

2007



IIASA Mission

IIASA's mission is to conduct international and interdisciplinary scientific studies to provide timely and relevant information and options, addressing critical issues of global environmental, economic and social change, for the benefit of the public, the scientific community, and national and international institutions.

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Schloss Laxenburg, Austria—seat of IIASA

Contents

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From the Chairman and the Director

By chance, three of the most newsworthy aspects of 2007 for IIASA occurred within a few weeks of each other. Two of these—the Republic of Korea joining IIASA and the news that 17 IIASA scientists were among those jointly awarded the 2007 Nobel Peace Prize—were announced at the third, the **IIASA Conference '07**, “Global Development: Science and Policies for the Future,” held on 14–15 November at the Hofburg Imperial Palace in Vienna.

The IIASA Conference '07, unequivocally our “event of the year,” represented an enormous investment of time and expertise by an organizational team headed by IIASA’s Deputy Director Sten Nilsson. The two days were packed with contributions from distinguished speakers from business, politics, policy, and science, whose thoughts and ideas still resonate long after the Conference’s end. Indeed, we acknowledge participants’ sound advice and stimulating suggestions for IIASA’s future research and methodology. And we trust that all our guests came away from this much-praised event similarly inspired.

With the **National Research Foundation of South Africa** starting its IIASA membership on 1 July 2007, it was doubly pleasing to hear the announcement at the Conference that the **Korean Science and Engineering Foundation (KOSEF)**, based in Daejeon, had successfully applied to join IIASA. Korea’s membership is effective from 1 January 2008.

We are very proud that, as authors and reviewers of the “Fourth Assessment Report” of the Intergovernmental Panel on Climate Change, 17 IIASA scientists shared the **2007 Nobel Peace Prize** awarded to the United Nations Intergovernmental Panel on Climate Change (IPCC) and Al Gore for their work on climate change. Their work is key to helping policymakers come to grips with this major global problem.

We were saddened to hear Bert Bolin, chair of IIASA’s Science Advisory Committee from March 2004 to June 2007, died on 30 December at 82. As a distinguished Swedish climate scientist, and as co-founder and first chairman of the IPCC, he played a key role in educating world leaders about the dangers of climate change.

The climate change theme spans all programs at IIASA. Scientists from the Forestry (FOR) and Risk and Vulnerability (RAV) Programs represented the Institute at the United Nations Climate Change Conference in Bali in December. FOR presented a side event on “The Political Economy of Avoided Deforestation,” while RAV provided important input to the debate in favor of innovative donor-supported options for sharing extreme-event risks for developing countries.

At the 26th session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) of the UN Framework Convention on Climate Change (UNFCCC) in Bonn in May, the Greenhouse Gas Initiative (GGI) held a side event relating to its work on medium-term emission reductions, “Keeping Options Open through Mid-Century Targets.” The importance of an integrated approach for the control of local air pollution and global greenhouse gases was highlighted at another side event co-organized by the Atmospheric Pollution and Economic Development (APD) Program at the 15th session of UN Commission on Sustainable Development (CSD-15) in New York in May.

The Global Energy Assessment (GEA), a multi-year, multi-stakeholder initiative looking at integrated solutions to existing and emerging threats associated with major global energy challenges, was officially launched at IIASA in January. The GEA was represented in two events at CSD-15: a lunchtime side event on “Global Energy Assessment: Major Energy Challenges and Solutions,”



SIMON LEVIN, CHAIRMAN

A handwritten signature of Simon Levin in black ink.

and a related evening event on “Energy Security through Lived Interdependence.” At the invitation of the UN Department of Economic and Social Affairs, IIASA’s Nebojsa Nakicenovic was a coordinating lead author of a major report on climate change to the CSD-15, “Confronting Climate Change: Avoiding the Unmanageable and Managing the Unavoidable.”

It was a good year for propagating IIASA research. A landmark for FOR was the publication of a CD-ROM on Russian Forests and Forestry containing consistent and spatial productivity tables for all major tree species in Russia, which is now being used by the Russian Ministry of Natural Resources in its forest management instructions. The Evolution and Ecology (EEP) Program published two articles in *Science*:

one urging evolutionary impact assessments for managing fisheries-induced evolution, and the other, with Harvard and Vienna universities, providing details of a new model explaining cooperation based on voluntary teamwork and costly punishment.

The journal *Technological Forecasting and Social Change* dedicated a special issue to new long-term scenarios on the uncertainties of greenhouse gas emissions and their mitigation. Developed by the Greenhouse Gas Initiative, the scenarios are based on methods and models from seven IIASA research programs and are available in an online scenario database. The World Population (POP) Program published an article in *Nature* showing how the world population will grow older faster, peaking from 2020 to 2030, as well as an article in *Science* on research showing the Millennium Development Goal of universal primary education by 2015 to be “insufficient” in terms of bringing the human capital of the adult labor force to the level required for rapid economic growth.

Internationally, many scientists gave high-level presentations and lectures that fostered IIASA’s profile and publicized its research successes. Other notable international work included a study by POP on projecting future population and human capital growth at the level of governorates in Egypt, and Roadshows by the Processes of International Negotiation (PIN) Network in Pakistan and China.

Finally, in summer 2007, IIASA welcomed 51 post-graduate students from 20 countries for its annual Young Scientists Summer Program as well as two new IIASA-funded postdoctoral fellows.

IIASA looks forward to continuing and implementing many of the research strategies and proposals put forward in 2007 in the coming year. We are also delighted to announce that the IIASA Council has enthusiastically appointed Detlof von Winterfeldt as the ninth Director of IIASA, effective 1 January 2009. IIASA is equally fortunate that Sten Nilsson will serve as Acting Director from mid-May through December 2008, assuring that there will be no loss of momentum for IIASA.



LEEN HORDIJK, DIRECTOR

Leen Hordijk, IIASA’s Eighth Director, 2002–2008

Leen Hordijk is coming to the end of one of the most successful terms as Director in IIASA’s history, and leaves to become Director of the Institute for Environment and Sustainability in Ispra, Italy. Thanks to Leen Hordijk’s leadership, IIASA is much stronger and more stable than it was when he began his term. He restored IIASA to financial stability, built spirit within, and broadened its reach by recruiting new National Member Organizations with new challenges and new perspectives.

Leen heightened communication both within the Institute and between the Institute and the outside world, reinstituting program leader meetings and fostering brainstorming that led to a plethora of new ideas and the establishment of cross-cutting programs that highlighted the Institute’s interdisciplinary approach to problem solving. This was a high priority for Leen, who saw it as an absolute necessity in an increasingly complex world.

Leen will probably best be remembered for his success in attracting new members to IIASA, to turn it from Cold War artifact into a future-oriented path-breaker. It is a tribute to Leen’s persistent diplomacy that India, Pakistan, South Africa, and the Republic of Korea have joined in recent years, and have already become well-integrated players in IIASA’s programs and governance.

On a personal level I thank Leen for his unfailing support of the Council, and of me as Chair. I am sure that IIASA staff members and all who have passed through the Institute since 2002 as researchers, post-doctoral fellows, and YSSP participants will wish to join me in expressing our bittersweet feelings at losing such a congenial colleague. Though we know that he leaves a shining legacy and is looking forward to new challenges, his influence at IIASA will be missed. We wish Leen and Joan the very best in their new life in Italy, and hope that they will come back to Laxenburg often.

Simon Levin, Chairman of IIASA’s Council

Thirty-Five Years of IIASA

IIASA was founded as a unique experiment to bring together scientists from either side of the iron curtain to find global solutions to global problems. A former imperial palace in Austria became the experiment's location and since 1972 science and diplomacy have been mixed together with astonishing results.

Examples of IIASA's achievements during its first 35 years, from a scientific breakthrough to a practical tool to help countries make environmental policies, are presented overleaf, together with a brief history of IIASA. These pages reproduce the exhibition from the IIASA Conference '07, which commemorated IIASA's thirty-fifth anniversary.

Today IIASA's international research is even more relevant as each country struggles to meet local challenges that are often caused by events far outside its borders. Our membership reflects today's world with IIASA's original members of Russia, the United States, Japan, and major European countries, joined by China, India, Republic of Korea, and South Africa to name a few.

The annual report highlights the four characteristics that underpin IIASA's success: high quality science with a truly interdisciplinary and international approach that delivers policy-relevant research. Updates on IIASA's research programs, scientists, finances, and other activities including the Young Scientists Summer Program then follow. More detailed information can always be found on our Web site:

www.iiasa.ac.at



IIASA Conference '07

Thirty-five Years of Science for Global

A Brief History of IIASA

The Founding of the Institute

In October 1972 representatives of the Soviet Union, United States, and 10 other countries from the Eastern and Western blocs met in London to sign the charter establishing IIASA. It was the culmination of six years of effort driven forward by both the US President Lyndon Johnson and the USSR Premier Alexey Kosygin.

The signing of IIASA's charter in London in 1972



For IIASA it was the beginning of a remarkable project to use scientific cooperation to build bridges across the Cold War divide and to confront growing global problems on a truly international scale.

Clearly, success at bridge building and successful science would go hand in hand. But neither was a foregone conclusion. This was the 1970s and most research organizations focused on national issues. Few encouraged researchers from different countries or disciplines to work together for the greater good.

To achieve its ambitious research vision, IIASA would have to break down the barriers between nations and disciplines. This it did, building international multidisciplinary teams to confront innumerable global challenges, both long-standing and emerging. For example, a study on water pollution carried out in the 1980s by a team of IIASA chemists, biologists, and economists influenced water management policy in Italy, Japan, USA, and the former USSR.

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Competing with France and the United Kingdom to host IIASA, Austria offered to house the Institute in a former Habsburg summer palace in Laxenburg, south of Vienna. The Austrian government renovated the magnificent buildings from 1972-76 and charges IIASA a symbolic rent of one Austrian schilling (US\$106) per year.



The following four examples give a flavor of the Institute's many accomplishments since its foundation in 1972. They show the breadth of IIASA's research in Energy and Technology, Environment and Natural Resources, and Population and Society. They also show the Institute from four different perspectives—a researcher, a mediator, a policy advisor, and a young scientist.

All IIASA's achievements have something in common. They could only have taken place at an Institute with a high-quality, policy-relevant, international, and interdisciplinary research agenda such as IIASA. The examples demonstrate the enormous value of IIASA's scientific findings and tools in an increasingly multifaceted and interconnected world.

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After the Cold War

When the Cold War ended, IIASA's sponsoring countries could have said "mission accomplished" and disbanded the Institute. IIASA had certainly helped foster mutual understanding among scientists from East and West. But it had also done more than this. IIASA had shown the scientific benefits of bringing together different nationalities and disciplines to work toward common goals.



IIASA scientists are highly published. From influential books of the 1970s and 1980s to today's most prestigious scientific journals and major international reports.

The Institute has 19 member countries, which account for over half the world's population (53%) and production (58%) and include the world's four largest economies and some of the world's fastest-growing economies.

Systems analysis is the scientific tool that unites the 3,500 scientists from more than 60 countries and 60 scientific disciplines that have researched at IIASA during its first 35 years. It is one of the few tools available that can effectively find long-lasting solutions to global problems as they become ever more complex and change ever more quickly.

Today's Research Themes

Energy and Technology

Understanding the major global energy challenges, both current and future, is the focus of IIASA's Energy Program. With about half of economic growth attributable to technological change, the Transitions to New Technologies Program is analyzing the diffusion of new technologies in time and space, along with their economic, social, and environmental implications. Underpinning IIASA's research and helping to keep the Institute at the forefront of dynamic systems modeling is the Dynamics Systems Program.

Indeed, this approach has been widely followed, for example, in the Intergovernmental Panel on Climate Change and the International Geosphere-Biosphere Programme. So instead of closing in the 1990s the Institute broadened its mandate from the East and West to a truly global focus. Today IIASA continues to bring together a wide range of scientific skills to provide science-based insights into critical policy issues in international and national debates on global change.

Eight Directors have led IIASA since 1972



Scientific Insights t

Energy and Technology

helped a researcher pioneer a new approach in economics with implications for the technology sector. The mind of young economist W. Brian Arthur originally joined IIASA in 1977 was why Western minds always start with letters QWERTY,

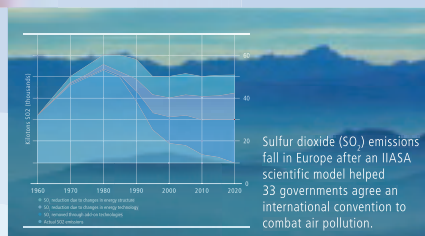
Or, in economics terminology, the QWERTY format had showed increasing returns.

By applying increasing returns to hi-tech markets Arthur so challenged economic orthodoxy that his ideas were initially rejected. Fortunately, IIASA's approach of bringing together scientists from different disciplines and countries helped Arthur to elucidate his theory. An IIASA physicist astonished him with the similarities between the inner workings of liquids and solids and what Arthur saw in economics. Later, Yuri Ermoliev, a Ukrainian mathematician at IIASA helped him develop a series of path-breaking approaches in mathematics to show increasing returns.

After six years of rigorous analysis at IIASA and a further six years of perseverance, Arthur's IIASA working paper was published in a prestigious economic journal. Today the research on increasing returns is highly regarded in the world of science, business, and policy. It has even provided the intellectual underpinnings for the US Department of Justice's case against Microsoft for monopolistic practices.

Environment and Natural Resources

Diplomats put an IIASA scientific model at the center of a successful multilateral treaty on the environment. Cleaning up air pollution is not easy. Each country generates different amounts of air pollution and feels the effects of air pollution unequally as the pollutants are blown across borders. Negotiating a clean-up policy in the face of such inequality will test even the best diplomat.



Sulfur dioxide (SO₂) emissions fall in Europe after an IIASA scientific model helped 33 governments agree an international convention to combat air pollution.

Pollution in our atmosphere comes from various sources, including agriculture, industry, and transport. The range of air pollutants, individually and in combination, has multiple effects on the environment, and these must be tackled by numerous measures. As well as having diplomatic skills, therefore, an international negotiator must also understand the complex science of air pollution.

The Geneva Convention on Long-range Transboundary Air Pollution is one of the most successful multilateral treaties protecting the environment. It has helped clean Europe's air since 1979. What is the secret of the treaty's success? The answer is the close collaboration between the scientists, the policymakers, and the diplomats who negotiated the agreements. Guiding the countries was a scientific tool, developed by IIASA and known as the Regional Acidification Information and Simulation (RAINS) model. Diplomats, with a few hours' training, can pose any number of "what-if" questions to RAINS. How much would it cost to reduce sulfur dioxide to a certain level for Europe? RAINS calculates the answer and guides governments to agree on sophisticated environmental policies. Today, RAINS continues to help reduce air pollution at the lowest cost.



Environment and Natural Resources

IIASA's Atmospheric Pollution and Economic Development Program guides countries on how to clean their air without burdening economic development. The Evolution and Ecology Program analyzes how evolution shapes our environment and ecology along with the species living within it. The Forestry Program investigates how countries can manage their forest sector so as to benefit economies and societies both now and in the years to come. IIASA's Land Use Change and Agriculture Program researches how countries can manage land and water resources to achieve long-term food, water, and energy sustainability.

Population and Society

IIASA's World Population Program researches the changing size and structure of the world's human population and related problems, while the Population and Climate Change Program analyzes how demographic change influences greenhouse gas emissions. With people come conflicts, and IIASA's Processes of International Negotiation Program studies what helps and hinders successful international negotiations. Increasing the resilience of the areas and peoples most vulnerable to natural disaster and helping them better manage the risks they face is the focus of the Risk and Vulnerability Program.

IIASA-wide Research and Special Projects

IIASA's Greenhouse Gas Initiative researches climate change by combining the interwoven fields of the economy, environment, energy, technology, population, and society. Water is studied across the research themes with investigations, among others, into future global water cycles. Special projects at IIASA explore promising research avenues. The Health and Global Change Project investigates the economic and social aspects of pandemic influenza. IIASA's Integrated Modeling Environment Project develops research tools to analyze complex problems.

Programs for Young Scientists

IIASA's programs for young scientists offer advanced graduate and postdoctoral students from around the world the opportunity to gain hands-on professional research experience in an international and interdisciplinary scientific environment.

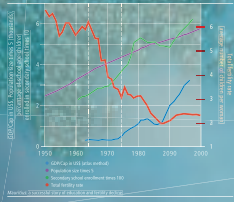


What Improve our World

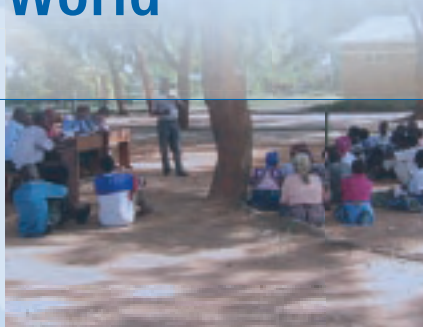
Population and Society

IIASA empowered policymakers in developing countries to find paths to sustainable development. "Science, like government, tends to be compartmentalized into disciplines. A division of labor is useful because it allows for in-depth expertise and efficient action. The only problem is that the real world is not compartmentalized, and changes in population, development, and environment are interwoven.

In the 1990s, IIASA's research helped further guide Mauritius to more economic growth without over-using its sparse resources.



Over a long planning horizon it becomes imperative to address a country's future in a comprehensive interdisciplinary and interministerial manner." So wrote the Chief Economist in Botswana's Ministry of Finance. In 2001 IIASA had just developed a sophisticated computer simulation on population, development, and environment interactions in Botswana. It was the outcome of a decade's research in which IIASA had built interdisciplinary teams of researchers, ranging from demographers to civil engineers, to investigate the paths to sustainable development for a host of developing countries from Mauritius to Mexico.



In Botswana, it showed that AIDS would either shrink the population or slow its growth. That the high death rates among young adults would impact the country's work force. That urbanization would increase the population and thus boost water demand in Botswana's water-scarce capital, Gaborone. Yet none of these future changes would be isolated or unidirectional. A short supply of unskilled labor would affect economic activity; business, in turn, would affect the environment; and both would affect people's lives and decisions ranging from whether to migrate to how many children to have.

This IIASA computer simulation helped local policymakers explore different sustainable development policies by overcoming the divide between the environment and economic development.

Young Scientists Summer Program (YSSP)

Since 1977, over 1,300 advanced graduate students from 70 countries have spent the summer researching at IIASA. Sarah Elizabeth Staveteig from the University of California, Berkeley, was one of the 59 young scientists in 2004. In January 2005 she reflected on her experience in the journal *Nature*: "The YSSP helped me look at my research from fresh angles. It offered the springboard I needed to move from coursework to productive independent research. I've returned with a potential dissertation chapter, lots of new ideas on how to proceed, and a new network of colleagues, friends and potential collaborators from around the world."



'07

IIASA Conference

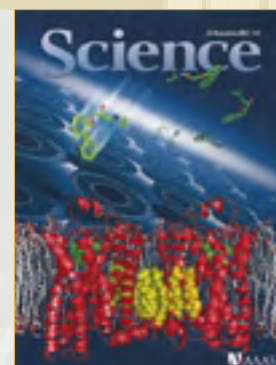
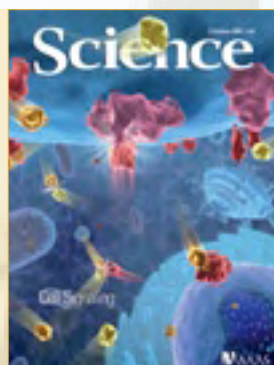
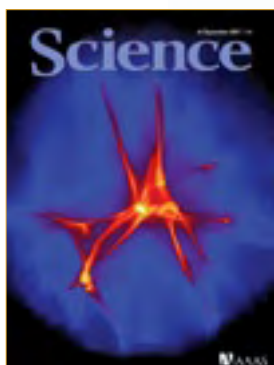
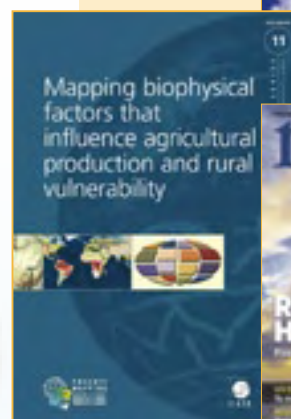
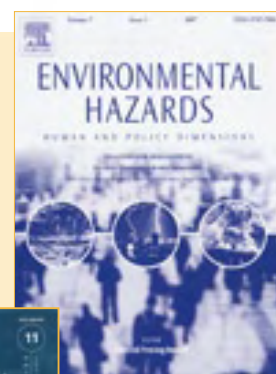
High-Quality Science

A year of new research findings and forward thinking:
from linking urbanization to climate change
to reducing countries' vulnerability to natural disasters.

HIGHLY PUBLISHED IIASA had its most successful year ever in terms of articles recognized by the renowned Institute of Scientific Information (ISI, today known as Thomson Scientific). In 2007, IIASA had a total of 97 publications which is considerably higher than the 61 articles it has published on average every year since 2000. In the preceding decades, IIASA averaged 39 publications a year in the 1990s, 44 in the 1980s, and 31 in the 1970s.

WORLD POPULATION However you look at it, the world's population is aging with increasing speed, according to research published by IIASA's demographers in *Nature*. This speed of aging will continue to increase over the coming decades but is likely to slow by mid-century. The findings come from the third update of probabilistic world population projections for 13 world regions produced by IIASA's World Population Program in 2007. The first update in 1996 forecast the doubling of world population was unlikely; and in 2001 the second update projected the end of world population growth.

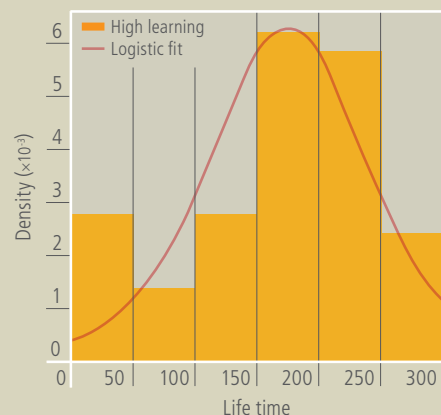
URBANIZATION AND EMISSIONS Urbanization in China and India could increase future greenhouse gas emissions by up to 45% and 35%, respectively, according to IIASA research presented at the Annual Meeting of the Population Association of America. Urbanization leads to faster economic growth, increasing the demand for energy used in manufacturing and by households for transportation, heating, cooking, lighting and appliances, leading to greater greenhouse gas emissions. The analysis was made possible by IIASA's Population and Climate Change Program, which built the first model that explicitly considers the impact of urbanization on future energy use and emissions in India and China.



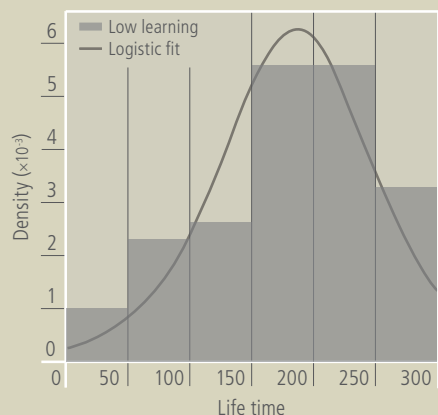
PUBLISHING RECORD Besides publishing more journal articles in 2007 than in any previous year, IIASA scientists published five articles in the most cited scientific journal, *Science*—again, more than in any preceding year. Articles ranged from the carbon benefits of fuels and forests to managing evolving fish stocks.



CONFLICT RESOLUTION Sage publishers have invited members of IIASA's Processes of International Negotiations Program to edit the new *Sage Handbook of Conflict Resolution*. Bringing together 36 specialists from around the world, the three editors are combining the latest knowledge, methods, theory, and practice in the new book. It will appeal equally to the seasoned diplomat as the student of international negotiations.



TECHNOLOGY LIFE TIME Time in use (survival time) of technologies in a sample of 200 simulations and under high (yellow) and low (grey) learning. Note the dominance of technologies with a lifetime of more than 100 periods (years), indicating extreme longevity and hence barriers for rapid change.



BARRIERS TO TECHNOLOGICAL CHANGE

Once technological combinations exist and become locked in, they remain in use for well over a century. This extreme longevity highlights that it might not be possible to accelerate pervasive changes in technology systems unless an explicit policy mechanism of Schumpeterian "gales of creative destruction" can be found. This was one of the findings from the development of a new model on the evolution of technological complexity by IIASA's Transitions to New Technologies Program.

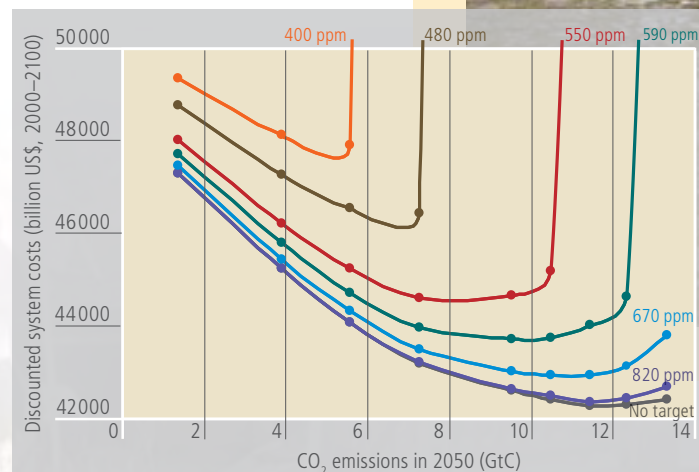
TECHNOLOGICAL FOLLOWERS Mathematicians at IIASA analyzed the problem of optimal economic growth of a technological follower, a country that absorbs, in its technological sector, part of the knowledge produced by a technological leader. The research from IIASA's Dynamic Systems Program fruitfully links the endogenous economic growth theory and mathematical theory of optimal control. One finding shows the technological follower optimizes its growth performance by dynamically redistributing available labor resources between the manufacturing and research and development sectors of the economy.

POVERTY AND THE ENVIRONMENT Mapping the suitability of land for agricultural activity across the globe can help countries better understand the links between poverty and the environment and ultimately to better target aid to rural communities. IIASA's Land Use Change and Agriculture Program worked with the UN's Food and Agriculture Organization to estimate and characterize the distribution of the world's rural population in terms of amounts and qualities of agricultural resources, land use category, and type of farming system.

DISASTERS EXACERBATE POVERTY In the past quarter century over 95% of disaster deaths occurred in developing countries, and direct economic losses as a share of national income were more than double in low-income versus high-income countries. Disasters exacerbate poverty as victims take out high-interest loans, sell assets and livestock, or engage in low-risk, low-yield farming to lessen exposure to extreme events. IIASA's Risk and Vulnerability Program authored a special issue of *Environmental Hazards* that explored new directions in pro-active disaster financing that can reduce disaster-related risk and vulnerability, and help alleviate poverty.

Interdisciplinary Research

Complex scientific problems are challenging scientists to find new ways to integrate knowledge from multiple and disparate fields. Since 1972, IIASA has been at the forefront of building such interdisciplinary teams. 2007 saw a wide range of academic disciplines gather at IIASA to research, rethink issues, and learn innovative ways of research.



CLIMATE CHANGE TARGETS The cost of reaching various levels of CO₂ emissions by 2050 and what long-term stabilization target this medium-term target would exclude.

CLIMATE CHANGE TARGETS Setting targets to reduce greenhouse gas emissions by 2050 could help the world reach long-term climate change goals. These medium-term decisions have to be made in the context of uncertainties of long-term stabilization targets. While too stringent interim-targets for emissions bears the risk of overspending on climate mitigation, too little over the short-term risks that the long-term objective is never achieved. An interdisciplinary team of climate scientists, economists, and energy analysts at IIASA systematically investigated the socioeconomic and technological implications of such mid-century emissions targets. They found, for example, that emissions targets above 11 gigatonnes of carbon by 2050 would result in a failure to meet the long-term stabilization target of 550 parts per million of carbon dioxide equivalent concentrations (chart, top). The analysis was the first results from a new myopic version of the global energy model, MESSAGE that was developed by IIASA's Energy Program in collaboration with IIASA's Population and Climate Change Program under the umbrella of the Greenhouse Gas Initiative. The model now bridges different time-scales enabling scientists to assess the consequences of short-term decisions for a range of long-term energy objectives.

ACCOUNTING FOR ONE IN 300 YEAR FLOODS Proper integrated modeling and decision analysis of on-going socioeconomic and environmental global changes raise new fundamental methodological challenges. IIASA's mathematicians, modelers, foresters and agricultural experts joined forces to develop a tool for decision making that takes extreme events, such as the possibility of a one in 300 year flood, into account. IIASA's Integrated Modeling Environment Project showed how the misperception of discount rates produces inadequate evaluations of risk management strategies that may significantly increase the vulnerability of our society.

YOUNG SCIENTISTS Fifty-one young scientists from 20 countries took part in IIASA's Young Scientists Summer Program in 2007. Ranging from economists to engineers to chemists, the young researchers spent the summer working with distinguished scientists in IIASA's environment of international and interdisciplinary cooperation.

Mathematicians et al. (23%)

Social scientists (39%)

Natural scientists & engineers (38%)

THE MANY DISCIPLINES OF IIASA RESEARCHERS IN 2007
IIASA builds interdisciplinary teams of researchers to research the complexities of global change and harvest the innovative research that results.



IIASA'S EVENT OF 2007 A Nobel Prize winner, Head of State, and one of the world's most famous economists joined 650 distinguished guests to analyze global development.



GLOBAL DEVELOPMENT: SCIENCE AND POLICIES FOR THE FUTURE

In November 2007, IIASA brought together a star-studded cast of scientists, policymakers, and thinkers to discuss global development. Over 650 experts attended the IIASA Conference '07 in Vienna and viewers in 22 countries watched the live Webcast. Speakers ranged from Jeffrey Sachs, Director of The Earth Institute at Columbia University, to Manfred A. Max-Neef, an alternative Nobel Prize winner.

The conference delivered a wide-ranging discussion on what a sustainable and equitable future might look like, and how to get there. All agreed that the world faces two fundamental challenges in the twenty-first century. One is to root out the persistent and entrenched poverty of the "bottom billion" of humanity. The other is to prevent economic growth from overwhelming the global commons—the atmosphere, oceans, water cycle, and biodiversity.

But there was disagreement about whether these goals can best be secured through better management of the existing political and economic systems, or whether more fundamental changes were needed. Put simply, can continued economic growth be made sustainable or not?

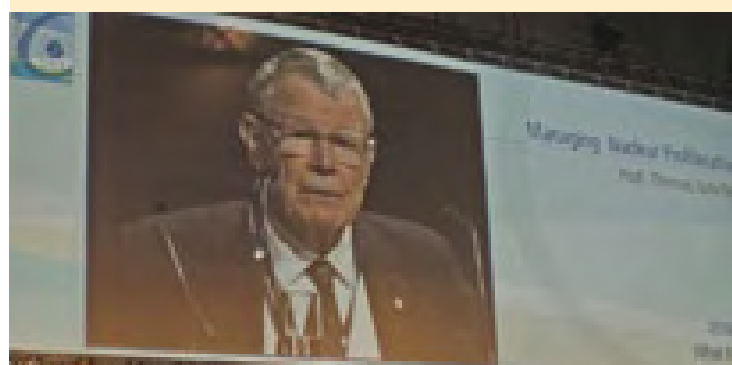
Agendas for improving human and social capital and for maintaining natural capital were laid out. But there was a lack of integration between the two, suggesting an important focus for future systems research. Likewise, the competing threats of over-consumption and over-population were often discussed rhetorically rather than analytically.

Competing demands for land and water resources threaten future supplies of the "three Fs": food, fiber, and fuel. The boom in biofuels amplified the risks.

More positively, there was discussion of potential no-regrets solutions that addressed both social and environmental problems. Finding alternatives to burning fossil fuels, for instance, addressed human health problems from smog and climate change. And the benefits of good governance in solving problems were illustrated.

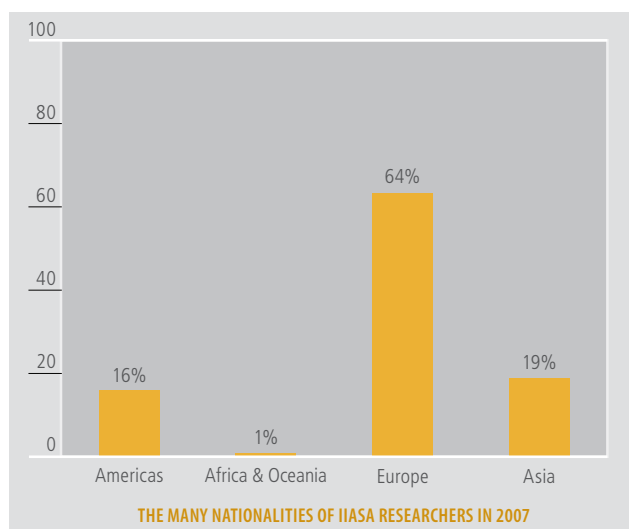
The conference commemorated IIASA's thirty-fifth anniversary.

www.iiasa.ac.at/iiasa35



International Dimensions

National interests aren't what they used to be. In the 21st century countries will have to face the reality that humanity shares a common fate on a crowded planet. By fostering international teams of researchers, IIASA uses science to help build bridges between countries and find local solutions over frequently contentious global problems.



In 2007 IIASA's researchers came from 32 countries, indicated on the map. The chart shows the percentage of researchers that come from each continent.

THE AMERICAS

- Fisheries-induced evolution in the North Atlantic
- Impact of an aging population on future carbon emissions in the U.S.
- Ground-water management in the Mexico-city basin
- Regional probabilistic population projections for Latin America

GLOBAL

- Global Energy Assessment
- Human capital reconstruction by age and sex for levels of education
- Evolutionary impact assessment for managing fisheries-induced evolution
- New scenarios on uncertainties of greenhouse gas emissions and their mitigation
- Diplomacy games, conflict resolution, and climate change negotiations

EUROPE

- Economic vulnerability of European households, businesses, and governments to extreme weather
- Health care finance reform in Bosnia and Herzegovina
- Air pollution emitted from European marine shipping
- Growth and productivity of forest species across Russia

ASIA

- Hydrogen deployment strategies in Japan
- Efficient energy use and clean coal technologies in China and India
- Current and future impacts of climate-related extreme events in Bangladesh
- Indian and Chinese forest sector development

AFRICA AND OCEANIA

- How climate forecasts help African farmers
- Projecting future population and human capital growth in Egypt
- Health infrastructure development in Lesotho
- Food security and climate change challenges in Sub-Saharan Africa

INTERNATIONAL NETWORKS

- Under the umbrella of the EU FP6 European Network of Excellence on "Atmospheric Composition Change", IIASA has helped bring together scientists active in satellite observations of atmospheric pollutions and bottom-up emission inventories
- IIASA's Processes of International Negotiation Network brings together international specialists who conduct research on the theory and application of negotiation via a network of 4,000 researchers and practitioners
- IIASA researchers serve as Convening Lead Authors, Lead Authors, and Reviewers in the reports of the IPCC Fourth Assessment
- Co-led by IIASA, the Integrated Assessment Modeling (IAM) Consortium comprises all main global and regional IAM modeling groups

INTERNATIONAL CONFERENCES:

- "Economic, Societal and Environmental Benefits Provided by the Indian Forests" conference co-organized by IIASA and the Technology Information, Forecasting and Assessment Council, New Delhi, India, 25–27 April
- "Water Science Day" hosted by IIASA, Laxenburg, Austria, 11 June
- "Negotiating with Terrorists" workshop hosted by IIASA, Laxenburg, Austria, 27 June
- "Complex Systems Modeling" workshop hosted by IIASA, Laxenburg, Austria, 27–29 August
- "Insurance Instruments for Adaptation to Climate Extremes" workshop hosted by IIASA, Laxenburg, Austria, 23–25 September
- "Pandemic Influenza in China" workshop organized by IIASA and hosted by the Peking University, Beijing, China, 18–23 October
- "Integrated Assessment of Air Pollution in China" workshop organized by IIASA and hosted by the Tsinghua University, Beijing, China, 9–10 November

Policy-Relevant Research

IIASA's researchers are in great demand by policymakers.

In 2007 IIASA applied its research to help countries face major challenges ranging from air pollution to climate change to over-fishing.

RUSSIAN FORESTS IIASA research is helping the Russian Federal Forest Service better manage its forests. IIASA's Forestry Program has compiled over 15 years of research and data on the growth and productivity of the main Russian forest species at the pan-Russian level into a single CD-ROM. Some of its contents have been published in a guide that forest enterprises are obliged to follow when planning the Russian forest sector. Ten thousand copies of this book have been distributed and every month over 1100 users have visited the home page of the CD-ROM since its publication in 2007. The research is also helping our understanding of the role forests play in greenhouse gas emissions.

REDUCING GREENHOUSE GASES AND AIR POLLUTION Countries can save significant costs and reap major environmental benefits by tackling air pollution and greenhouse gas emissions at the same time. Thanks to IIASA's GAINS (Greenhouse Gas and Air Pollution Interactions and Synergies) model, policymakers in Europe, China, and India can identify practical solutions that reap multiple benefits in problems that are usually analyzed in isolation. For example, IIASA is helping China tackle the immediate problem of air pollution while ensuring these strategies maximize the positive side effects for reducing the emissions of greenhouse gases. IIASA's recommendations also keep the burden on economic development of any environmental policies to a minimum.

MANAGING EVOLVING FISH STOCKS In the 23 November issue of *Science*, an international group of experts collaborating with IIASA's Evolution and Ecology Program urges the introduction of evolutionary impact assessments for managing fisheries-induced evolution. The experts summarize mounting evidence that fishing causes rapid contemporary evolution in exploited populations, in both freshwater and marine environments, and suggest an evolutionarily enlightened management approach to address this challenge.

SHRINKING FISH Worldwide, commercial fishing maximally exploits or over-exploits three-quarters of fish stocks, reducing the number of fish and changing their heritable features. The picture shows the decreasing size and weight of the Atlantic Cod at first reproduction. This previously-overlooked evolutionary dimension of modern fishing could have unexpected consequences for the economic value and the ecological stability and recovery potential of exploited fish stocks.

2000s / average size and weight at first reproduction: 72.8cm, 3.2kg

1970s / average size and weight at first reproduction: 82.0cm, 4.6kg

1930s / average size and weight at first reproduction: 85.1cm, 5.1kg



IIASA AND THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

The Nobel Peace Prize for 2007 was awarded to the Intergovernmental Panel on Climate Change (IPCC) and Al Gore for “their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change.”

Over the past two decades, hundreds of scientists have collaborated to summarize and evaluate the work of thousands more in the IPCC’s scientific reports. Together the scientists have documented their progress in climate change science and created an ever-broader informed consensus about the connection between human activities and global warming.

Since 1990, over 20 IIASA scientists have contributed to the IPCC reports—a contribution far greater than some of the world’s most prestigious universities. But not surprising. IIASA’s approach of merging interdisciplinary and international research ensures its scientists are well experienced to provide expertise in understanding problems, such as climate change, that also cross national and disciplinary boundaries.

IIASA congratulates the huge contribution of the Institute’s scientists to the IPCC reports and highlights on this page the role they played in various reports. In addition, several IIASA alumni have made large contributions to the IPCC since leaving IIASA. Martin Parry, for example, who led IIASA’s Climate Impacts Project from 1983 to 1987, is now co-chair of the IPCC Working Group III and Bert Bolin, a long time collaborator with IIASA, was co-founder and first chairman of the IPCC. Indeed IIASA’s pioneering research into climate change in the 1970s and 1980s played a role in establishing the IPCC.

www.iasa.ac.at/IPCC

IIASA AUTHORS HAVE CONTRIBUTED TO THE FOLLOWING IPCC REPORTS

The Assessment Reports

4AR Climate Change 2007 – The Fourth Assessment Report of the IPCC

TAR Climate Change 2001 – The Third Assessment Report of the IPCC

SAR Climate Change 1995 – The Second Assessment Report of the IPCC

WGI IPCC Working Group I – The Physical Science Basis

WGII IPCC Working Group II – Impacts, Adaptation and Vulnerability

WGIII IPCC Working Group III – Mitigation of Climate Change

Other reports and papers

GNGGI IPCC Guidelines for National Greenhouse Gas Inventories (2006)

SRCCS IPCC Special Report on Carbon Dioxide Capture and Storage (2005)

SRES IPCC Special Report on Emissions Scenarios (2000)

SRLULUCF IPCC Special Report on Land Use, Land-Use Change and Forestry (2000)

Amann, Markus Lead Author (4AR, WGIII, Chapter 11) **Fischer, Günther** Reviewer

(4AR, WGII) **Freeman, Paul** Reviewer (TAR, WGII) **Furukawa, Michinobu**

Reviewer (4AR, WGIII) **Grübler, Arnulf** Lead Author (4AR, WGIII, Chapter 2)

▪ Contributing Author (TAR, WGI, Chapter 4) ▪ Lead Author (SAR, WGII,

Chapter B & SAR, WGIII, Evaluation of IS92 Scenarios) ▪ Contributing Author

(SAR, WGII, Chapter 21) ▪ Reviewer (SAR, WGII) ▪ Lead Author (SRES) **Klaassen, Ger**

Reviewer (TAR, WGIII) **Kolp, Peter** Reviewer (4AR, WGIII) **Ma, Tiejun** Reviewer

(4AR, WGIII) **Mechler, Reinhard** Reviewer (4AR, WGII) **Nakicenovic, Nebojsa**

Coordinating Lead Author (4AR, WGIII, Chapter 3) ▪ Lead Author (4AR, WGIII,

Technical Summary & Summary for Policymakers) ▪ Lead Author (TAR, WGII,

Chapter 3 & WGIII, Chapter 2) ▪ Convening Lead Author (SAR, WGII, Chapter B) ▪

Lead Author (SAR, WGII, Chapters 19 & 21 & Summary for Policymakers) ▪ Author

(SAR, WGII, Technical Summary) ▪ Reviewer (SAR, WGII) ▪ Coordinating Lead

Author (SRES) ▪ Lead Author (Technologies, Policies and Measures for Mitigating

Climate Change – Technical Paper I) **Nilsson, Sten** Reviewer (4AR, WGII) ▪

Principal Lead Author (SAR, WGII, Chapter 15) ▪ Contributing Author (SAR, WGII,

Chapter 24) **O’Neill, Brian** Lead Author (4AR, WGII, Chapter 2) ▪ Contributing Author

(4AR, WGIII, Chapter 3) ▪ Reviewer (4AR, WGI & WGII) ▪ Contributing Author

(SAR, WGI, Chapter 2) **Patt, Anthony** Contributing Author (4AR, WGII, Chapter 2)

▪ Reviewer (4AR, WGI & WGIII) **Rao, Shilpa** Contributing Author (4AR, WGIII,

Chapter 3) **Riahi, Keywan** Core Writing Team (4AR, Synthesis Report) ▪

Lead Author (4AR, WGIII, Chapter 3) ▪ Lead Author (TAR, WGIII, Chapter 2)

▪ Lead Author (SRCCS, Chapter 8) ▪ Lead Author (SRES) **Rogner, Hans-Holger**

Lead Author (Technologies, Policies and Measures for Mitigating Climate Change

– Technical Paper I) **Röhrli, R. Alexander** Contributing Author (TAR, WGIII, Chapter 2)

▪ Lead Author (SRES) **Schopfhauser, Wolfgang** Contributing Author (SAR, WGII,

Chapter 24) **Schrattenholzer, Leo** Reviewer (4AR, WGIII) ▪ Reviewer (TAR, WGIII)

▪ Lead Author (SAR, WGIII, Chapters 8 & 9) ▪ Lead Author (SRCCS, Chapter 8)

Shvidenko, Anatoli Lead Author (4AR, WGII, Chapter 12) ▪ Contributing Author

(TAR, WGII, Chapter 13) ▪ Lead Author (SAR, WGII, Chapter 15) ▪ Lead Author

(SRLULUCF, Chapter 2) **Sinyak, Yuri** Reviewer (SAR, WGII & WGIII) **Toth, Ferenc**

Lead Author (4AR, WGII, Chapter 18) ▪ Contributing Author (4AR, WGII, Chapter 20

& WGIII, Chapters 3 & 11) ▪ Coordinating Lead Author (TAR, WGIII, Chapter 10)

▪ Lead Author (TAR, WGII, Chapter 2) ▪ Contributing Author (TAR, WGIII,

Chapters 1 & 8) **Tubiello, Francesco** Lead Author (4AR, WGII, Chapter 5) ▪

Lead Author (Climate Change and Water – Technical Paper VI) **Van Minnen, Jelle**

Reviewer (SAR, WGII) **Victor, David** Reviewer (SAR, WGIII) **Wagner, Fabian**

Lead Author (GNGGI, Volume 2, Chapter 2) ▪ Contributing Author (GNGGI,

Volume 5, Chapter 3) **Winiwarter, Wilfried** Lead Author (GNGGI, Volume 1,

Chapter 6) **Zhihong Wei** Reviewer (SAR, WGII)

Environment and Natural Resources

“IIASA is really in the central position as one of the institutions that can live with dealing with large-scale, nonlinear, difficult to understand, not fully conceivable problems, whose impact cannot be easily anticipated but involves multiple perspectives, multi-stakeholder responses.”

—Ged Davis, Co-President of the Global Energy Assessment, speaking as concluding discussion chair at the IIASA Conference '07

FORESTRY (FOR)

In 2007 FOR worked on a major European Commission (EC)-funded project to assess the socioeconomic and environmental benefits of the Global Earth Observation System of Systems. In November it joined a new EC research project aimed at implementing a “policy–model–data fusion” concept to guarantee efficient and effective mitigation and adaptation policies in the land use sector.

FOR’s full GHG analysis of Northern Eurasia’s terrestrial biota continued in 2007. The project aims to contribute to a better understanding of the dynamics of the cycling of terrestrial carbon dioxide (CO₂) and non-CO₂ gases for improved full GHG terrestrial biota budgets. Elements of FOR’s methodology are becoming visible in different scientific and policy-relevant publications, international debates, and forest management in Russia. FOR published a CD-ROM, “Russian Forests and Forestry,” which is used by scientific and management institutions worldwide.

Gaining a better understanding of the impacts of emerging economies on the global forest sector in China and India and how these developments will influence the global forest sector was key to FOR’s work in 2007. FOR also sought to contribute to the improvement of international practices in forestry. For the EC it implemented the “Study on the Effects of Globalization on the Economic Viability of EU Forestry.” FOR scientist, Dr. Ewald Rametsteiner, worked with the UNFF secretariat to outline a strategic direction for better linking global policymaking and local sustainable development needs.

www.iiasa.ac.at/Research/FOR

ATMOSPHERIC POLLUTION AND ECONOMIC DEVELOPMENT (APD)

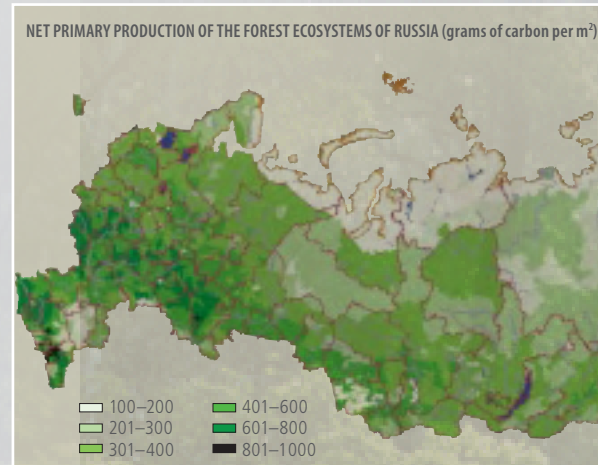
In 2007 APD’s work focused mainly on using its newly developed GAINS (Greenhouse Gas and Air Pollution Interactions and Synergies) model for a variety of policy analyses. Among work carried out for the European Commission, APD assisted in proposing quantitative ceilings to the emissions of five air pollutants for all member states, analysis of the future potentials and costs for mitigation of non-CO₂ greenhouse gases for the EU’s 2008 climate and energy package, and organization of a workshop “Remote Sensing and Inventories of Anthropogenic Emissions.”

APD continued with the implementations of its GAINS model for China, India, and Pakistan in 2007, highlighting the potential for win–win solutions to near-term atmospheric pollution that do not place an excessive burden on economic development.

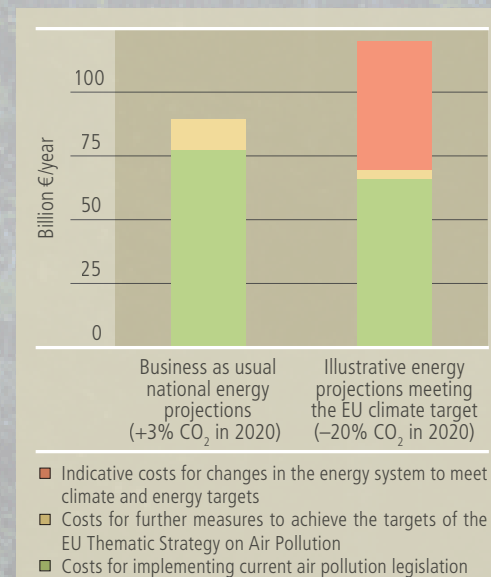
APD was invited by the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) to present its GAINS approach to support the forthcoming negotiations on a post-Kyoto climate agreement. A special GAINS analysis presented to negotiations of the International Maritime Organization demonstrated that air quality targets could be achieved at lower costs if emission controls also included measures for ships in international waters.

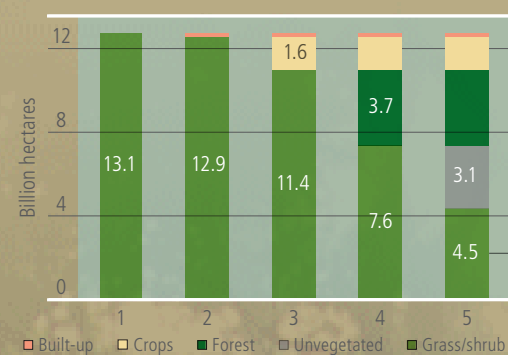
Meanwhile, for the United Kingdom Royal Society Working Group on “Ground-level ozone in the 21st century,” APD used GAINS to demonstrate the large-scale avoidance of dramatic increases in global ozone levels if current legislation were fully implemented.

www.iiasa.ac.at/Research/APD

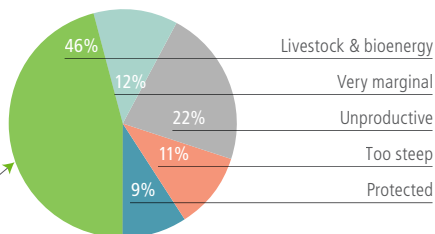
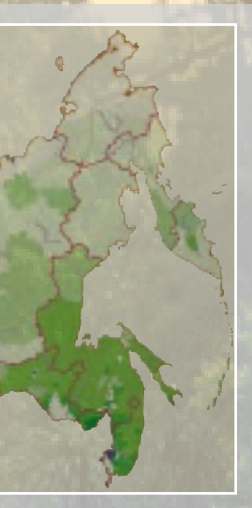


EMISSION CONTROL COSTS The cost for the EU to meet their air quality and climate targets in 2020.





LAND FOR BIOENERGY The global land potentially usable for ligno-cellulosic biofuel feedstock production after excluding built-up land, cropland, forests, barren land, and water.



LAND USE CHANGE AND AGRICULTURE LUC

In 2007 LUC pursued three main areas of research into understanding the potential interactions between society, land use, agriculture, and climate over the coming decades.

Regarding biofuel production, LUC demonstrated—for a European Commission (EC) project—that only advanced, second-generation biofuels from residues and woody or grassy plants can adequately contribute to greenhouse gas emission reduction and energy security. Applying a “food first” paradigm, LUC also estimated the land potentially available for bioenergy production, that is, excluding current agriculture and forestry land, to be 600–800 million hectares globally. In a project for the EC’s Intelligent Energy Executive Agency, LUC and partners began analyzing the effects of different policies and measures for promoting bioenergy, with the aim of reducing the impacts of increased demand for biofuel feedstocks on the food and feed commodity markets.

For an EC-funded project on modeling the global hydrological cycle from 1900 to 2100, LUC compiled global spatial data on key components of the water cycle, in terms of land use changes, agricultural development as well as agricultural, industrial, and domestic water uses. For another EC-funded project LUC provided spatial pan-European datasets used for developing and analyzing comprehensive scenarios of Europe’s freshwater futures up to 2025.

In close cooperation with the Food and Agriculture Organization, and with contributions from the Chinese Academy of Sciences, the International Soil Reference and Information Centre, and the EC Joint Research Centre, LUC compiled an up-to-date harmonized global soil resources database with superior spatial representation and attribute information to any other currently available global soil data product.

In support of and complementing the global studies, LUC took part in a number of regional projects. For example, an EC-funded project investigated the impacts of China’s rapid economic and demographic transition on its agricultural economy with special reference to trade, social conditions, and the environment.

www.iiasa.ac.at/Research/LUC

EVOLUTION AND ECOLOGY EEP

A significant expansion and intensification of EEP’s international collaborative research activities took place in 2007. The Program continued to develop the adaptive dynamics toolbox at the front line of international research. An overview of adaptive dynamics theory, a backbone of EEP’s research activities, will be provided in a forthcoming book. In terms of applications, efforts have focused on multi-species models for examining ecosystem structure, predator–prey evolution, the evolutionary restorability of ecological communities, and the origin of biodiversity through speciation.

EEP’s research on the evolution of cooperation strives to unravel the conditions required for preventing the “tragedy of the commons,” through which selfish individual behavior jeopardizes public goods. Published in *Science*, the article “Via Freedom to Coercion” explains how voluntary teamwork and costly punishment interact in the emergence of cooperative behavior.

EEP’s research on fisheries-induced evolution is designed to overcome a blind spot in the management of living aquatic resources by addressing the evolutionary consequences of fishing. Recent progress includes an investigation of the propensity of marine reserves to slow such evolution. Led by IIASA, the EC Research Network Fisheries-induced Evolution brings together 18 international research institutions to provide recommendations for evolutionarily enlightened management. A Policy Forum article in *Science* on “Managing Evolving Fish Stocks” attracted wide attention and triggered lively debate (see page 16). The article was authored by the Study Group on Fisheries-Induced Adaptive Change established by the International Council for the Exploration of the Sea and co-chaired by IIASA scientists Mikko Heino and Ulf Dieckmann.

www.iiasa.ac.at/Research/EEP

Population and Society

"I will give three strategies for us Africans. One is quality education and I'm putting emphasis on the quality. The second one is the importance of science policies as a foundation policy that will not only give us the knowledge, the understanding, and the comprehension we need to choose the ways we want to act, but also the passion and the compassion to really pursue sustainable development. The third is networks to deeply understand the factors that influence the policymaking process at the global level. This is very important for Africa."

—Lidia Brito, former Minister of Higher Education, Science and Technology, Mozambique, speaking at the IIASA Conference '07

WORLD POPULATION

Lack of appropriate data is often a key obstacle in producing the most important and policy relevant research. For this reason, POP emphasized the further development of new and unique datasets in 2007. One database, which reconstructs human capital for 1970 to 2000 by age and sex for 120 countries, is now publicly available on the IIASA Web site and is the basis for revolutionary new assessments of the returns to education. Another database is the most comprehensive ever created on differential fertility by level of education or other social stratification indicators.

A third update of POP's probabilistic world population projections for 13 world regions was released in 2007, focusing on the speed of population aging. The first consistent probabilistic population projections for all EU member states regarding future fertility, mortality, and migration trends were also produced by POP, together with the Vienna Institute of Demography.

Strengthening its collaboration with Africa, POP and the Cairo Demographic Center launched a report on future human capital in Egypt in Cairo. There was also cooperation on the returns to education in selected African countries with the African Population and Health Research Center (APHRC) in Nairobi, the University of Cape Town, and at the African Population Conference in Tanzania.

The year was productive for POP's new project, Human Capital and Economic Growth. A landmark paper published in *Science* concludes that the Millennium Development Goal of universal primary education is insufficient to bring countries out of poverty and needs to be complemented by a focus on broad secondary education.

www.iiasa.ac.at/Research/POP



SUB-SAHARAN AFRICA POPULATION

In 2007, IIASA's World Population program updated world population projections for 13 world regions. Work was also done on a new project on human capital and economic growth, which will estimate the aggregate level returns to education. (Photo © Manoocher Deghati/IRIN: Two boys return home at the end of a school day in Zambia.)



POPULATION AND CLIMATE CHANGE (PCC)

PCC fulfills its mandate to develop new approaches to the interdisciplinary analysis of the climate change issue through three projects. In 2007 the Demography, Energy, and Emissions project produced a first set of greenhouse gas emissions scenarios for China and India showing that explicit consideration of aging and urbanization increased projected emissions by nearly 50 percent.

In 2007 the work of the project on Uncertainty and Learning was highlighted by a paper it published in *Science* indicating how the latest scientific assessments by the Intergovernmental Panel on Climate Change (IPCC) fell short in terms of characterizing uncertainty, especially regarding the potential for extreme outcomes, and how assessment processes might be revised. The project also began a new research activity with Brown University to better understand how scenarios are used in the scientific and policy communities and to identify key research questions and needs for improvement.

The Medium-Term Climate Strategies project continued to research policy strategies that would limit mid-century atmospheric concentrations at a level that would keep long-term policy options open while uncertainties are reduced through learning. This work complements international climate policy objectives to stabilize atmospheric greenhouse gas concentrations in the long term in order to prevent dangerous impacts.

www.iiasa.ac.at/Research/PCC



Climate forecasts help Zimbabwean farmers prepare for the growing season (Photo: A. Patt)

RISK AND VULNERABILITY (RAV)

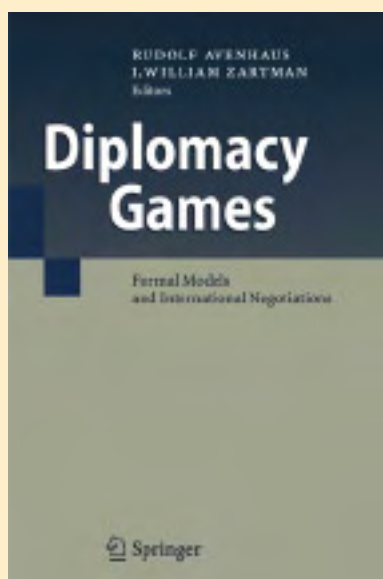
RAV is at the forefront of methodological development in support of risk and vulnerability analyses. In 2007 its exemplary research on Bangladesh showed population dynamics and increases in assets to potentially contribute as much as climate change to future losses from extreme weather. A RAV-led EC project also produced the first-ever probability-based digital maps of risks from natural extremes which demonstrated that, even in Europe, early financial planning is vital to avert the dire fiscal and economic consequences of disasters.

Practical ways of promoting climate change adaptation led to research in Malawi on an innovative crop insurance system for poor farmers based on interannual climate variability and in Mozambique on farmers' and policymakers' perceptions of climate change and increased weather variability.

RAV applied an innovative systems modeling technique, causal loop diagramming, to examine surprising and counterintuitive reversals in flood control in Hungary's Tisza Basin. CATSIM—the RAV Catastrophe Simulation Model, which assesses risks, financial vulnerability, and adaptive capacity of governments to extreme events—helped Mexico become the first transition country to transfer part of its public-sector natural catastrophe risk to the international reinsurance and capital markets.

RAV organized an expert workshop that debated strategies for placing insurance instruments on the Bali roadmap, and presented these strategies at a special session at COP 13 of the United Nations Framework Convention on Climate Change.

www.iiasa.ac.at/Research/RAV



PROCESSES OF INTERNATIONAL NEGOTIATION (PIN)

At the heart of the PIN Network is its extensive dissemination and exchange of ideas through books, *PINPoints* magazine, and personal contacts. One book, *Diplomacy Games*, was published in 2007 and five more are in progress, dealing with conflict resolution, climate change negotiations, negotiating with terrorists, handling risks in the negotiation process, and failed negotiations.

In May, PIN held its second successful Dialog among representatives of the five littoral states of the Caspian Sea on non-contentious questions such as water management, maritime emergency management, fisheries, and energy transport. Four IIASA scientists gave presentations to the 40 academics, NGOs, and policymakers present.

There were two PIN Roadshows in 2007. In February the Forman Christian College in Lahore, Pakistan, hosted two days of presentations and debate on topics ranging from negotiating with terrorists to the resolution of military confrontations. The Johns Hopkins and Nanjing University Center, China, was the venue for the October Roadshow, where participants addressed, among other negotiation-related topics, the value of trust building, security in Asia, and the sensitive subject of human rights.

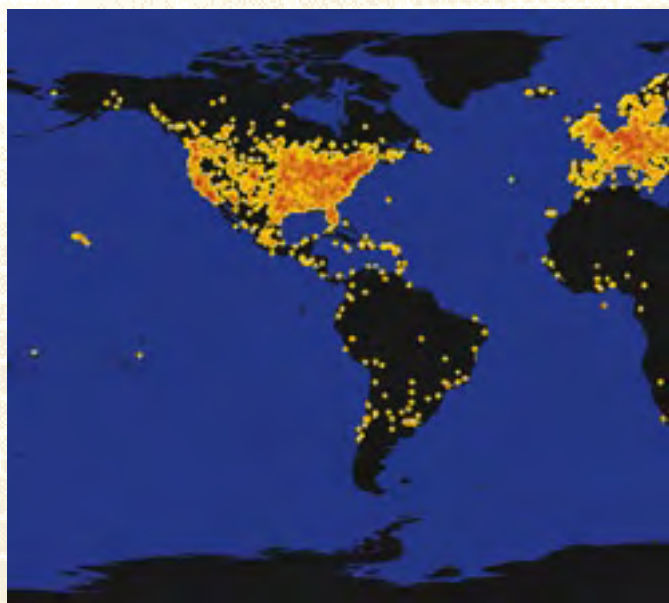
The PIN Steering Committee welcomed three new associates in 2007: Professors Jacob Bercovitch of Canterbury University, New Zealand, William A. Donohue of Michigan State University, USA, and Mark Anstey of Michigan State University, Dubai.

www.iiasa.ac.at/Research/PIN

Energy and Technology

“New energy technologies are needed for providing the essential services to the two billion without access to modern energy forms as well as for improving the efficiency and reducing adverse impacts of energy in the more affluent parts of the world.”

—Nebojsa Nakicenovic, Program Leader of IIASA's Energy and Transitions to New Technologies Programs, speaking at the IIASA Conference '07



DYNAMIC SYSTEMS (DYN)

DYN developed two IIASA-wide initiatives in 2007, both involving IIASA researchers and external experts, and both with strong methodological agendas.

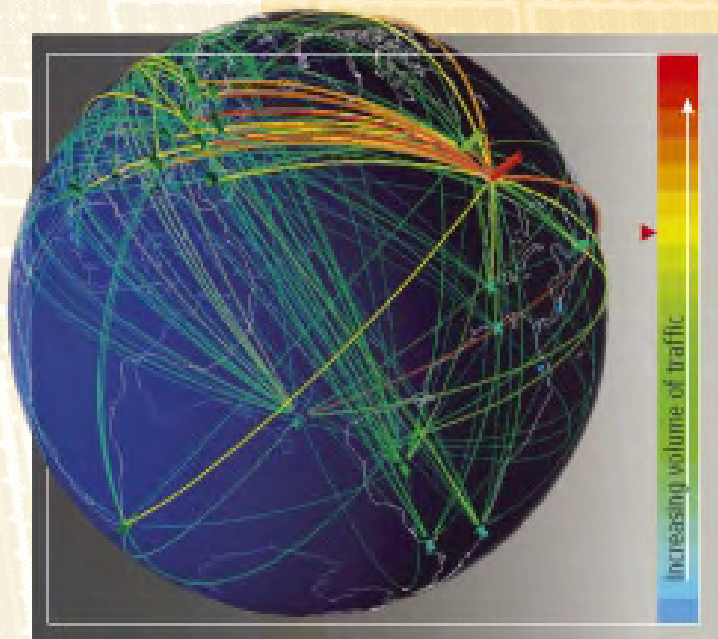
The Driving Forces of Economic Growth project provides a creative environment for matching different disciplinary approaches to studying economic growth. The Fragility of Critical Infrastructures aims to link scientists with business to uncover ways of designing and controlling societal systems that fulfill their function in the face of unknown, and possibly unknowable, disruptions.

Modern society deals with complex problems that require dynamic and constantly changing solutions, and DYN provided specialized mathematical models of dynamics and control to many IIASA Programs in 2007. For example, a new TNT/DYN project, launched as part of the 2007 YSSP Program, applies Modern Portfolio Theory methodologies to assessing sets of technologies for electricity generation.

In the environmental dynamics area, an exploratory PCC/DYN/YSSP-based methodological project focused on the widespread phenomenon of negative learning. Another project focused on bivalve shellfish agriculture and the impact of the spatial distribution of rearing density on water quality within a licensed area.

In the area of economic growth, a new FOR/DYN project proposes an approach to optimizing investment in a global Earth observation system to lower economic losses from future natural disasters, while a new GGI/DYN project focused on the design and analysis of a new simplified stochastic DICE-type model of global economic development in relation to GHG emissions.

www.iiasa.ac.at/Research/DYN



CRITICAL INFRASTRUCTURE

Telecom networks crisscross the globe, providing a vital infrastructure for business. (Source: Stephen G. Eick)



THE INTERNET The map shows the density of a sample of 564,521 internet routers. Note, in particular, the extreme low density in developing countries. (Raw data courtesy of Mark Crovella, Boston University)

TRANSITIONS TO NEW TECHNOLOGIES (TNT)

The year 2007 was one of scientific harvest with altogether four major international, collaborative scientific assessments being published that reaped wide international recognition.

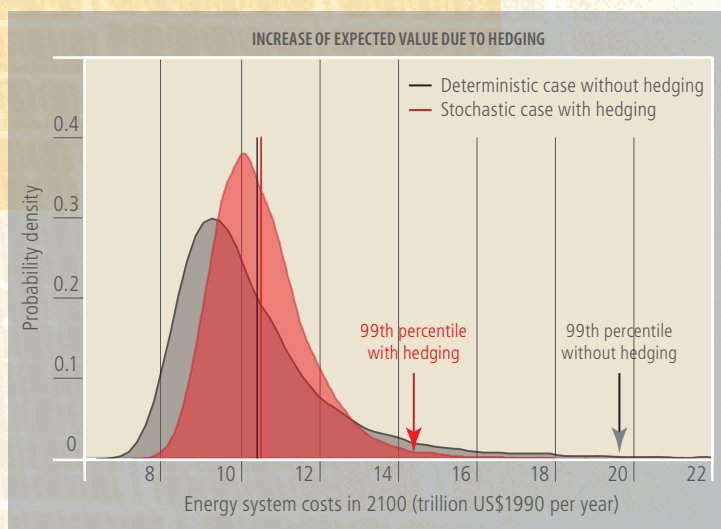
First and foremost, 2007 saw the final publication of the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4). With three TNT staff members serving as Coordinating Lead and Lead Authors and another one as Reviewer, TNT's contribution to the IPCC AR4 not only reflected both the Program's substantive focus but also synthesized the findings of its multi-year research efforts.

The results of three additional major collaborative projects were also published in 2007: the UN Foundation—Sigma Xi report, *Confronting Climate Change: Avoiding the Unmanageable and Managing the Unavoidable*; the InterAcademy Council report, *Lighting the Way: Toward a Sustainable Energy Future*; and the IIASA–GGI integrated assessment/scenario study that appeared in print as a special issue of *Technological Forecasting and Social Change* in September 2007.

In addition to the completion and dissemination of the major international assessment reports highlighted above, in-house research focused heavily on a new generation of an agent-based model of the evolution of technological complexity. An initial model emulating a stylized energy system was substantially improved during 2007 and numerous simulation runs were performed at the turn of 2007/2008.

In addition to this more basic-research-oriented modeling work, there was also noticeable progress in applied modeling and software development, including an update and extension of the popular online Logistic Substitution Modeling (LSM) software package, which is used for the analysis of competing technologies. LSM as well as the continued maintenance and improvements in the GGI scenario database, have become an extremely successful tool for disseminating IIASA's research results with some 28,000 data retrievals, and close to 3,000 data downloads in 2007.

www.iiasa.ac.at/Research/TNT



ENERGY SYSTEM COSTS Ignoring uncertainties and not diversifying investments in the energy system (black lines) exposes the world to the risk of high-impact, low-probability events (lines at the 99th percentile). Additional hedging investments in response to energy–economic and climate policy uncertainties (red lines) reduces such risk, changes the distribution of future energy systems costs, and shifts the expected value. These findings are just one example from a new stochastic systems engineering model of the global energy system.

ENERGY (ENE)

An important milestone in ENE's research activities in the field of energy modeling in 2007 was the development of a stochastic systems engineering model of the global energy system. This is the first model of its type to manage a comprehensive and endogenous representation of salient energy and policy uncertainties within an engineering framework that fully represents the global energy system along all its main energy extraction, conversion, and end-use sectors (chart, left).

Since the IPCC decided in early 2006 to act as a catalyst in the development of new emission scenarios rather than being directly involved, ENE scientists have played a central role in the planning and coordination of necessary future activities across the main international climate research communities. IIASA is one of the three co-leaders of the Integrated Assessment Modeling (IAM) Consortium, which aims to identify research needs and discuss the development and design of coordinated community climate change scenarios.

The objective of the Global Energy Assessment (GEA), launched at IIASA in January 2007, is to identify the state of knowledge and key strategic gaps in global energy to support long-term decision making. It represents a critical complement to and source of added value for other ENE projects and for broader IIASA research activities. As a result of stakeholder consultations, including a side event at the 15th Session of the UN Commission on Sustainable Development in May 2007, GEA governance was strengthened and several new sources of funding acquired.

Beyond the research and coordination activities highlighted above, ENE has continued in 2007 a number of strategic collaborations on distributed hydrogen systems, end-use investments, automobile technology strategies for greenhouse gas (GHG) abatement, and the further development and testing of an integrated energy–climate model (extension of MESSAGE climate component to aerosols and long-lived gases).

www.iiasa.ac.at/Research/ENE

Institute-Wide Research and Special Projects

“IIASA has long been the path breaker in integrated systems analysis, linking human and physical systems. As far back as IIASA has studies, it’s always been about how to feed the planet or where the energy resources are going to come from by mapping a global-scale set of challenges and a global-scale set of projections and forcing a look—which almost no normal scientific enterprise does—at the interface between the physical environment and the human systems. And this has been a profound contribution.”

—Professor Jeffrey Sachs, Director of The Earth Institute at Columbia University, speaking at the IIASA Conference ‘07

GREENHOUSE GAS INITIATIVE (GGI)

The Initiative continued to actively bring together scientists from different IIASA programs, organizing 21 seminars and establishing new links in research agendas. A major collaboration was among GGI and ENE/TNT to create a new prototype MESSAGE model without perfect foresight: Myopic MESSAGE permits the implications of alternative planning horizons for decision making to be analyzed. GGI and POP further developed the Simple Economic Demographic Interaction Model (SEDIM), designed to show the effects of demographic changes on economic performance.

In a GGI, PCC, and RAV/YSSP collaboration, the relative merits of mitigation and adaptation were explored with a DICE-type model modified to also include adaptation options. GGI also collaborated with FOR and a YSSP student on a new project in which optimal control methodologies were applied to analyze the consistency between long-term “aspirational” mitigation targets and short-term policies.

In 2007 GGI fostered initial discussions between LUC and FOR on competition over land for different production uses, such as for food, biofuels, timber, and carbon credits. GGI has also continued to encourage and to fund a number of small-scale methodological and exploratory projects or skunk projects, of which a number were completed in 2007.

RAV researchers, in collaboration with GGI, began a new case study for Bangladesh to assess current and future impacts of climate-related extreme events to be finalized in the first quarter of 2008.

www.iiasa.ac.at/Research/GGI

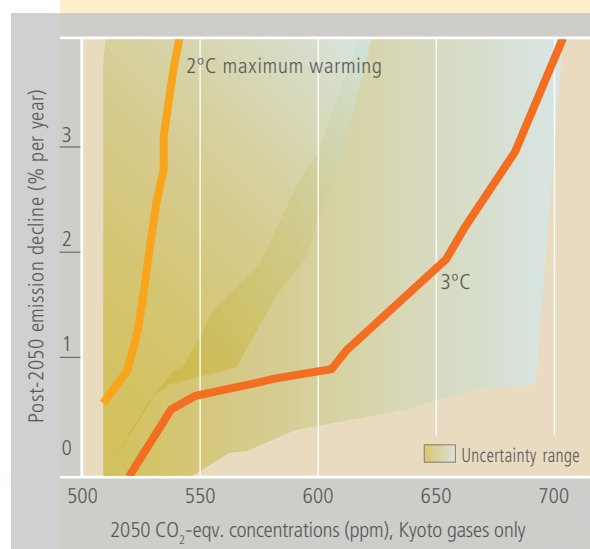
WATER ACTIVITIES

Water-related research is a top priority on the international sustainable development agenda, and many of the projects undertaken by IIASA have a water-related element. Seven research programs (DYN, FOR, IME, LUC, PIN, RAV, POP) currently form the basis of the Water Science Dialog in which ongoing research activities related to water in various programs at IIASA are discussed.

The Dialog began internally among IIASA scientists and focused on projects, research capacity, and data, existing and planned, related to water science. It then moved to consider where IIASA currently stands in this field by inviting external input as to key projects, questions, and methods that offer new opportunities in water science. External water experts were invited to attend, comment, and lead a discussion according to planned talks.

The final phase of the Dialog concluded on 11 June 2007 with a special Water Science Day, at which the Water Dialog’s findings were reviewed by prominent scientists who have long familiarity with IIASA. The Water Dialog participants were particularly keen to investigate what key gaps there might be in theory and methods at the frontiers of research, management, and policy support. The critical question now to be answered is whether IIASA’s programs can address such gaps, either in their present state or by expanding to add skills and expertise.

www.iiasa.ac.at/Research/WAT



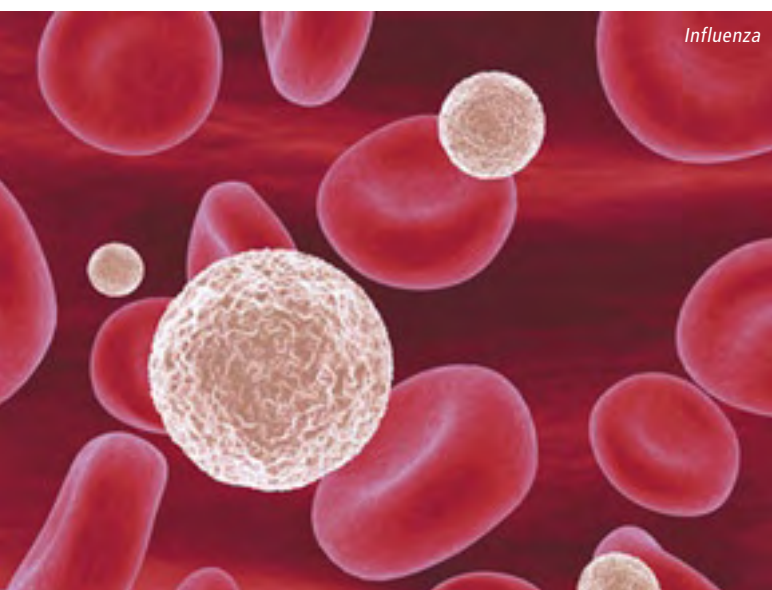
CLIMATE CHANGE TARGETS Annual reductions in emissions needed to reach a given long-term stabilization target (2 or 3 degrees), as a function of a mid-century concentration target reached in 2050.

METHODOLOGY FORUM (MF)

The Methodology Forum, established in response to suggestions from IIASA's Council, its Science Advisory Committee, and its Evaluation Committee for Energy and Technology, aims to facilitate cross-program sharing of experiences and problems in methodological issues. Regular presentations began in 2005 with open discussions to increase cooperation between IIASA's applied research programs and those with a focus on methodology.

As part of the Forum, scientists from the Dynamic Systems, Evolution and Ecology programs and the Integrated Modeling Environment, and invited scholars from outside IIASA discuss methods they judge to be of importance for the scientists in the other programs.

www.iiasa.ac.at/Research/MF



HEALTH AND GLOBAL CHANGE (HGC)

HGC is currently disseminating work produced during its first two-year phase (2005–2007) on pandemic influenza and exploring new aspects of health and global change, notably, urban health, in collaboration with the International Council for Science (ICSU). In 2007, HGC published three peer-reviewed journal articles and gave a number of lectures and presentations.

In October a joint IIASA/HGC–Peking University Institute for Population Research roundtable “Pandemic Influenza in China: Challenges, Responses, Needs” brought together 15 experts on human and animal health from IIASA, Peking University, the Chinese Centre for Disease Control, the Agriculture Academy, the Ministry of Agriculture, Chinese Centre for Animal Disease Control, and the Natural Science Foundation of China.

During 2007 HGC staff member Clara Cohen, financed by the U.S. National Academy of Sciences African Science Academy Development Initiative (ASADI), worked on capacity-building in health-policy-related areas in Cameroon, Nigeria, and Senegal.

Landis MacKellar provided an impact analysis of World Bank support for health care finance reform in Bosnia and Herzegovina; served as a USAID-financed advisor on pension reform in Armenia; was team leader of the EC–EuropeAid evaluation of country cooperation strategy with Moldova; and provided an economic analysis of health infrastructure development in Lesotho to the U.S. Millennium Challenge Corporation.

www.iiasa.ac.at/Research/HGC

INTEGRATED MODELING ENVIRONMENT (IME)

In 2007 IME advanced the development and application of new concepts of robust decisions under inherent uncertainty and risks with potential catastrophic consequences and applied them in cooperation with colleagues at LUC, FOR, and TNT.

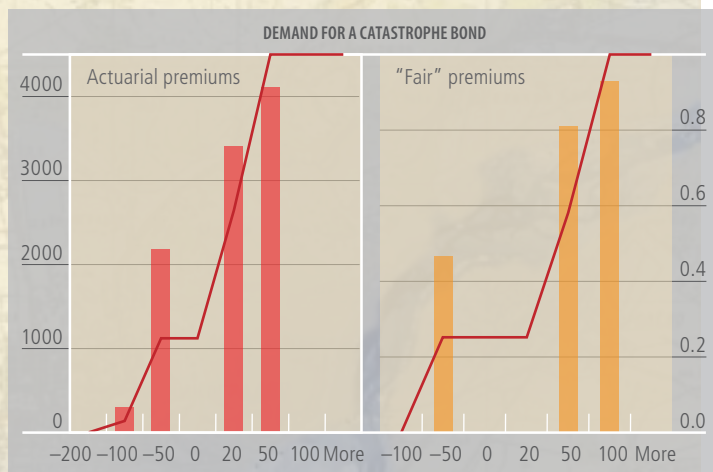
As start-up contribution to the new IIASA cross-program initiative on Fragility of Critical Infrastructures, IME studied novel approaches to analysis of the network risks—typically interdependent and endogenous—as well as key issues in defining the robustness of infrastructures (e.g., energy systems, gas, transport, and distribution systems, information, and communication networks).

IME also researched new methods of multicriteria analysis, and approaches for Web-based interactive analysis of discrete alternatives. These aim at the development of an application supporting analysis of future energy technologies by a large number of stakeholders with diversified backgrounds.

In 2007 IME finalized research on two issues necessary for a new implementation of the Structured Modeling Technology (SMT) which will be capable of handling a new generation of IIASA models that are not only growing fast in complexity and in size, but also pose new challenges for the modeling process as a whole. The first issue involved the effective handling of measurement units in which model components (parameters, variables, relations) are represented. The second solution found an efficient way for handling complex indexing structures needed for compound entities of complex models.

After much research, IME staff developed and implemented at the Japan Advanced Institute of Science and Technology a Creative Environment to support creative processes in research with a number of functions: creative group communication environment (posting papers, debating panels, brainstorming panels, casual knowledge sharing); electronic environment for experiment support; adaptive hermeneutic agents (help in Web search; special search in texts and specialized text mining); planning and road-mapping systems.

www.iiasa.ac.at/Research/IME



FLOOD MANAGEMENT An analysis of the effectiveness of financial instruments applied to the integrated management of catastrophic flood risks for the Tisza river, the Ukraine.

Programs for Young Scientists

“With the risk of over-interpreting IIASA’s experience, I think there is a permanent challenge to a researcher of any age to help identify and spread new knowledge—but even more than *knowledge*, to spread *wisdom*. And it is in this area where Einstein said that ‘imagination is more important than knowledge.’ Who has more imagination than young people?”

—Tibor Vasko, one of the signatories of the IIASA Charter that established the Institute In 1972, in his annual speech welcoming participants to the Young Scientists Summer Program, 4 June 2007

YOUNG SCIENTISTS SUMMER PROGRAM (YSSP)

Fifty-one young scientists from 20 countries took part in IIASA’s Young Scientists Summer Program in 2007.

The YSSP, established in 1977, lasts from June through August and provides gifted young researchers with an opportunity to research and produce a paper, for possible publication, on a theme related to IIASA’s ongoing research on issues of global environmental, economic, and social change. Each young scientist joins an IIASA Program and experiences at first hand the atmosphere of interdisciplinary cooperation in an international setting that typifies IIASA’s work.

YSSP 2007 also challenged participants to experience science and science-related issues in an international multidisciplinary setting beyond their own research through lectures, seminars, and discussion groups. The first seminar in a series of many provided an opportunity for YSSP participants to listen to and interact with Simon Levin, Chair of IIASA’s Council.

The overall theme of most lectures was on IIASA science and policy guidance research. Eminent speakers—Professor Norman Meyers, Professor Machiko Nissanke, Professor Norman Neureiter, and Mr. David Kinley—addressed global challenges of the environment, poverty and globalization, and the science–policy divide and knowledge communication, all in the context of

moving from agenda to action. Most of the lectures, which received very encouraging feedback, were recorded and are available as “IIASA Podcasts” on the IIASA Web site. A full program of sporting and leisure activities was extended to the young scientists during their stay.

The substantive efforts of the summer were varied and of high quality. Among many others, Vithal Karoshi of India (FOR) assessed forest plantations for climate change mitigation. Maiko Sakamoto of Japan (PIN) worked on coalition and information relationships among the littoral countries of the Caspian Sea. Marta Vicarelli of Italy (RAV) won the Peccei scholarship with her study on integrating climate forecasts into climate-indexed insurance schemes in Africa. Andries Richter from the Netherlands (EEP) won the Mikhalevich Scholarship for his research on the evolution of social norms for renewable resource harvesting. An honorable mention went to Aron Larsson of Sweden (IME) for his research on evaluating emergency preparedness plans and response strategies.

This was the first year as YSSP Dean for Mahendra Shah (LUC) who took over the responsibilities for this successful IIASA program from Joanne Linnerooth-Bayer, who was Dean for 15 years.

As a 2007 participant summed up his experience: “I believe the YSSP to be an excellent program that finds the right balance between social, networking, academic, and professional activities.”

www.iiasa.ac.at/YSSP



YSSP PARTICIPANTS: NAME & NATIONALITY Marko Ahteensuu, Finland ■ Naomi Aoki, Japan ■ Agnieszka Banrowska, Poland ■ Dietmar Borst, Germany ■ Gergely Boza, Hungary ■ Thomas Buchholz, Germany ■ Simona Cantono, Italy ■ Cheol Hung Cho, Republic of Korea ■ Dorothy Dankel, USA ■ Tyler Felgenhauer, USA ■ Muhammad Goheer, Pakistan ■ Sepo Hachigonta, Zimbabwe ■ Sarah Hall, Sweden ■ Khrystyna Hamal, Ukraine ■ Michiel Hekkenberg, Netherlands ■ Jin Huang, China ■ Vithal Karoshi, India ■ Neala Kendall, USA ■ Annemarie Kerkhof, Netherlands ■ Oscar Larsson, Sweden ■ Jing Li, China ■ Yubo Liu, China ■ Jufen Liu, China ■ Jing Liu, China ■ Iwona Markiewicz, Poland ■ Ivan Medvedev, Russia ■ Elisabeth Meze-Hausken, Austria ■ Fabian Mollet, Switzerland ■ Miyuki Nagashima, Japan ■ Alexey Nikitin, Russia ■ Valentin Nikonov, Russia ■ Simon-Erik Ollus, Finland ■ Heidi Pardoe, UK ■ Denis Pivovarchuk, Russia ■ Soumya Rangarajan, USA ■ Andries Richter, Netherlands ■ Shovonlal Roy, India ■ Maiko Sakamoto, Japan ■ Marcin Salwa, Poland ■ Nikola Sander, Germany ■ Imran Shahid, Pakistan ■ Joshua Smilovitz, USA ■ Carolyn Snyder, USA ■ Heekyu Sohn, Republic of Korea ■ Edward Spang, USA ■ Pavel Stupin, Russia ■ Gregor Thenius, Austria ■ Marta Vicarelli, Italy ■ Vivek Voora, Canada ■ Li Yue, China ■ Weilin Zhao, China

POSTDOCTORAL PROGRAM

IIASA postdoctoral fellowships offer research opportunities to talented individuals who have just received their doctorate to engage in their research for one to two years within one of IIASA's research programs or special topics closely related to IIASA's agenda. The experience allows postdoctoral candidates to develop their knowledge and experience, build a network of contacts and associations, and build a reputation in research circles. IIASA itself benefits from the influx of these creative and highly trained scientists with their up-to-the-minute knowledge and youthful enthusiasm.

IIASA's postdoctoral fellowships used to be funded entirely by IIASA's National Member Organizations in Finland and the Netherlands, by the Kempe Foundation in Sweden, and also as part of projects funded by the European Commission. These fellowships have proved so successful that since 2006 IIASA has also been funding two applicants from its own resources. The following two IIASA-funded postdoctoral research fellows began work in 2007.

Dr. Christopher Doll (GGI/TNT) is carrying out research on the production of socioeconomic datasets from night-time light satellite imagery and how they can be combined with other data to help answer fundamental questions concerning sustainable development and the human dimensions of global change.

Dr. Edmar Teixeira (LUC), whose research interests are in crop physiology, crop simulation modeling, and the development and implementation of sustainable agricultural practices, is focusing on the enhancement of the FAO/IIASA Agro-ecological Zones (AEZ) methodology.

The following postdoctoral research fellows worked at or were appointed to IIASA during 2007.

Dr. Åke Brännström (EEP) is working on the evolutionary effects of harvesting on food webs as part of the European Research Training Network on Fisheries-induced Adaptive Changes in Exploited Stocks (FishACE).

Dr. Fredrik Dahl (FOR) is researching how large-scale habitat changes and climate change affect the fauna in the boreal forest.

Dr. Katja Enberg (EEP) worked on eco-genetic models of fisheries-induced evolution to elucidate the ecological and evolutionary dimensions of fish stock recovery processes.

Dr. Maria Hörnell Willebrand (FOR) focuses on wildlife GIS applications and habitat relationships of forest wildlife and harvest management.

Dr. Adam Kun (EEP), a Lise Meitner Fellow funded by the Austrian Science Fund, is studying the evolution of cooperation in populations with unequal distributions of economic wealth.

Dr. Joakim Lundgren (ENE) researched the future energy situation of the county of Norrbotten in the northern part of Sweden.

Dr. Shuichi Matsumura (EEP) is working on spatial modeling of interactions between anglers and fish populations.

Dr. Rupert Mazzucco (EEP) is working on computational models of non-allopatric speciation and biodiversity formation along environmental gradients.

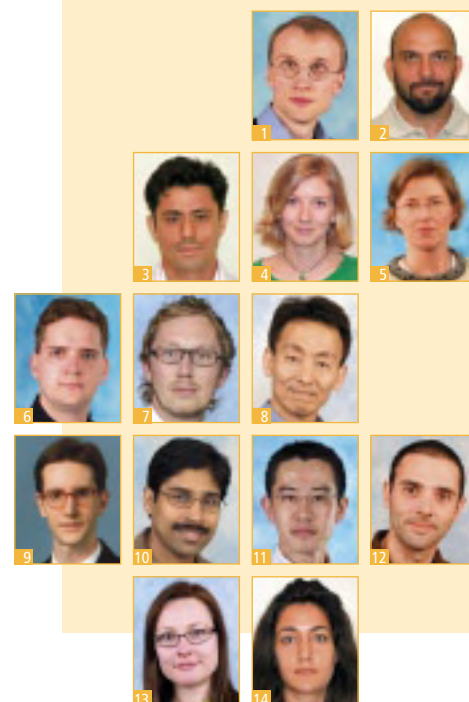
Dr. Tapas Mishra (POP) is studying the consequences of stochastic demographic systems on economic growth and development by exploiting their non-stationary temporal and spatial features.

Dr. Katsumasa Tanaka (PCC) is working on learning about Earth system uncertainty.

Dr. Emma Terämä (POP) is developing multi-state population projections of the future of religions worldwide.

Dr. Rebecca Whitlock (EEP) is working on the EU FishACE project to develop and apply eco-genetic modeling approaches that account for anthropogenic evolution of sturgeon stocks in the Caspian Sea.

www.iasa.ac.at/YSSP/pdoc



POSTDOCTORAL FELLOWS: NAME AND NATIONALITY

1 Åke Brännström, Sweden **2** Fredrik Dahl, Sweden **3** Christopher Doll, UK **4** Katja Enberg, Finland **5** Anna Hörnell-Willebrand, Sweden **6** Adam Kun, Hungary **7** Joakim Lundgren, Sweden **8** Shuichi Matsumura, Japan **9** Rupert Mazzucco, Austria **10** Tapas Mishra, India **11** Katsumasa Tanaka, Japan **12** Edmar Teixeira, Brazil **13** Emma Terämä, Finland **14** Rebecca Whitlock, UK

THE IIASA SOCIETY continued to expand in 2007 and to help facilitate communication between colleagues working at the Institute during the 35 years since its founding.

The focus of activity in 2007 was the IIASA Conference '07, "Global Development: Science and Policies for the Future," held in Vienna in November. Members of the Board of the Society served at an information table during the Conference, offering membership to alumni and information about the history of IIASA and the Society, as well as helping Conference participants to locate each other.

A season's greetings card was mailed to all members, and follow-up work after the Conference has concentrated on updating the Society's e-mail list, which is available online.

At Board meetings in 2007, plans were made for an online questionnaire, so that the Society can offer members activities they want and need, as well as an alumni day in the near future.

www.iasa.ac.at/IIASA_Society

New and Returning Researchers

Fifty-two promising and leading researchers joined or returned to IIASA in 2007. They come from 21 countries and have backgrounds in a wide variety of disciplines ranging from biophysics to economics. They joined the 140 researchers already at IIASA. IIASA's success owes much to the talent and commitment of its researchers and the staff that support them.



NEW AND RETURNING RESEARCHERS: NAME & NATIONALITY 1 Hans Benzinger, Germany 2 Per Bodin, Sweden 3 Hannes Böttcher, Germany 4 Gergely Boza, Hungary 5 Clara Cohen, USA 6 Erfu Dai, China 7 Christopher Doll, UK 8 Daniel Falster, Australia 9 Varvara Fazalova, Russia 10 Sjur Flam, Norway 11 Steffen Fritz, Germany 12 Regina Fuchs, Austria 13 Sabine Fuß, Germany 14 Alexei Gaivoronski, Norway 15 Alberto Gappmayer Biscaia, Brazil 16 Daniel Garcia Galindo, Spain 17 Victor Garcia Guerrero, Mexico 18 Petr Havlik, Czech Republic 19 Joanna Horabik, Poland 20 Toshio Inaba, Japan 21 Jan Johansson, Sweden 22 Fiona Johnston, Canada 23 Juha Kämäri, Finland 24 Nikolay Khabarov, Russia 25 Mohammad Khan, Pakistan 26 Sebastian Klaassen, Austria 27 Daniela Knorr, Germany 28 Andrey Krasovskiy, Russia 29 Volker Krey, Germany 30 Daniel Kull, USA 31 Anna Lasut, Poland 32 Vladimir Likhachev, Russia 33 Xiaozhen Liu, China 34 Gregg Marland, USA 35 Tapas Mishra, India 36 Patrick Nussbaumer, Switzerland 37 Martin Offutt, USA 38 Unmesh Patnaik, India 39 Pallav Purohit, India 40 Hongtao Ren, China 41 Axel Roßberg, Germany 42 Anke Salzmann, Germany 43 Marcin Stonawski, Poland 44 Erich Striessnig, Austria 45 Katsumasa Tanaka, Japan 46 Edmar Teixeira, Brazil 47 Emma Terämä, Finland 48 Zhan Tian, China 49 Geza Toth, Hungary 50 Davnah Urbach, Switzerland 51 Rebecca Whitlock, UK 52 Chuying Zhang, China

IIASA's Program Leaders

Internationally renowned scholars direct IIASA's research programs and projects.

ENVIRONMENT & NATURAL RESOURCES



Dr. Markus Amann
Austria
Atmospheric Pollution &
Economic Development (APD)



Dr. Ulf Dieckmann
Germany
Evolution & Ecology (EEP)



Prof. Sten Nilsson
Sweden
Forestry (FOR)
Deputy Director (IIASA)



Dipl. Ing. Günther Fischer
Austria
Land Use Change & Agriculture (LUC)

POPULATION & SOCIETY



Dr. Brian O'Neill
USA
Population & Climate Change (PCC)



Dr. Joanne Linnerooth-Bayer
USA
Risk & Vulnerability (RAV)



Prof. Wolfgang Lutz
Austria
World Population (POP)



Processes of
International
Negotiation (PIN)
Network Steering
Committee

Left to right: Prof. Rudolf Avenhaus (Germany),
Prof. Guy Olivier Faure (France), Prof. I. William Zartman (USA),
Paul W. Meerts (Netherlands), Ambassador Franz Cede (Austria),
Prof. Victor Kremenyuk (Russia), Prof. Gunnar Sjöstedt (Sweden)

ENERGY & TECHNOLOGY



Dr. Arkady Kryazhimskiy
Russia
Dynamic Systems (DYN)



Prof. Nebojsa Nakicenovic
Austria
Energy (ENE)
Transitions to New Technologies (TNT)

SPECIAL PROJECTS



Dr. Landis MacKellar
USA
Health & Global Change (HGC)



Dr. Marek Makowski
Poland
Integrated Modeling
Environment (IME)

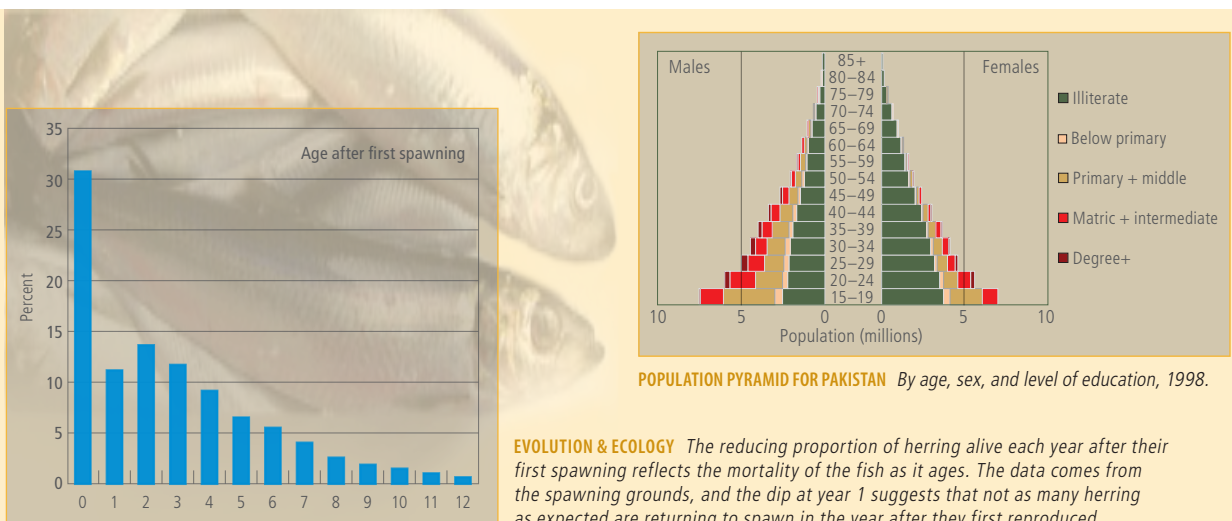
In 2007, 192 research scholars, research assistants, and postdoctoral research fellows from 30 different countries worked at IIASA. Together, these scientists contributed 104 person-years to IIASA's research—an expansion from 91 person-years in 2006.

Mid-Career Researchers

“Against the background of global climate change, we have to conduct a clear-sighted policy based on profound analysis. We therefore face an increasing need for research and communication, particularly in those areas which are on the agenda at IIASA.

The main objective of the priority research areas is not only to gather information on the current standards of knowledge concerning possible health and environmental risks brought about by global change, but also to analyze and summarize available results.”

—Dr. Johannes Hahn, Federal Minister for Science and Research of Austria, speaking at the IIASA Conference '07



ANNE GOUJON (World Population Program) After a master's degree in development economics from the Sorbonne and several stints in the development community, including UNESCO, UNICEF, and French NGO EquiLibre, Anne Goujon married an Austrian. Job applications to institutions in the Vienna area then followed, and the perceptive Wolfgang Lutz of IIASA's World Population (POP) Program snapped up her talents. Since 1994 she has achieved a Ph.D. in social and economic science from the University of Vienna and an IIASA research scholarship, written numerous articles, and fronted the POP presentation at the IIASA Conference '07. She loves IIASA: the open and friendly international atmosphere here, she says, is like “un bol d'oxygène.”

Dr. Goujon has been working lately on the reconstruction of educational attainment distributions by age and sex for 120 countries for the years 1970–2000. The resulting dataset has enabled researchers for the first time to perform detailed statistical analyses of the relation between consistent and homogenized levels of education by age and macroeconomic growth: a breakthrough for POP which is directly attributable to IIASA's ability to work independently of national governments, unlike UNESCO which is reliant on the (usually non-comparable and non-consistent) data supplied by member states.

Dr. Goujon's newest project involves forecasting the religious composition of the United States from 2003 to 2043. This research is expected to have major policy implications.





MIKKO HEINO (Evolution & Ecology Program) Mikko Heino's links to IIASA go back to 1997 when he participated in the Young Scientists Summer Program, receiving the Mikhalevich Scholarship for his work on management of evolving fish stocks. He studied biology and mathematics at the University of Helsinki, Finland, completing his Ph.D. on theoretical evolutionary ecology in 1998, for which he was awarded the 1998 Dissertation Prize of the University of Helsinki.

As well as being an IIASA researcher, he is now Principal Scientist at the Institute of Marine Research in Bergen and Professor of Fisheries Biology at the University of Bergen, Norway. He is currently working in the area of evolutionary ecology, investigating the evolutionary changes in the life histories of fish that are commercially exploited. Fish maturing earlier and at a smaller size than some decades ago are two such changes. However, his fields of interest are wide-ranging, including fisheries ecology and management, management and conservation of evolving populations, life-history evolution, dynamics of spatially structured populations, and population dynamics in stochastically varying environments.

While, in keeping with his academic interests, Professor Heino used to be a diver, he says he now prefers "fresh air and climbing over canned air and diving." Luckily, the serious accident he had in August 2007 while climbing Erikagrat crag in Mödling, Lower Austria, seems to have had no lasting effects.



REINHARD MECHLER (Risk & Vulnerability Program) Interdisciplinary by education and by inclination, Reinhard Mechler of IIASA's Risk and Vulnerability (RAV) Program studied economics, mathematics, and English at Heidelberg University, writing his dissertation on Henry David Thoreau's *Walden*, a seminal work on ecological thinking. A Ph.D. in economics from Karlsruhe University followed and he joined IIASA in 1999 to work on natural disaster risk management.

Like Thoreau, Dr. Mechler is fond of field work, but his interests and talents lie in modeling, for example, the manipulation of extreme value statistics, through which the limited data available on the countries most vulnerable to natural disasters can be made useful. For making the modeling and data generated useful, further contact with people "on the ground" he finds mutually advantageous.

As one example of the work he is doing with disaster-prone countries in Latin America, Asia, and Africa, he and his colleagues just held a workshop with delegates of the government of Madagascar and its Meteorological Service for a study on the financial and economic impacts of natural hazards.

Through modeling techniques Dr. Mechler can infer, from partial data, generalized policy directions and strategies capable of lessening the impacts and costs of natural disasters to developing countries. "This is very important," he says, "given that, in many instances, poor countries now have to show proactivity in risk reduction to qualify for disaster relief."



KEYWAN RIAHI (Energy and Transitions to New Technologies Programs) "The strength of IIASA," says Keywan Riahi, Research Scholar in IIASA's Energy (ENE) and Transitions to New Technologies (TNT) Programs, "is the weakness of many research facilities."

Professor Riahi is talking about interdisciplinary research: working in a narrow academic field would be unthinkable for him now and his remit at IIASA is wide, encompassing climate change, energy and poverty, future energy strategies and technologies. Indeed, his work as Lead Author to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) won him a "slice" of the Nobel Peace Prize awarded to Al Gore and the IPCC in 2007.

Liaising with IIASA's World Population, Land Use Change and Agriculture, and Forestry Programs—to, respectively, look at the energy–demography nexus, bio-energy and its relation to food production, and carbon storage in trees—is part of his job, as is work on the Global Energy Assessment (GEA), established by IIASA in 2007 to address the challenges of providing energy services for sustainable development while facing the threats and opportunities of doing so. Professor Riahi has recently been appointed to lead the assessment's work on scenarios, but emphasizes that the GEA "will go far beyond scenarios", aiming at becoming to the energy community what the IPCC is to climate change.

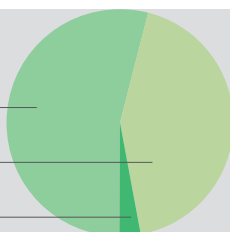
Still he finds time to be a part-time professor at the Graz University of Technology, Austria, where he received his Ph.D. in mechanical engineering, industrial management, and economics.

International Funding for International Research

IIASA's work is funded by prestigious scientific institutions in 18 countries in Africa, the Americas, Asia, and Europe. Known as National Member Organizations (NMOs), the institutions—along with contracts, grants, and donations from government, academia, business, and individuals—ensure IIASA performs independent research because of its many, diverse income sources. IIASA would like to thank all those who have given their financial support.

INCOME

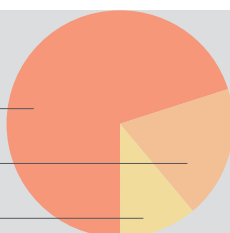
NMO contributions	54%
Grants and contracts	43%
Investments and other	3%



In 2007, IIASA's income was €13.2 million, 54% of which came from national member organizations and 43% from contracts, grants, and donations.

OPERATING EXPENDITURE

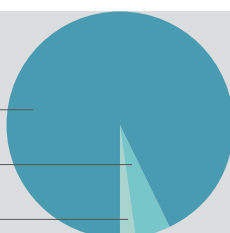
Research program	70%
Infrastructure	19%
Scientific services	11%



In 2007, research represented 70% of total expenditure, with 19% spent on infrastructure and only 11% on scientific services.

NEW EXPENDITURE IN 2007

Research	93%
Infrastructure	5%
Scientific services	2%



In 2007, IIASA's expenditure rose by €1.9 million, 93% of which was invested in research.

IIASA Endowment Fund

In order to cope with global change, we must first understand it.

IIASA research generates this understanding, helping to provide decision makers with effective policies to deal with its myriad effects.

The recently established IIASA Endowment Fund (IEF) provides an opportunity to support this important undertaking. IIASA is very grateful to the following individuals for their contributions to the IEF in 2006 and 2007, and for their belief in the goals and mission of this institution:

SUMMARY OF FINANCIAL ACTIVITIES

INCOME

NMO contributions
Contracts, grants and donations
Other income
TOTAL

EXPENDITURE

Research
Infrastructure
Scientific services
TOTAL

Contracts, Grants, and Donations 2007

- Richard Caputo
- Robin Dennis
- Joshua Goldstein
- Leen Hordijk
- David E. Horlacher
- Avriott John
- Johannes Ledolter
- Marek Makowski
- Sadaaki Miyamoto
- Nebojsa Nakicenovic
- Tom Schelling
- Bob White

Austrian Development Agency, Vienna, Austria
 Austrian Exchange Service, Vienna, Austria
 Austrian Research Promotion Agency, Vienna, Austria
 Austrian Science Fund, Vienna, Austria
 Federal Chancellery, Vienna, Austria
 Federal Ministry for Agriculture and Forestry, the Environment and Water Management,
 Vienna, Austria
 Federal Ministry for Education, Science and Culture, Vienna, Austria
 Federal Ministry for Science and Research, Vienna, Austria
 MERIT Consulting and Brokerage, Vienna, Austria
 City of Vienna, Cultural Department, Science and Research Promotion, Vienna, Austria
 Vienna Science and Technology Fund, Vienna, Austria
 Carl von Ossietzky University, Oldenburg, Germany
 Forschungsverbund Berlin e.V., Berlin, Germany
 Friedrich Schiller University Jena, Jena, Germany
 Dipartimento di Economia e Sistemi Arborei, Sassari, Italy
 Acid Deposition and Oxidant Research Center, Niigata, Japan
 Kyoto University, Kyoto, Japan
 The Japan Foundation, Tokyo, Japan
 Tokyo Electric Power Company, Tokyo, Japan
 Tokyo Gas Co. Ltd., Tokyo, Japan
 Toyota Central Research & Development Laboratories, Inc., Aichi, Japan
 Energy Research Centre of the Netherlands, Amsterdam, Netherlands
 Netherlands Environmental Assessment Agency, Bilthoven, Netherlands
 Norwegian Meteorological Institute, Oslo, Norway
 ENIPPF Ltd., Moscow, Russia
 Russian Academy of Sciences, Moscow, Russia
 Swedish Environmental Protection Agency, Stockholm, Sweden
 Swedish Meteorological and Hydrological Institute, Norrköping, Sweden
 The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning,
 Stockholm, Sweden
 National Academy of Sciences, Washington, DC, USA
 National Aeronautics and Space Administration, Washington, DC, USA
 United States Institute of Peace, Washington, DC, USA
 Department for Environment, Food and Rural Affairs, London, United Kingdom
 Department for International Development, London, United Kingdom
 Unilever UK Central Resources Limited, London, United Kingdom
 University of Bristol, Bristol, United Kingdom
 European Commission, DG Agriculture & Rural Development, Brussels, Belgium
 European Commission, DG Environment, Brussels, Belgium
 European Commission, DG Environment, LIFE, Brussels, Belgium
 European Commission, DG Fisheries and Maritime Affairs, Brussels, Belgium
 European Commission, DG Research, Brussels, Belgium
 Food and Agriculture Organization of the United Nations, Rome, Italy
 United Nations Economic Commission for Europe, Geneva, Switzerland
 WWF International, Gland, Switzerland
 The World Bank, Washington, DC, USA
 United Nations Foundation, Washington, DC, USA

2007 (€)	2006 (€)
7,126,865	7,329,686
5,661,032	4,677,626
368,896	341,704
13,156,793	12,349,016

2007 (€)	2006 (€)
9,834,240	8,097,055
2,727,199	2,636,039
1,592,532	1,552,478
14,153,971	12,285,572

ABOUT IIASA

IIASA is an international, independent, and interdisciplinary research institution with thirty-six years' experience in researching global change.

IIASA is sponsored by its National Member Organizations. On 1 January 2008 these were:

- AUSTRIA** The Austrian Academy of Sciences
- CHINA** The National Natural Science Foundation of China
- EGYPT** The Academy of Scientific Research and Technology (ASRT)
- ESTONIA** The Estonian Association for Systems Analysis
- FINLAND** The Finnish Committee for IIASA
- GERMANY** The Association for the Advancement of IIASA
- INDIA** The Technology Information, Forecasting and Assessment Council (TIFAC)
- JAPAN** The Japan Committee for IIASA
- NETHERLANDS** The Netherlands Organization for Scientific Research (NWO)
- NORWAY** The Research Council of Norway
- PAKISTAN** The Pakistan Academy of Sciences
- POLAND** The Polish Academy of Sciences
- REPUBLIC OF KOREA** The Korea Science and Engineering Foundation (KOSEF)
- RUSSIAN FEDERATION** The Russian Academy of Sciences
- SOUTH AFRICA** The National Research Foundation
- SWEDEN** The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS)
- UKRAINE** The Ukrainian Academy of Sciences
- UNITED STATES OF AMERICA** The National Academy of Sciences



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