

ganized, each gathering together more than one hundred experts. The Fondazione also hosts the Secretariat of the European Association of Environmental and Resource Economists (EAERE). The results of the Fondazione's research activities are presented and discussed during the meetings that we organize as well as at other international conferences.

The international dimension is also exemplified by active involvement of the Fondazione in such events as the Rio '92 UNCED 'Earth Summit' as well as several UN, OECD, and EC, working groups. Finally, communication with the international community is pursued through publications. The editorial activities include publication of books, working papers, and a quarterly *Newsletter* as well as articles in major national and international periodicals.

Another common feature results from the interaction between academic research, other research bodies (such as the Italian statistical office), private business, and public policy-making institutions among which are the Ministry of the Environment, the Ministry of Industry, and other national Ministries, as well as other bodies at the international level.

To date, the Fondazione has engaged in six main projects which are now briefly described. The project on Environmental Accounts involves the development of a

scheme of environmental statistics applicable at both the individual firm and national levels. The second project comprises widely-ranging research on Energy and Environmental Policies, which includes studies on international coordination of environmental policies for the protection of the environment at the global level, regulatory policies regarding transboundary pollutants, and the formulation of a model for the quantitative evaluation of the effects of energy and environmental policies on macroeconomic variables, energy markets, and pollution levels. Thirdly, the 'Mediterranean Countries' project is organized under the two main headings of energy *per se* and socio-economic aspects (such as migrations, trade, fiscal and budgetary policies, and changes in socio-political structures). A computer support system has been designed and implemented to assist researchers in the area of Environmental Impact Assessment. Two other major areas of research are waste management and sustainable development, which make up the total of six.

DOMENICO SINISCALCO, *Direttore
Fondazione ENI Enrico Mattei
Via Santa Sofia 27
20122 Milano
Italy.*

US National Pollution Prevention Center for Higher Education

Innovative companies of today recognize the value and importance of pollution prevention. Preventing the creation of pollution at its source, rather than treating it further downstream, is more logical, efficient, and cost-effective, than past emphasis on end-of-pipe practices. The US Environmental Protection Agency (EPA) recognizes the effectiveness of pollution prevention; its administrator, Carol Browner, has targeted pollution prevention as a key environmental policy of the Agency.

NPPC — a Collaborative Effort

Prompted by a need expressed by a group of industrial leaders, the EPA created the National Pollution Prevention Center (NPPC) to foster pollution prevention within society's educational systems and ultimately throughout many other sectors of society. The EPA selected the University of Michigan in 1991 to serve as the base for the NPPC which will collect, develop, and disseminate, educational materials on pollution prevention for higher education. The NPPC represents a collaborative effort between various sectors of society — business and industry, government, non-profit organizations, and academia.

The NPPC defines pollution prevention as reducing hazardous or obnoxious waste generation *at its source, through careful use of materials and processes*. Included in this definition are resource and energy conservation as well. The NPPC's pollution prevention modules are based on the product life cycle framework. This life cycle framework considers the environmental consequences of all activities, from raw-materials' extraction to manufacturing, distribution, use-resource recovery, and disposal.

Educational Resources Development

The educational resources produced by the Center, called modules, describe core concepts in pollution prevention for a variety of disciplines. These sets of instruc-

tions and materials offer a spectrum of resources from which faculty members can draw information to help them to incorporate pollution prevention theory into their courses. Modules include, but are not limited to: annotated bibliographies, case-studies, engineering design problems, problem sets, journal articles, and a list of key personnel and programmes from around the world. In addition to this listing, module summaries also provide background information on pollution prevention, an overview of pollution prevention activities across disciplines, and details of the applications of pollution prevention to the module discipline.

The NPPC currently has module summaries available in accounting, business law, industrial and operations engineering, and chemical engineering. The Center is also working on modules in architecture, chemistry, civil/environmental engineering, corporate strategy, industrial design, operations management, and marketing. Examples of some of the documents which the Center has produced include a hazardous-waste minimization case-study at International Business Machines (IBM) which has proved useful for both corporate strategy and operations management courses. This case-study and accompanying teaching note together describe an IBM project to minimize the use of ferric chloride and develop a process to regenerate the ferric chloride solution in typewriter manufacturing. Another case that we have developed describes and discusses the joint McDonald's/Environmental Defense Fund (EDF) cooperative project on waste-source reduction at McDonald's. Case A addresses this project in general terms, while Case B focuses on McDonald's decision to change from polystyrene packaging to paper-wrap.

Non-ozone-depleting Refrigerator

In the field of Chemical Engineering, the NPPC has developed a design case which challenges students to use

a non-ozone-depleting refrigerant in the design of an energy-efficient refrigerator. In addition to the modules, the NPPC is currently creating a network of faculty and programmes around the country which are involved in integrating pollution prevention concepts into curricula. This *Directory of Pollution Prevention in Higher Education: Faculty and Programs, 1992* is also available from the Center (US faculty no charge, others US \$4.50 + shipping).

The NPPC's creation and development of educational materials on pollution prevention is a cyclical process. The modules are continually being made, used, reviewed, and updated in such a way as to remain applicable to our changing society. The use of our resources by faculty members and other staff is critical to achieving the

NPPC's goal of widespread pollution prevention education.

If you are interested in more information on the Center, please contact Dr Gregory A. Keoleian, Center Manager at the address given below or telephone (313) 764-1412, or Fax (313) 936-2195.

VERA SIGUEL
National Pollution Prevention Center
for Higher Education
430 East University Avenue
Dana Building 2540
Ann Arbor
Michigan 48109-1115
USA.

Global Distinction for INSONA's *Environmental Awareness*

The quarterly journal *Environmental Awareness*, organ of the International Society of Naturalists (INSONA), with headquarters in Baroda, India, has achieved a rare and possibly unique record of having eleven United Nations Environment Programme (UNEP) 'Global 500' Laureates on its Board of Consulting Editors. They were chosen for the Awards, during 1987 to 1992, for outstanding achievements in the protection and improvement of the environment.

The recognized celebrities who have excelled in the main fields of environmental endeavour and who figure on the UNEP's Roll of Honour include Senator Professor Mohamed Kassas (Egypt) and Maurice F. Strong (Canada) for 1987; Professor Norman Myers (England, UK) for 1988; Professor Paul R. Ehrlich (USA) for 1989; Professor Gunavantrao Oza (India) and Dr Arthur H. Westing (USA) for 1990; Professor Lynton K. Caldwell (USA) and Professor Nicholas Polunin (Switzerland) for 1991; Dr Mrs Shirley McGreal (USA), Professor Vo Quy (Vietnam), and M. A. Partha Sarathy (India), for 1992.

Environmental Awareness is devoted to the cause of environmental conservation for human welfare. Founded in the year 1977 and edited throughout by the undersigned, the journal is thought to have been the first of its kind to become established in any Asian or African country, and is well-received among international non-governmental organizations (INGOS) (Oza, 1987, 1989a).

It is yet another matter of distinction that the above-mentioned 'eleven' are among the distinguished adherents of now 28 mostly internationally-known leaders in the environmental movement to constitute the Panel of Consulting Editors of *Environmental Awareness* (Oza,

1989b). They include (in alphabetical order of family names) William C. Burns (USA), Professor Raymond F. Dasmann (USA), Richard Fitter (England, UK), Dr Walter D.S. Leal Filho (Brazil), Dr F. Raymond Fosberg (USA), Dr Thor Heyerdahl (Norway), Grenville Lucas (UK), Dr Walter J. Lusigi (Kenya), Professor Makoto Numata (Japan), Mrs Premalata Oza (India), Dr Mrs Mrunalinidevi A. Puar (India), Dr George B. Rabb (USA), Dr S. Dillon Ripley (USA), Professor Richard E. Schultes (USA), Dr Monkombu Swaminathan (India), Dr Lee M. Talbot (USA), and Dr John R. Vallentyne (Canada).*

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GUNAVANT M. OZA, *Professor of Botany, The Maharaja Sayajirao University of Baroda; General Secretary of INSONA & Founding Editor of Environmental Awareness Oza Building, Salatwada, Baroda 390 001, India.*

* In our considered opinion, several of these merit Global 500 Awards and to our knowledge one has latterly been nominated while at least six more will be in due course if (as is much to be hoped) this honouring distinction is extended and provided we are invited again to nominate and are spared to do so. — Ed.

Ozone Depletion Over Antarctica Returns

The depletion of ozone returned with vigour over the sunlit regions of the Antarctic at the beginning of the second ten-days' period of August 1993. This was revealed by the World Meteorological Organization (WMO) through its bulletins on the state of the ozone layer which are issued annually during the August/November period. The first of these this year was issued in Geneva on August 30th.

During the preceding four weeks, total ozone values had fallen from a normal of 310 m atm cm* down to about

or below 200 m atm cm — a decline of over 35%. This decline had commenced at least three weeks earlier than was observed in the mid-1980s and is a few days earlier than the unprecedented events of 1992, when the earliest-starting depletion, to the lowest-observed values and covering the largest area ever, was recorded, stated Dr Rumen D. Bojkov, Special Adviser to WMO's Secretary-General on the Ozone and Global Environmental Issues.

Ozone 'Hole' Annual

Based on the data provided by Members of the World Meteorological Organization who participate in the

* m atm cm = .001 atmosphere pressure centimetre.