

# Jones studies ecosystem engineering at Cary

By Carola Lott

Mankind's instructions "to fill the earth and subdue it" have had some serious consequences.

Cary Senior Scientist, Dr. Clive Jones, is in the forefront of a branch of science called "ecosystem engineering" that studies how to use nature "to help solve the environmental problems we create."

Implicit in the exercise is that before we try to master nature, we look first and consider how the natural ecosystem functions, thereby learning how to use natural systems to achieve a desired result.

Take, for example, the way we use snow cats and snowmobiles to groom our ski slopes. The practice may smooth them to our satisfaction, but it compacts the soil so that plants cannot survive, creating patches of bare ground that result in erosion.

Rather than sowing seeds that will soon wash off these hard packed slopes, Alpine ecologists are now allowing cows to graze the mountains during the warm months.

Their hoof prints create pockets that capture enough rainwater and seeds to allow the slopes to regenerate in the course of the summer. Not only does this practice stop erosion, it increases biodiversity and provides habitat for small creatures and insects.

Dr. Jones was born, raised and educated in the United Kingdom. Soon after he completed his post doctorate studies in this country, he heard that the Cary Institute was being formed.

"I was a young scientist, had some grants and thought if this happened it would be a great place to be scientifically." Dr. Jones came to the Institute shortly before it opened in 1983.

At first he focused on plants and herbivores at a time when studies focused on the relationship between predator and prey and the competition for nutrients. Dr. Jones changed his approach after meeting a colleague who was studying desert rocks that had lichens living inside them for protection.

At the same time snails were eating the rock, and it was the effect these creatures had on the rest of the

ecosystem that interested Dr. Jones. The snails were not only turning the limestone into soil at the rate of 2,200 pounds of soil per 2.47 acres per year, but they were also transferring the nitrogen in the rocks to the soil thereby fertilizing the desert.

This led Dr. Jones to conclude that we could gain an understanding of how nature worked if we look at nature as an ally and not as something to be conquered.

Last week Dr. Jones returned from three and a half months as a visiting professor at the Royal Netherlands Academy where he worked with fellow scientists and graduate students studying issues related to coastal protection, an important subject in the Netherlands because much of their land is below sea level.

Dikes are usually built of concrete or brick. Recently, however, ecology engineers have found that earthen dikes planted with herbaceous plants and grasses that sheep are allowed to graze are just as effective.

The grazing by the sheep encourages grasses to grow and to develop an interlocking root system, making a stable earthen dike. This is an example of using nature's engineering to work for our benefit. Although earthen dikes have existed for several hundred years, this is the first time they have been studied in any detail.

As the climate warms, low lying regions like the Netherlands will have to use nature's engineering to provide protection from rising sea levels. Salt marshes of spartina grass that trap the sediment that comes in on the tide are ideal for this.

As the sediment falls onto the ocean bed the spartina repeats the process so that slowly the level of the bed rises. Because the spartina is able to keep pace with rise of sea level, the idea is to encourage salt marshes to develop, forming a first line of defense for fragile coastlines.

The loss of the salt marshes may well have contributed to the massive damage caused by Katrina. Over 50 miles of salt marsh were lost. While replanting 50 miles of salt marsh is

see CLIVE JONES on page 3

## CLIVE JONES

continued from page 1

impossible, conditions can be created whereby the marsh can rebuild itself. The Dutch discovered that if they dredge accumulated sediment and deliver it to front of the marsh, spartina grass will grow enough for the marsh to build up on its own.

Some of the techniques of ecological engineering go back to antiquity and have been forgotten. Before men had the technology for complicated systems, they relied on nature so in one sense it is a process of re-discovery.

On gentle slopes in the Negev desert, for example, shrubs intercept the wind-blown dust that falls to the ground to create a mound around the shrubs.

The infrequent rainfall is stored under these mounds providing water for shrubs and annuals. This system has existed in the Negev for thousands of years. Today, a farm uses this ancient system to grow crops with as little as four inches of rain a year.

Another example of ecological engineering is the beaver dams that provide habitat for plants, animals and insects. When beavers abandon a dam the resulting wetland becomes a valuable natural habitat.

In the Adirondacks it is thought that one half to one third of all vascular plant species live along streams that owe their existence to beavers.

In one area of Utah it is estimated that beaver dams contribute \$10 million a year of value to the ecosystem

The science of ecology engineering is likely to grow in importance as a means of restoring damaged ecosystems and providing protection from what is likely to occur as the climate warms.

Having nature do some of this work can often be up to 20 times cheaper than man made systems and possibly more effective.

This is good news. Dr. Jones is inspired to continue his work because there are "probably a great many opportunities that people haven't even thought of yet."