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## Seeking a Pollution Solution

In a bid to help Danbury city officials develop a modern-day method for cleaning and restoring a piece of land polluted with toxic levels of mercury, WestConn Assistant Professor Ruth A. Gyure is looking for help from an ancient and well-known form of life — bacteria.

Gyure is assisting the city with a phytoremediation project that will be conducted at a vacant, weed-infested half-acre lot located just a short distance from WestConn's downtown campus. Phytoremediation is a process that uses of plants to remove contaminants from soil. The plants absorb pollutants into their roots, stems and leaves. They are then harvested and safely disposed of or destroyed. On a national level, phytoremediation promises potentially huge environmental and financial rewards because the use of plants poses a simple, safe and cost-effective approach to remediate soil and water. The federal Environmental Protection Agency estimates that there are more than 30,000 sites requiring hazardous waste treatment services throughout the United States.

In Danbury, the EPA has provided a \$55,000 grant for the project. With final approval from the city near, work could begin by the fall, according to Jack S. Kozuchowski, an official with Danbury's health and housing department who will serve as the project manager.

Gyure's role will be to conduct research that will explain the role of bacteria in the phytoremediation process, or what she refers to as bioremediation. Specifically, she will study how bacteria assist plants in absorbing mercury from the soil. The bacteria to be studied exist naturally.

"How are bacteria in the soil feeding mercury to the plants? This is extremely important," says Gyure, a microbial ecologist who received her Ph.D. from Purdue University in 1986.

"First, we want to learn what we should add to the soil so we can optimally aid the plants so that the bacteria are working for us and not against us," she adds.

The site in question is known as Barnum Court. Until vacated in 1992, the site had been home to a variety of businesses. From the late 19th century until 1952, the property was used by a variety of hat



Ruth A. Gyure

manufacturers, and a key chemical in the hat-making process is mercury.

Mercury is a naturally occurring element present in the environment and in plants and animals, but at high levels it can cause a variety of health problems. It can cause long-term damage to the nervous system, the brain and kidneys. Short-term exposure to mercury can cause nausea, vomiting, diarrhea and skin rashes. The phrase "mad as a hatter" resulted from the observed adverse affects the hat-making process had on its workers.

At Barnum Court, the mercury levels range as high as 463 micrograms per milliliter of soil (463 ug/ml). This roughly corresponds to about 463 parts per million, far above levels considered safe for soil in residential and commercial areas. Despite this, a variety of plants are growing at the site, and the phytoremediation project intends to learn which plants are doing the best job at removing the mercury.

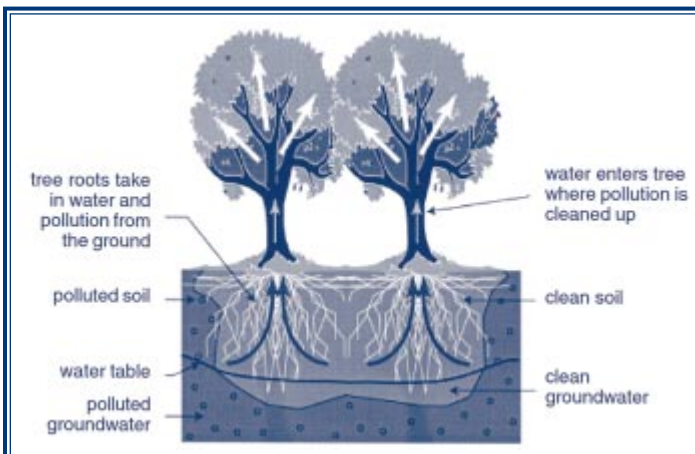
Kozuchowski said to clean the lot using conventional means — excavating, hauling away the contaminated soil and replacing with clean fill — would cost about \$500,000. But he added, "The site is not worth it." Growing and harvesting plants will be much cheaper. And if phytoremediation works, the long-term goal is to sell the property.

"We started talking about this project in 1999 and then submitted our proposal to EPA in 2000," Kozuchowski said. "We wanted a research demonstration ... we wanted more of an academic approach rather than an engineering approach."

And with that in mind, he approached the university, because: "The biology department at WestConn has some very talented people."

Gyure, who teaches microbiology courses and serves as coordinator of the university's medical technology program, gladly signed onto the project, because it fit with her research interests and because it will provide learning opportunities for students. Students have already been involved in some of the preliminary work. Also joining Gyure in the project from the WestConn faculty is Edwin Wong, an assistant professor of biology. Both professors received 2002-2003 Connecticut State University Grants to support their work on the phytoremediation project.

"Ed and I are not planting plants and analyzing plant materials," Gyure said. "We may go out there to add things to the soil to enhance existing plants — to change the environment."



During phytoremediation, plants absorb pollutants from the soil and groundwater, leaving the soil and groundwater cleaner.


U.S. EPA Graphic

Already, Gyure has isolated bacteria taken from soil at the lot, and she is studying it to see how resistant it is to mercury.

"The mercury is bound in the soil. It is not easy for plants to take it up the way it is now," she said. "We want to slowly release the mercury so the plants can absorb it and not allow it to migrate to the groundwater. Bacteria would be the best way to do this slowly and safely."

Once she determines which plants are doing the best job absorbing the mercury, Gyure intends to try to boost the effectiveness of the bacteria using "plain, old fertilizer." She said pure nitrogen, which is found in fertilizer, is an additive that has been used successfully at other phytoremediation sites.

"The ultimate goal is to get the plants to take the mercury out of the soil," she said. "The ideal would be for the plants to take the mercury out and hold it and not release it into the atmosphere."

"So far, there aren't a whole lot of success stories out there. A lot of it is experimental ... there's a lot to learn." 



*Professor Ruth Gyure (second from right) makes a point while teaching a group of students on the campus of Western Connecticut State University.*

*Photo by Peggy Stewart*

## Poverty *Continued from page 2*

uses it as an educational tool — talking about the virus from experience. In fact, he has added AIDS counselor for juvenile offenders to his long list of activities. Casanova believes the lack of activity is one of the things weighs against people with HIV. He feels his commitment and work are both his therapy and his medication.

In an interview with Casanova, Gomez asked: "You have no money, are you still in poverty?" Casanova answered, "No." Gomez was surprised by the response.

"It wasn't because he now had a home, it was because he felt that poverty isn't defined by a lack of money at any given point of your life. Getting out of poverty is something else — having social links, seeing a light at the end of a tunnel, finding solidarity and justice and having the ability to overcome," Gomez said.

Casanova believes that poverty is a state of mind that, when combined with a lack of income, dooms most people. Based on his own life experiences, Casanova believes that combining the efforts of different grassroots organizations — such as the homeless, welfare rights advocates and mothers' groups — into coherent social action is the best way to reduce poverty.

Gomez came in contact with Casanova through his work at Curbstone Press, where he volunteers on Curbstones' editorial board; he also edits films for the organization's poetry festival. Curbstone, which published Casanova's book, is a non-profit literary arts organization founded in 1975 and located in Willimantic.

"We are very grateful at Curbstone for Jaime's input into our program," notes Alexander Taylor, co-director of Curbstone. "He has documented several of our activities, such as the Windham area poetry festival, and he is able to record for posterity some events that would vanish if they were not recorded."

Throughout its history, Curbstone's co-directors and board members have nurtured a focus on creative literature that invites readers to examine social issues, encourages a deeper understanding between cultures and reflects a commitment to promoting human rights. It was Taylor who first introduced Gomez to Casanova.

"I knew Jamie was interested in making films, and Ron Casanova had an interesting story to tell," Taylor continues. "Since much of our mission is dealing with social issues, it seemed very appropriate to get

them together. The film Jaime is making on Ron will not only be interesting to the general public, but will be extremely useful in our school programs in Hartford and Willimantic, where Casanova frequently visits to speak with youngsters on homelessness and poverty. He has been an amazing force among students — they admire him for putting his ideals into practice."

Gomez's documentary will explore the philosophies and values that motivate and inspire social activists. Gomez believes that by telling Casanova's story, and combining it with a focus on poverty in Connecticut, he will send a message to young people in the state that "they must pay attention."

Gomez further hopes his video, which is scheduled for completion in May 2003, will be a powerful, interdisciplinary instrument. It could be used in sociology and humanities courses, as well as communication and arts courses. The video will be distributed to television community channels across the state and will be made available, at no cost, to all schools and higher education institutions in Connecticut.

Gomez's goals are similar to Casanova's. As Casanova writes in *Each One Teach One*: "Whatever they learn in order to make their lives and their organization work, they need to show other people how to do it, too. That's what I believe in: each one teach one. Then, and only then, do I believe we're doing things right." 