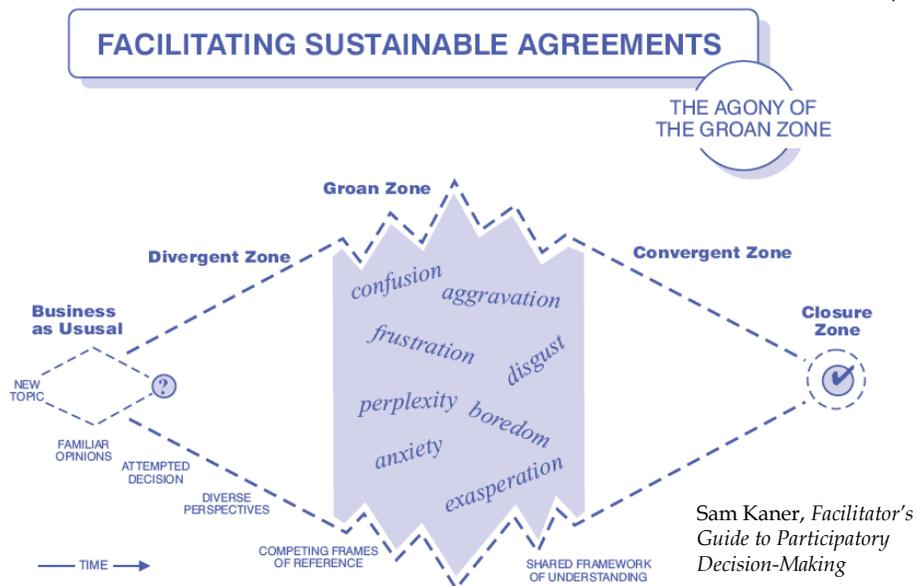
WHAT TO DO WITH THESE RADIONUCLIDE CLAY SETTLING AREAS?

Florida Institute of Phosphate Research (FIPR) was established in 1978 to conduct and support research on issues pertaining to phosphate mining. There have been many efforts by the Institute of Food and Agricultural Sciences, University of Florida, in collaboration and cooperation with other public agencies and private institutions, including USDA, FIPR and National Renewable Energy Laboratory of DOE, to conduct research on the feasibility of using phosphate mined land in Florida for agricultural activities. However, due to technical and environmental issues, these efforts have not resulted in bringing any significant portion of the mined lands under any commercial production activity. ■

## Stage Setting with Dr. Paul Clifford

The highlight of the day was to hear from our stage setting speaker, Dr. Paul Clifford, of New York City and executive director of FIPR. He began with a fascinating review of the state of science in the U.S. today. According to Dr. Clifford, before the Cold War, Americans had to go to Germany and France to learn about chemistry and physics. However, the space program brought about funding for science, and the U.S. became the leader in the field. Dr. Clifford felt strongly that despite U.S. scientific accomplishments, Americans are suffering a brain drain. Students do not know the scientific method, and people, in general, have unfounded fears of things like radionuclides, which he believes could be used in road building. These roads could be made of phosphogypsum (20 to 35 PCi/g in Central Florida), thereby solving the huge problem of gypstacks storage. Researchers are continuing to work with various chemical processes that will make materials more usable. Ninety-five percent of phosphate goes to fertilizer, the rest to animal feed and Coca-Cola. ■

## Group Dynamics



Leading the discussion, Jon pointed out that a good practice to practice when groups gather to make decisions is brainstorming. This allows individuals to understand each other's ideas and sift through different approaches and possible outcomes. People often misunderstand each other, get confused, bored or are concerned that there will never be an agreement. This is known as the Groan Zone. To be successful, the group should persevere and try to understand each other in order to enter the Convergent Zone.

If people do not enter the Groan

Zone during the complex process of decision-making, that may mean that something is missing. Maybe not all the right people are engaged in the process.

Jon used a bicycle to represent the two sets of group dynamics that are important for maintaining group discussion: 1) group maintenance roles (e.g., to welcome, encourage, harmonize, set standards, compromise, observe, etc.) and 2) task maintenance roles (e.g., to orient, evaluate, coordinate, initiate, clarify, delegate, etc.). ■



Upon arrival at The Mosaic Company 's Four Corners Mine, we were introduced to Lance Moody and Ron E. Concoby, who are in charge of reclamation for the mine. They showed us a brief PowerPoint orientation of phosphate mining. After the orientation, we toured the site in two groups. While one group visited the dragline, the other group visited the pumping station.

Draglines remove approximately 30 vertical feet of overburden and store it for use in reclamation. Once the overburden is removed the dragline can gain access to approximately 15 vertical feet of "matrix," a mix of clay, sand and phosphate-bearing rock (which is more like a sandy clay than rock). The dragline scoops up the matrix and dumps it into the basin.

Once dumped into the basin, the phosphate is suspended in the water when water cannons stir it.

After the phosphate is suspended in the water, it is pumped through a 24-inch diameter pipe for up to eight miles to get to the processing plant. The most efficient mix is approximately 40 percent solid. The rock and sand particles suspended in the liquid wear out the pipes, which then need to be replaced. *(continued on page 4)*

# phosphate mining

# mining continued...

The liquid is separated into phosphate, sand and clay slurry. The phosphate is processed for fertilizer, and the clay slurry is pumped to the clay-settling pond. As the clay settles, the water reaches a point where it can be reused in the mining operation and is pumped back for use in the basin. The sand is reused to fill holes left by the strip mining.

Once the matrix has been mined from an area, that area becomes a candidate for reclamation. Reclaimed areas can be turned into ponds, marshes, flatwoods, sandhills, scrubs, pastures and citrus groves.

Longleaf pines, various drought-tolerant oaks and palmettos in one-gallon pots are planted to the sites. These sites are the recipients of gopher tortoises and other wildlife that live in areas about to be mined. ■



Photo from Class VII

Left: Dragline dumps matrix.



Photo from Class VII

Left: Water cannons stir the matrix.



Photo by Laila Racevskis

Above: You can see a reclaimed area that is being restored to a mixture of sandhill and scrub.



Photo by Laila Racevskis

# Stakeholder Panel

The panel included: Adam Cummings, Charlotte County commissioner; Karen Collins, Manatee County environmental management director; Dee Allen, engineer and attorney for The Mosaic Company; Gail Giles, of the Sierra Club; and Maran Hilgendorf, of the Charlotte Harbor National Estuary Program. Each of them introduced themselves and gave brief explanations of their roles in the phosphate mining issue.

There were conflicting opinions expressed about the water quality downstream from the mine. Some of the Fellows found this discrepancy to be frustrating because, although the quality is measurable, no one provided any numbers. It was therefore difficult to assess the accuracy of the statements made.

*A brief synopsis of the panel:* Phosphate is important, and it will be mined somewhere. It can be mined in Morocco or in Four Corners Mine. On a global scale, the environmental impact is less when the phosphate is mined in Florida. So let's do the best job of mining while protecting the environment. The planning process for mines needs to be done on a landscape scale rather than on an individual mine because the impact from a combination of mines can seriously affect surrounding counties, including counties that do not have mines. ■

Visit the following Web site  
for more on the mining  
process:  
[www.phosphateflorida.com](http://www.phosphateflorida.com)

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The dragline shown above is capable of picking up 67 cubic yards of soil, or 14 NRLI Fellows, at a time.

# Team Permitting

After our morning break, Dr. Burl Long introduced Kevin Claridge, an environmental manager with the Florida Department of Environmental Protection's (DEP) Bureau of Mine Reclamation. Kevin gave the class a thought-provoking presentation on the current state of mining in Florida, which includes mining phosphate, sand, limestone, Fuller's earth and other minerals. He began with a brief history of the industry and discussed the ways in which past practices had contributed to a very negative public perception of mining. Kevin then outlined DEP's regulatory oversight of all mining activities, which included the twin concepts of Team Permitting and Net Ecosystem Benefit (NEB).

Kevin explained that DEP's need for a more coordinated permitting process had forced regulators to develop a holistic or "team" approach to reviewing new mine applications. Initially, team permitting seemed to hold great promise. The process brought stakeholders together early, provided for better designed projects, allowed for a better informed public, provided agencies a mechanism to handle all

regulatory requirements at once and introduced the important new concept of NEB. NEB required applicants to agree to a high level of environmental gain that exceeded what was normally achieved through more traditional regulatory processes. Kevin explained that everything seemed to point to success when DEP implemented team permitting.

Was team permitting a good fit for the mining industry? Kevin concluded his presentation by using several mines as case studies for a lessons-learned discussion about the team concept. DEP found that team permitting presented its own set of unexpected challenges. The process was plagued by constant stakeholder turnover. In some cases, DEP found that team permitting actually *extended* approval times. Finally, and probably most importantly, some applicants still did not receive concurrent agency approval on their requests, which was the ultimate point of the whole process. From this experience, we learned that prolonged conflict resolution processes often do not sustain the initial optimistic assumptions about the outcome. ■