

TO STUDY A LIVING PLANET

Why can we send people to the moon, yet not be able to predict cod stocks?

By Paul Keddy
Special to the Citizen

How do scientists decide whether to work building bombs and perfecting napalm, or conserving tropical rain forests and endangered species?

Well, in general, we do what we get rewarded for. By rewarding some activities, and discouraging others, society plays a major role in guiding scientific research. I have read many articles in the last few years about the growing shortage of trained scientists in Canada. But few ask what kind of scientists we need.

One reads that more than half of the world's scientists already work for the weapons industry. Do we need more people trained to build bombs, to make toxic chemicals, to design rocket ships or do we need more people to study the living part of the planet — our living life-support system? There is only so much money to spend, and only so many graduate students. It costs a great deal of money to educate scientists, and even more to provide the libraries, travel and equipment to support our work. How do we wish to allocate resources — more physicists studying particle physics, or more biologists studying rain forests?

Actually, the choice has already been made. I shall describe the continuous discrimination that discourages students from entering biology and, instead, encourages them to study physics and chemistry. This in turn explains partially why we have more people who understand nuclear power plants than understand our forests.

Let me remind you why we need a cadre of qualified life scientists.

Declining soil productivity and desertification. Disappearing rain forests. Loss of Canadian forests. Collapse of the cod fishery. Increasing numbers of endangered plant and animal species. Invasion by dangerous pests like purple loosestrife and zebra mussels. Declining water quality in lakes and rivers. This is only the beginning of the list. Have I convinced you yet?

Can the biologists of Canada solve these problems? No. But it is not because we are incompetent or lazy — it is just that there are so few of us relative to the large number of problems. In spite of extensive areas of Canada being dominated by plants (forest, wetlands and farmland), and in spite of the fact that 99.9 per cent of all living material on Earth is plants, there are only a handful of plant ecologists in Canada. (My students are frequently hired before they have finished their degrees — often with several jobs to choose among.) The shortage of biologists means that biological questions of national importance are being ignored.

Early in our careers, we may participate in science fairs. I was active in science fairs while in grade and high school, and one pattern immediately struck me. There were always far more rewards for projects in engineering, physics and chemistry than for biology.



The collapse of the cod fishery is only one example of why we need a cadre of qualified life scientists.

There were many reasons for this. In part, the main sources of prizes were chemical, petroleum and engineering firms. There were no equivalent organizations (or prizes) for young biologists. So by the age of 16 I already understood that, if I was to study the life sciences, I would never receive the rewards (financial or otherwise) that my peers in physics and chemistry would.

At the other end of the career, the pressure is worse. No matter how outstanding a botanist, zoologist or ecologist is, he or she cannot win the Nobel Prize. The Nobel Prize specifically excludes those areas of human endeavor!

As a consequence, brilliant and influential biologists such as professors E.O. Wilson, Paul Ehrlich or Phil Grime go unrecognized.

"Who?" You may say, and this illustrates the very point.

Yet E.O. Wilson has founded an entire new scientific discipline — sociobiology — in his lifetime.

Or closer to home, consider Dr. David Schindler. His work on lakes has led to breakthroughs at least the equivalent of a Herzberg or Polanyi, but few of you have probably heard of him. True, he has won other international awards, and true, they have been worth a good deal of money, but they do not carry the prestige (read media coverage) that the Nobel Prize does.

So the message to senior scientists is to keep out of biology and ecology because even major breakthroughs will not be rewarded. Your friends, neighbors and colleagues will not see your name in the headlines. You can be sure that students get the message — when they see the Nobel Prizes being awarded year after year to bio-technologists, chemists and physicists, they naturally assume that these are the only areas where exciting scientific work is being done. They are wrong — they are just the only areas where exciting scientific work is being rewarded. But either way, the message is clear: leave ecology, zoology and botany and go into chemistry and physics.

Now, these two examples could be treated as mere historical artifacts. The final straw for me was the recent creation of the Polanyi Prizes in Ontario. Here we have a prize named after a scientist who won the Nobel Prize. We may speculate that it could have been the Wilson Prize or the Schindler Prize, but then recall that they could never be considered because they are biologists. The Polanyi Prize, given out by the government of Ontario to reward bright young scientists early in their careers, has been set up to specifically exclude research in botany, zoology and ecology!

So if you wonder why we can land people on the moon but cannot maintain our cod stocks, or why we can perfect napalm but not prevent the extinction of rare species, you now have part of the answer. The only way we are going to change this is to reward biologists the same way we do other scientists.

(Professor Keddy teaches at the University of Ottawa. His recent book on competition won the Gleason Prize as the outstanding book in biology in 1991.)