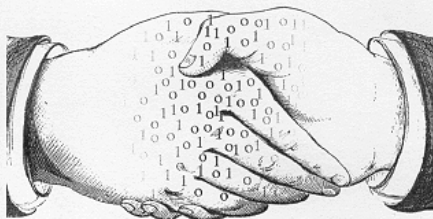




by Graciela Chichilnisky

Program  
on  
Information  
and  
Resources



*Science  
&  
Policy  
beyond  
the  
Selfish  
Gene*

The link between physical sciences and policy is one of the most difficult interfaces in interdisciplinary work. Two years before the Earth Institute was created, in 1994 PIR scientists set out to understand and offer solutions to Global Environmental issues based on their 25 years of experience in the area, linking science and policy. This article explains how PIR has gone about fulfilling its unusual mission, helping in the process to build scientific and human links with various parts of the Earth Institute and the University community. The task involves new social skills and flexible intellectual approaches, as well as performing according to traditional standards of excellence.

## The Human Link

A personal involvement of world class scientists from the biological, physical and social sciences requires special social events to break the ice. For this purpose the PIR Distinguished Lectures on the Global Environment were created in 1998. The first three authored articles, based on their lectures, were published in the last issue of *EARTHmatters*. Professor of Geophysics Lynn Margulis spoke on GAIA and the Biosphere, population specialist Norman Meier spoke on Perverse Environmental Subsidies and mathematician Ralph Gomory, president of the Sloan Foundation, spoke on Global Trade. A remarkable presentation was given by Ambassador Raul Estrada Oyuela, the main architect and Chief of the Negotiating Committee of the Kyoto Protocol, who spoke on the Negotiation and Future Development of the Kyoto Protocol. These presentations were attended by a wide Columbia public ranging from Earth and life scientists to economists and policy specialists and opened up a dialogue between these diverse groups. Forthcoming lecturers are Ismail Serageldin, Vice President of the World Bank, Timothy Wirth, President of the United Nations Foundation, and David Tilman from the University of Minnesota.

Lubricating the creation of a unified approach to life sciences requires building an unusual link between biological and social scientists, people that rarely find themselves in the same room. In the Spring of 1998 PIR organized an international conference on Managing Human Dominated Ecosystems at the Missouri Botanical

Gardens (MBG) with Peter Raven, Secretary of the National Academy of Sciences and Director of the MBG. The conference was unique in that it had the active participation of leading researchers in both biological and social sciences. Participants included leading and controversial industry figures such as John Brown, Chairman of British Petroleum, and 200 leading biologists and economists who concentrated on the challenges involved in managing ecosystems in an era in which these are human dominated. A main topic of the conference was the Knowledge Revolution as a possible path for sustainable development. Chaired by Graciela Chichilnisky, the Organizing Committee included Professors Paul Ehrlich of Stanford University and Geoffrey Heal of Columbia School, as well as Gretchen Daily, Bing Research Scientist at Stanford University. A book is being prepared for publication in 1999.

## Movies and Hard Science

Popular communication can help link scientists from a variety of fields by successfully demonstrating how hard, traditional science can help with problems of immediate human interest. A new PBS movie on PIR shows how new developments in science lead to new view of society: featuring the Knowledge Revolution, a concept pioneered and developed by PIR scientists, "*Life by the Numbers—A New Age*" was aired in June and July of 1998 on WQED, Channel 13 and other TV channels. Starring PIR scientists, the movie was produced by award winning Director David Elisco with the support of the Sloan Foundation. The selection for the topics was made by the American Mathematical Society (AMS) to highlight the most innovative recent developments in mathematics in the USA. The movie has led to assure interest in PIR from all over the world, including from people currently in correctional facilities in the USA.

Traditional academic achievement should not be neglected, for otherwise professional links can be weakened. At PIR we worked very hard in traditional scientific areas. Even though economics is the strongest part of PIR, this year PIR scientists were chosen among the 2,000 most outstanding scientists of the 20th Century by a recent publication in Cambridge, UK. This is a major recognition that helps PIR efforts in the sciences as a whole. Simultaneously in the US, PIR's Chichilnisky was

invited to deliver the 1998-99 Pegrum Distinguished Lectures at the Brookhaven National Laboratory, in Long Island, N.Y. Previous Pegrum Lectures were delivered by prominent scientists such as Nobel Laureate David Baltimore, President of Cal Tech, and Nobel Laureate James Watson. A book will be published with the contents of the PIR lectures.

Another effort by PIR is to show the human impact of its work by linking climate science with financial policy. With the cooperation of Joseph Flicek of Columbia Innovation Enterprises, PIR scientists filed a patent on two new financial products to hedge catastrophic risks connected with El Niño events. PIR scientists also presented a key note addresses to the reinsurance industry at a yearly event of the reinsurance industry in Bermuda, June 1998, in collaboration with Chris Barton of the U.S. Geological Survey. Following this presentation four insurance industry sponsors supported the creation of a PIR Risk Center, which provides a unique combination of climate science and innovative financial instruments to alleviate the exposure of vulnerable sectors of the population to catastrophic natural hazards.

## Publish or Perish

Top level publications are a must. A parallel traditional approach is followed by PIR in academic publications: with Columbia University Press, PIR initiated a new series of books on Economics of the Global Environment. The first two books in the series are *Valuing the Future* by Geoffrey Heal and *Environmental Markets* by G. Chichilnisky and G. Heal. PIR scientists published two more books this Spring: *Sustainability: Dynamics and Uncertainty* (Chichilnisky, Heal and Vercelli) Kluwer, 1998, and *Mathematical Economics*, three volumes, by G. Chichilnisky (Edward Elgar Publisher), 1998.


In the Fall of 1998 two more books published by PIR scientists are: *Markets, Information and Uncertainty* (ed. Chichilnisky) Cambridge University Press, and *Topology and Markets* (ed. Chichilnisky) published by the American Mathematical Society and The Fields Institute of Mathematical Sciences.

Adding to the science-policy link, PIR's active role in scientific publications in mathematics and economics include twenty-two scientific publications, including a recent article by Chichilnisky and Heal in "Nature," February 1998, proposing financial instruments that can help realize the value of biological assets while inducing preservation. PIR's *Topology and Invertible Maps* develops a new theory of inverting maps for computational purposes, using topological tools; this article by Chichilnisky appeared in *Advances in Applied Mathematics*, 1998.

The proof of the pudding is in the eating. If the work is important, it should have a real world impact. As difficult as this is to achieve, a leadership role in global environmental policy was achieved by PIR at a meeting organized August 5th 1998 by the group of all developing nations in the United Nations — traditionally called the Group 77. Chaired by Ambassador Wibisono of Indonesia, the meeting requested PIR's technical advice in the preparation of a proposal for a strategy for the Buenos Aires Conference of the Parties (COP4). PIR was the proponent of the global emissions trading regime, which became Article 17 of the Kyoto Protocol last December, including a proposal for the creation of a global clearing house for such trades, the International Bank for Environmental Settlements (IBES). Following on this tradition PIR will offer technical support for the September 10-11 meeting of the Group of 77 on how the developing nations can best collaborate with or participate in this scheme, and in the Kyoto Protocol as a whole. PIR is working with Richard Fairbanks of Lamont-Doherty Earth Observatory and Duncan Foley of Barnard College to form a high level committee of the world's most distinguished geoscientists, economists and policy makers to assist the G77 in this important global process.

Supporting PIR's active efforts in linking cutting edge science and policy, UNESCO and the U.S. Department of State provided funding for the Secretariat at Columbia University at the Institute for Biosphere and Society (IBS) created last year by Provost Jonathan Cole: the new Assistant Director for the IBS is Christine Noredom, a French national with extensive administrative experience in the United Nations. Ms. Noredom has field experience in Cambodia and Vietnam, and currently holds a P1 post in UNESCO Paris. She will act as the Assistant Director to the IBS Director, Graciela Chichilnisky, at Columbia University.

## Beyond the Selfish Gene

PIR can only succeed in its unusual mission by helping other parts of the Earth Institute. PIR staff has participated actively in the Earth Institute committees (the Planning Committee and the Interim Academic Committee) and offers its services tirelessly to the Earth Institute and the Columbia community, donating much of its human resources in the hope of contributing to the common cause. At the end, of course, only time will tell. We request the input from *EARTHmatters* readers in suggesting how we can improve on our goal. Please send an email to [gc9@columbia.edu](mailto:gc9@columbia.edu), or come visit us. Our doors are always open. 



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