

Further work will be required to determine whether additional odor reduction can be obtained if birds are fed supplemented diets before three weeks of age, Bazemore said.

Because most odor complaints are made after manure is applied to fields as a fertilizer, the scientists evaluated the effect of soil properties on odor.

“One important component in the odor of poultry manure is butyric acid. At low pH (acidic conditions), butyric acid is more volatile and is released into the environment,” Bazemore explained. “We were interested to see whether acidic soils had an effect on manure odor.”

Soils in north central Mississippi are mildly acidic. Therefore, manure samples from chickens fed a standard diet were adjusted from their natural pH (pH 6.98) to a pH that mimicked these acidic soil conditions (pH 5.58). Results from this study showed that manure odor is more intense and unpleasant when pH values are low.

“The pH of soil may account, in part, for the overpowering odor of manure after it’s initially spread onto a

field,” Bazemore said. “The degree of odor intensity and unpleasantness can be affected by adjusting the pH.”

The smell of ammonia within poultry houses is another common odor complaint. However, the manure samples collected for this study did not smell strongly of ammonia. Bazemore found the cause of this difference to lie in the pH of the manure — more alkaline conditions in poultry houses seemed to result in higher ammonia levels.

Bazemore said unwanted odors are not the only reason farmers should be concerned about the pH conditions in their poultry houses. Conditions that favor high ammonia levels are potentially dangerous to the health of humans and chickens.



**Bazemore and Yoon judge the odor intensity and unpleasantness of manure samples.**

## Team Spreads the Message of Sustainable Design

By Charmain Tan Courcelle

Global warming, eutrophication (nutrient enrichment) of water bodies, deforestation, the mass extinction of species — all are well-known examples of our ability to alter the environment both temporarily and permanently, often to the verge of destroying the very natural resources we need for survival.

A new book, which is in its final stages of writing by MAFES biological engineer Tom Cathcart and MSU landscape architect Pete Melby, suggests that far from being at an impasse, we have the ability to meet our basic needs, while living within the constraints of our environment. The key? Sustainable design.

“The need for sustainable design is inevitable,” Cathcart said. “We’ve gone from a population of less than 3 billion people 50 years ago to 6 billion today. By the year 2050, our population is projected to reach between 9 and 12 billion. We will eventually crowd the natural, cyclical systems we depend on if we don’t learn to live within the rules of these processes.”

Cathcart and Melby’s book, which has the tentative title *Regenerative Technologies in the Sustainable Landscape*, outlines the rules of sustainable living and discusses “the systems and processes that we need for survival, the ways that we can disrupt them and how we might avoid such disruptions.” Each chapter of the book describes methods for incorporating sustainable design into human practices.

Sustainable practices fulfill human needs but leave minimum impact on the environment. Cathcart said sustainable systems blend the human landscape with natural ecological systems.

Pete Melby



Pete Melby



**Sustainable design balances human needs with the environment. Members of the Center for Sustainable Design built a salt marsh, left, to replace a storm drain carrying runoff into the Mississippi Sound.**

### Examples of Sustainable Practices

1 Harvesting rain water for irrigation or household needs.

2 Composting of biodegradable wastes including newspapers, magazines, food waste, leaves and other plant materials.

3 Use of renewable energy resources, such as solar, wind and geothermal systems, to meet energy demands.

4 Designing and siting buildings to reflect climate conditions. Some examples to reduce dependence on artificial cooling systems in hot and humid climates include situating the broad surfaces of buildings away from the hot afternoon sun, using trees and other vegetation for shade, and incorporating overhangs and other shading devices into building design.

“Sustainable technologies are not difficult to implement. In fact, many sustainable practices are older technologies that we have abandoned,” he said.

Some examples of these practices include planting trees for sun and wind control, using insulation to control heat transfer into and out of buildings and harvesting rain water for household and irrigation purposes.

Living within the rules of our environment requires only that we be willing to change our habits, Cathcart said. He and Melby hope to provide readers with the information they need to adopt sustainable practices into everyday life.

“Ocean liners don’t turn on a dime. They can’t make a 90-degree turn without planning ahead. Human cultures and practices are also like that,” Cathcart said. “If we’re to become sustainable, we have to do it soon. We can’t wait until temperatures rise by 3 degrees because by then, we’re like the Titanic heading for an iceberg.”

*Regenerative Technologies* will promote the message of sustainability through demonstrations of sustainable design concepts. Cathcart said the book is written in nontechnical language and is aimed at readers in high school and up.

Cathcart and Melby are no strangers to the use of sustainable design in human landscapes. They are cofounders of the Center for Sustainable Design, which they established in 1997. However, their partnership dates back to 1990, when they began to bring biological engineering and landscape architecture students together to address engineering problems in biological systems.

“The idea for the center was to create an umbrella group that would allow like-minded professionals to come together and be involved in the area of sustainable design,” Melby said. “There is a lot of potential for sustainable design in the man-made environment. In the future, we will have to create sustainable environments that reflect natural ecological processes.”

Members of the Center for Sustainable Design have been involved in a number of projects around the state. These projects include the restoration of a beach in Biloxi, the development of management practices to minimize effluent release from commercial catfish ponds, and the completion of a master plan for the Stennis Space Center buffer zone and an interpretive plan for an interactive

visitor center for the Gulf of Mexico Program.

“We’ve seen from our experiences that nature is resilient and a good partner,” Melby said. “When we built a salt marsh to replace storm drains on the Biloxi beach, we saw the return of crabs and baitfish within the first two weeks. Now every time we go back, we see more and more wildlife in this restored beach, which contributes to the diversity of organisms in the area and adds to the enjoyment of visitors.”

The team’s book effort is an outgrowth of the work at the center. It encapsulates sustainable design principles used in the center’s projects, Melby said.

“Sustainability is a new and different way to think about design and development, but it is no harder than traditional ways,” he noted.



Marsh development plan

ELEVATION OF PROPOSED MARSH DEVELOPMENT