

IIASA Annual Report 2005



International Institute for
Applied Systems Analysis
www.iiasa.ac.at

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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Copies of reproduced material should be sent to:
IIASA, Department of Outreach and Sponsored Research
A-2361 Laxenburg, Austria

Telephone: +43 2236 807 477
Telefax: +43 2236 807 201
Web: www.iiasa.ac.at
E-mail: inf@iiasa.ac.at

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From the Chairman and the Director

Simon Levin, Chairman



This annual report highlights some of the fine achievements that IIASA's scientists accomplished during 2005. The successes demonstrate the scientific advances made at IIASA and the policy relevance of our research. The accomplishments are also a ringing endorsement of IIASA's unique approach that, for over 30 years, has combined truly interdisciplinary and international research.

IIASA's achievements and unique approach have helped attract some of the best researchers in the world. We were particularly pleased to see that Tom Schelling, an Institute scholar at IIASA between 1994 and 1999, was awarded the Nobel Prize for Economics in 2005. He is the fourth Nobel Prize Laureate to have worked at IIASA.

In 2005, ten IIASA scientists were also awarded part of the \$1 million proceeds from the prestigious environmental award, the Zayed Prize. They had all contributed to the Millennium Ecosystem Assessment, a global research project set up by UN Secretary-General Kofi Annan, to produce a definitive snapshot of the planet's environmental health.

Our role, as Chairman and Director of IIASA, is to improve the working environment at IIASA and so provide the best conditions possible for scientists to do their research. In 2005, we have seen the fruition of part of our work.

Financially, IIASA is now stable. This is partly a legacy of a 25 percent expenditure reduction that was implemented in 2002–2003, but also a result of attracting new member countries such as China and Egypt. More recently in 2005, the Indian government approved a budget for one of its nongovernmental organizations, the Technology Information Forecasting and Assessment Council (TIFAC), to join the Institute. TIFAC and IIASA are now discussing timing and details of the Indian membership.

The Institute's Council decided to increase annually the funding from IIASA's current national member organizations, which will lead to the strengthening of IIASA's core financial support in the near future. In addition, an endowment fund has been established to strengthen the long-term financial security of the Institute. In 2005, the statutes and board of trustees for the new IIASA endowment fund were approved, and now fund raising can begin in earnest.

Improved finances have resulted in IIASA employing more scientists. In 2005, 184 research scholars, assistants, and postdoctoral scholars

Leen Hordijk, Director

worked at IIASA. These 184 scientists contributed 85 person-years to IIASA's research, which was an increase from 73 person-years in 2004 and from 66 person-years in 2003.

New procedures for the approval of a long-term research plan have eased the administrative burden on research programs and brought greater long-term stability to each program's research. The procedures culminated in 2005 with IIASA Council's approval of an Institute research plan from 2006 to 2010. The Council will be kept informed about each program's activity through yearly progress reports, but the individual programs no longer have to ask Council for funding each year.

The new research plan outlined the renewal of IIASA's research programs as their research is developed over the next five years. Some programs have changed their names to reflect their new focus. The Transboundary Air Pollution Program is now the Atmospheric Pollution and Economic Development Program. The Adaptive Dynamics Network has become the Evolution and Ecology Program. The Land Use Change and Agriculture Program replaces the Modeling Land-Use and Land-Cover Changes Program. The Risk, Modeling and Society Program is now the Risk and Vulnerability Program.

In addition, Council approved a new Energy Program to begin in 2006. Its overall objective is to better understand the nature of alternative future energy transitions, their implications for human well-being and the environment, and how they might be shaped and directed by current and future decision makers.

IIASA's current financial stability has enabled the Institute to fund two new special projects: Health and Global Change and Integrated Modeling Environment. Their aims are to investigate promising research areas. Such explorations have the potential to evolve into future IIASA research programs as well as to keep IIASA at the forefront of emerging research areas in its core theme of the human dimensions of global change.

IIASA Council's Science Advisory Committee, under the chairmanship of Bert Bolin, played an important role in this new process of developing a long-term research plan. We and the Council are most grateful.

These new planning and reporting procedures have also resulted in a new IIASA Annual Report. We hope you like the changes and, as always, would welcome your feedback.

Last, but not least, the IIASA library was renovated in 2005, and online access to scientific journals was increased from 120 to approximately 1,900. Additionally, IIASA researchers now have enhanced access to major reference sources and statistical databases.



A sound historical basis

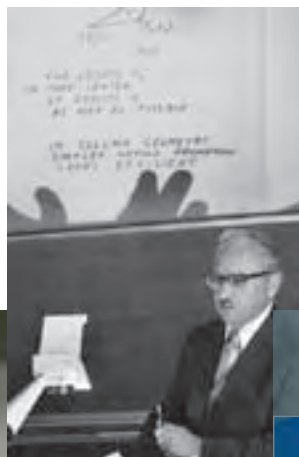
IIASA researches complex problems that are too big for one country or academic discipline to solve alone. For over 30 years, IIASA has helped countries tackle both international and local issues by, for example, reducing air pollution and more efficiently managing land, water, and energy resources.

Four characteristics underpin IIASA's success: the Institute's scientific excellence, the relevance of its research for policy makers, its interdisciplinary approach, and its independence from both government and country. This combination of qualities makes IIASA a truly international and unique research institute.

The following pages show how IIASA has continued to achieve these characteristics by highlighting examples of the Institute's accomplishments in 2005. But first, for readers who are new to IIASA, we put 2005 into context by presenting a few of IIASA's major achievements since it was founded in 1972.

Introductions to 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 • Highlights



1972

At the height of the Cold War, 12 nations from the East and West meet in London to sign the charter establishing IIASA in its neutral setting of Austria.

1974

George Dantzig, winner of the US National Medal of Science, is joined at IIASA by Nobel Prize laureates Tjalling Koopmans (USA) and Leonid Kantorovich (USSR) to expand IIASA's study of advanced systems science and methodology.

1975

A new research field, Adaptive Ecosystem Policy and Management, is founded at IIASA based on results of a study relating forest conditions to pest propagation that had implications for forest management policy throughout North America and Scandinavia.

1976

IIASA scientists warn the world about the dangers of climate change and suggest pioneering solutions such as capturing and storing carbon. IIASA was one of only two institutions worldwide that by the mid-1970s already had an established research program on climate change and policy.

1977

The first Young Scientists Summer Program is a huge success and IIASA attracts over 1300 talented young scientists during the next 28 years to spend a summer working with scholars from other nations and disciplines. Many go on to take senior posts in academia, business, and government.

1980

A chance remark to a colleague brings unexpected results. James Vaupel, a US demographer, mentions a scientific problem to Soviet mathematician Anatoli Yashin. "I think I can help," Yashin replies. They go on to develop more reliable projections of population aging in developed countries.

1981

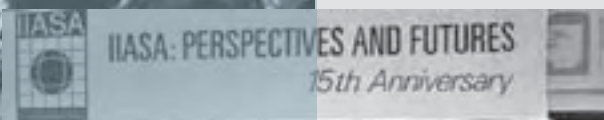
IIASA publishes the first comprehensive, truly global assessments of energy issues resulting in the internationally acclaimed report: *Energy in a Finite World*.

1982

An IIASA research team of chemists, biologists, mathematicians, engineers, hydrologists, economists, computer specialists, and managers complete a study on eutrophication and management of Lake Balaton, central Europe's largest lake. Its findings influence water policy in Italy, Japan, USA, and the USSR.

1983

Groundbreaking research by an IIASA scholar will provide the intellectual underpinnings for the US Department of Justice's antitrust case against Microsoft. The findings pioneered the modern approach to increasing returns which showed how powerful firms could exploit the peculiar nature of high-tech markets to the disadvantage of opponents who offer better products.



1986

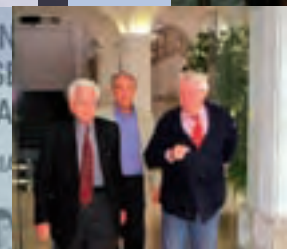
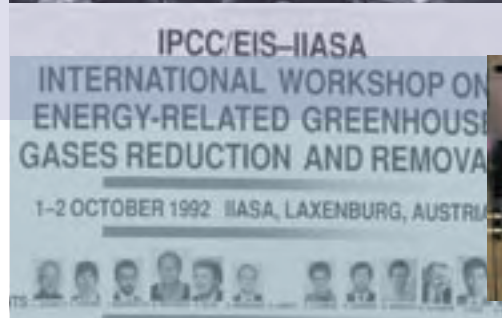
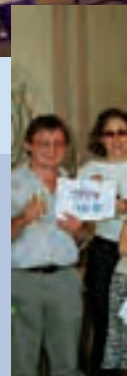
IIASA scholars publish *Sustainable Development of the Biosphere*, which is quickly accepted by the science community as the core scientific text on sustainable development.

1988

In response to mounting tensions regarding global food issues, IIASA creates an unprecedented computer model that links national agricultural models. Named the Basic Linked System, it becomes a practical tool to determine the effectiveness of policies to eliminate hunger and the impacts of agricultural trade liberalization.

1989

IIASA's scientific model of Europe's acid rain problem is officially adopted by the 28 countries of the Geneva Convention on Transboundary Air Pollution as the main technical support for renegotiation of the treaty. This is the first time that all parties to a major international treaty accept a single scientific model.



1991

IIASA researchers complete the first consistent continent-wide assessment of forest resources in Europe and the European regions of the former Soviet Union, revealing alarming consequences of air pollution for European forests.

1994

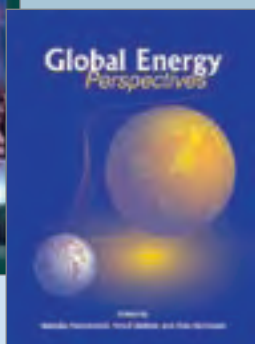
IIASA's Regional Acidification Information and Simulation (RAINS) model underpins the agreement of 33 European governments to reduce the damaging emissions of sulfur dioxide.

1995

Five IIASA scientists are chosen to be leading authors of the second Intergovernmental Panel on Climate Change's assessment report. Since then, eleven IIASA scholars have played leading roles in the IPCC's third and fourth assessment reports, which provide the world with the most scientifically advanced, comprehensive, and rigorous analysis of the state of climate change.

1995

Funded by the World Bank and the Asian Development Bank, the RAINS model is extended to facilitate the analysis of sulfur dioxide pollution in Asia and is presented to energy planners and government officials in 18 Southeast Asian nations.



1996

A second edition of the IIASA book *The Future Population of the World: What Can We Assume Today?* is published. It includes the first-ever completed probabilistic population scenarios (predicting world population will probably never double again) and new findings on population aging.

1998

The World Energy Council partners with IIASA in a unique study on *Global Energy Perspectives*. It analyzes how current and near-term energy decisions will have long-lasting implications throughout the twenty-first century. The five-year study presents its findings at the World Energy Congresses in 1995 and 1998, and publishes its results in a book with Cambridge University Press in 1998.

2000

IIASA scientists and models play a leading role in preparing the most comprehensive and sophisticated scenarios of greenhouse gas emissions for the twenty-first century. The work is published as the *Special Report on Emissions Scenarios* by the Intergovernmental Panel on Climate Change and Cambridge University Press in 2000.

2001

IIASA demographers are first to forecast in a *Nature* article that the world population will peak in the twenty-first century and then begin to decline.

2002

IIASA scientists complete the most comprehensive study of Russian forests and land resources ever undertaken. Results are presented to President Putin of Russia.

2002

The United Nations commissions IIASA scientists to analyze the likely impact of climate change on agriculture to 2080. The influential report was published at the World Summit on Sustainable Development in Johannesburg. It highlighted the need to focus on extending the mitigation scope of the Kyoto Protocol and put the issue of adaptation to climate change on the global agenda of international negotiations.

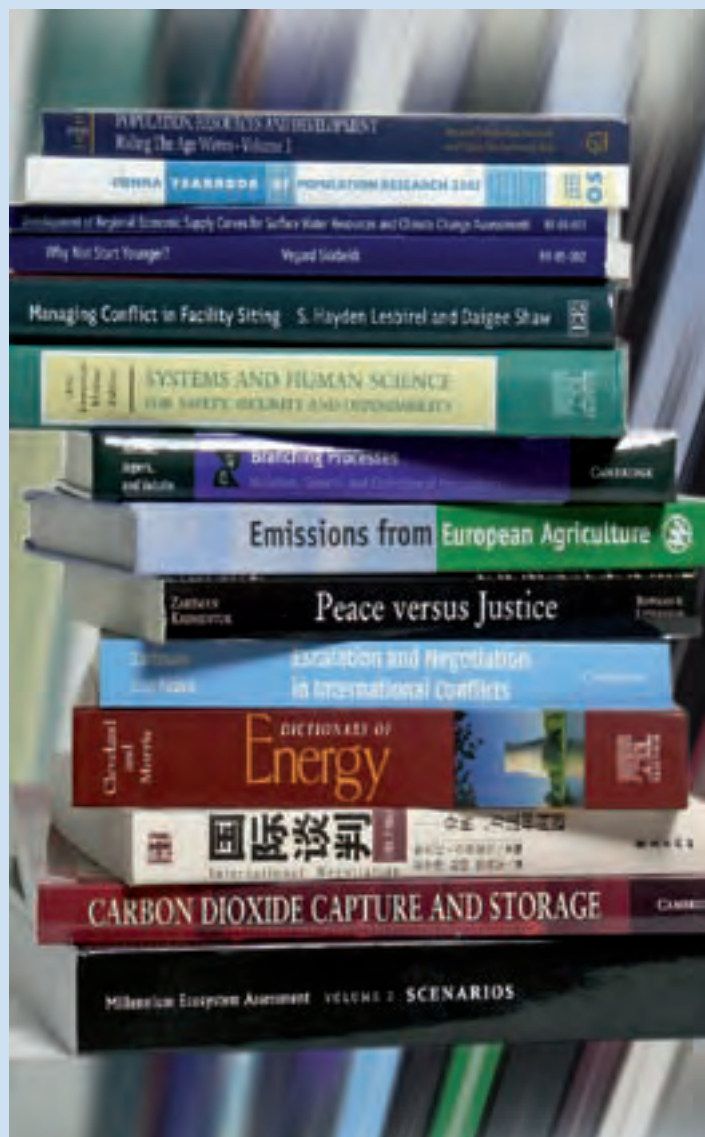
2003

The importance of using technical experts in multilateral negotiations is highlighted by IIASA scientists as a strategy to achieve more effective negotiated outcomes.

2004

IIASA scientists reveal that undesirable genetic changes are taking place in fish stocks as a result of commercial exploitation. Documenting these evolutionary changes might have provided a valuable early warning signal for the collapse of a fish stock such as the northern cod in the early 1990s.

**First-rate science underpins IIASA research.
The Institute's achievements in 2005 continue
to give it a scientific standing far greater
than its size suggests.**



CARBON DIOXIDE CAPTURE AND STORAGE

Keywan Riahi from IIASA's Transitions to New Technologies Program was chosen as lead author for the Intergovernmental Panel on Climate Change (IPCC) *Special Report on Carbon Dioxide Capture and Storage*. This comprehensive analysis of carbon dioxide capture and storage built on the work of hundreds of scientists from around the world. The IIASA scientists' chapter on costs and economic potential concluded, among other findings, that the financial cost of capturing and storing carbon dioxide from fossil-fired power plants is dominated by the expense of capture. These costs indicate that carbon dioxide capture and storage systems are unlikely to be deployed on a large scale unless governments impose limits on greenhouse gas emissions.

ENTRAPMENT

In international negotiations, entrapment is a powerful option open to the world's weaker countries to compensate for their lack of power. In a new book, *Escalation and Negotiation in International Conflicts*, IIASA's negotiations researchers show how smaller nations can use the strength and assertiveness of the more powerful nations to entrap the strong countries.

WINNING THE INNOVATION RACE

A mathematician and an economist from IIASA's Dynamic Systems Program analyzed the race between two competing technology companies to develop and commercialize innovative projects. IIASA's researchers revealed the optimal strategies for the firms and extended the study by characterizing the optimal investment strategy for a large firm, an industry sector, and a country. Along with these applications, the cutting-edge methods used to research the innovation race have added a new analytical method to the mathematical theory of optimal control.

HIGHLY PUBLISHED In 2005, IIASA scientists published 11 books. Popular demand for IIASA books saw one of its bestsellers, *International Negotiation*, translated into Chinese and several books republished as paperbacks. Four of the 91 peer-reviewed journal articles authored by IIASA researchers were in the world's top two scientific journals—*Nature* and *Science*. IIASA's researchers also wrote 46 book chapters, 81 IIASA research and interim reports, 87 other publications, and contributed to 40 conference proceedings. For a complete list of IIASA publications, visit www.iiasa.ac.at/Publications.

AGING POPULATIONS USE LESS ENERGY

The United States' aging population could reduce future greenhouse gas emissions from the country by as much as one-third according to IIASA's newest program on Population and Climate Change. As the population ages, the labor supply reduces and so slows economic growth, which in turn reduces energy use and therefore greenhouse gas emissions. The analysis was made possible by building a new set of household projections for the United States that quantifies how much the age structure of households may shift over the next 50–100 years.

CLEAN AIR FOR EUROPE

The European Commission asked IIASA's Transboundary Air Pollution Program to identify targets for each of the European Union's 25 countries to improve their air quality by 2020. Using IIASA's world-renowned RAINS model, the Institute's scientists identified targets that would achieve the Commission's health and environmental objectives at the minimum cost for Europe.

I HELP YOU AND SOMEBODY ELSE HELPS ME

Scientists from IIASA's Adaptive Dynamics Network are among world leaders researching indirect reciprocity. This explores how cooperation, common to human societies, has evolved. In a *Nature* article (27 October 2005), the scientists highlight how indirect reciprocity leads to reputation building, morality judgement, and complex social interactions with ever-increasing cognitive demands.



GERMANY IS STILL A MIDDLE-AGED NATION

Many analyses of aging populations of developed countries are incomplete according to leading demographers from IIASA's World Population Program. In a *Nature* article (9 June 2005), the researchers argue that it is also important to study a population's age based on the number of years its people have left to live. This approach is crucial in areas such as pensions where people make decisions based on how much longer they expect to live. In 2000, the average German was 39.9 years old and had a remaining life expectancy of 39.2 years—almost exactly a middle-aged nation.

TOO LITTLE, TOO LATE?

Disaster aid is often too little and too late. It also discourages governments and individuals from taking advantage of the high returns on preventive action. Scholars from IIASA's Risk, Modeling and Society Program identified in a *Science* article (12 August 2005) several innovative approaches to free recipient countries from relying on unpredictable post-disaster assistance.

HEALTH, AIDS, AND POPULATION

A detailed analysis by IIASA scientists has found that the large increases in funding for health development to fight HIV/AIDS in developing nations hides a fall in the share of aid targeted at helping all other health concerns.

CARBON ACCOUNTS

Using advanced sensors on 15 satellites, together with vegetation models, IIASA's Forestry Program advanced our understanding of how forests, frozen ground, and forest fires, among others, affect greenhouse gases. The objective of this major study of 3 million km² of Siberian forest was to demonstrate the role that remote sensing could play in measuring sources and sinks of greenhouse gases—a vital verification tool for the Kyoto Protocol.

YOUNG SCIENTISTS

Two young female scientists won scholarships to return to IIASA. They were among four researchers honored for outstanding investigations carried out during summer 2005 as part of IIASA's Young Scientists Summer Program. Daniela Knorr of Germany developed a more efficient approach to mapping the vegetation cover of large and inaccessible regions by producing a new model that uses data from satellites. Anna Maria Eikeset of Norway analyzed how different harvesting regimes would reduce the evolutionary changes that commercial fishing causes to fish. She also found that such genetic changes in fish can significantly lower the profits in the fishing industry.



IIASA researches current world problems to provide countries with the evidence and tools to make better-informed and more cost-effective policy decisions.



The 11th conference of the parties to the United Nations Framework Convention on Climate Change where IIASA researchers presented their latest studies. (Photo courtesy IISD/Earth Negotiations Bulletin.)

MAJOR ASSESSMENT OF CLIMATE CHANGE

Six IIASA scientists have been appointed as convening lead authors or lead authors for the Intergovernmental Panel on Climate Change's Fourth Assessment Report. Due out in 2007, it will be the most comprehensive scientific assessment of climate change. Other IIASA researchers have contributed research, written parts of chapters, and served as expert reviewers.

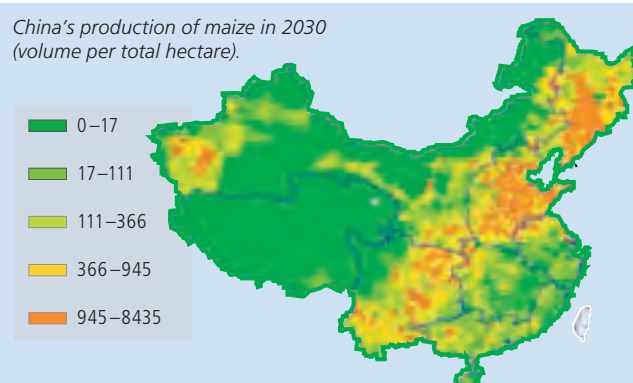
THE PLANET'S ENVIRONMENTAL HEALTH

Ten IIASA scientists contributed to the Millennium Ecosystem Assessment (MEA), a global research project set up by UN Secretary-General Kofi Annan to produce a definitive snapshot of the planet's environmental health. It informs decision makers about the consequences of ecosystem change for human well-being and how to respond to those changes. The MEA authors were awarded part of the \$1 million proceeds of the prestigious environmental award, the Zayed Prize.

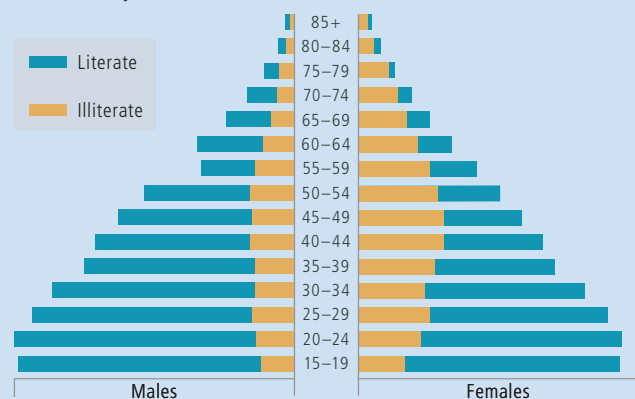
CHINA'S AGRICULTURE TOWARD 2030

Chinese agriculture faces huge challenges with the increasing urban-rural inequality, rapid urbanization and changing food tastes, shrinking farmland, growing water scarcity, pressing environmental problems, and the removal of international trade barriers. Following a detailed analysis of how the challenges may affect China over the next 30 years, IIASA's Land Use Change program and collaborating institutes in China and Europe carried out research to advise the Chinese government on options to improve food security and farmers' incomes, to prevent massive environmental pollution, and to address agricultural issues arising from China's membership of the World Trade Organization.

China's production of maize in 2030 (volume per total hectare).



India's literacy level in 2015.



UNESCO ADOPTS IIASA METHODS

At a meeting in Montreal in February 2005, UNESCO's Institute of Statistics decided to adopt IIASA's multistate methodology for literacy projections. Demographers from IIASA's World Population Program helped apply this new methodology to the official 2006 UNESCO literacy forecasts for all countries in the world. The chart above projects India's literacy level in 2015.

EUROPEANS LIVE LONGER

Scientists from IIASA's Transboundary Air Pollution Program will help to increase statistical life expectancy by on average three months in Europe by 2020. IIASA is providing the European Commission with the scientific evidence and solutions which forged an agreement this year between the 25 EU member states to clean up the continent's air and reduce premature deaths caused by exposure to air pollution.

LARGEST CLIMATE CHANGE CONFERENCE SINCE KYOTO

IIASA scientists spoke at two side events during the 11th Conference of the Parties to the United Nations Framework Convention on Climate Change. One examined how insurance can be used to manage climate risks, the other explored how negotiators can avoid stumbling blocks to reaching agreement on climate change. With some 10,000 participants, the Montreal event was the largest intergovernmental climate conference since the Kyoto Conference in 1997.



NEW EMISSIONS SCENARIOS

Emissions scenarios underpin the research and policy analysis that is crucial to understanding and mitigating climate change. Scientists from IIASA's Transitions to New Technologies Program participated in the special Intergovernmental Panel on Climate Change Task Group on New Emissions Scenarios. IIASA was chosen to host the task group's first workshop which highlighted the need to develop scientifically strong and widely supported new emissions scenarios.

NATURAL GAS PIPELINES

Energy importers want secure supplies of energy, and energy exporters want reliable and regular customers for their fuel. Harmonizing these two wishes is not easy considering the multimillion dollar investment needed to build natural gas pipelines along with a wide range of other commercial, logistical, timing, and pricing questions. Scientists from IIASA's Dynamic Systems and Environmentally Compatible Energy Strategies Programs developed a model of competition in natural gas markets that identifies potential gas pipeline projects connecting major gas fields with demand centers in Eurasia.

CHINA'S REGIONAL DIVERSITY

IIASA's Sustainable Rural Development Project developed a tool to analyze China's regional development. In 2005, the project completed its work which aims to help policy makers and regional planners quickly and easily analyze regional disparities in China, including those of an economic, environmental, political, and demographic nature.

POLICY REFORMS IN THE FOREST SECTOR

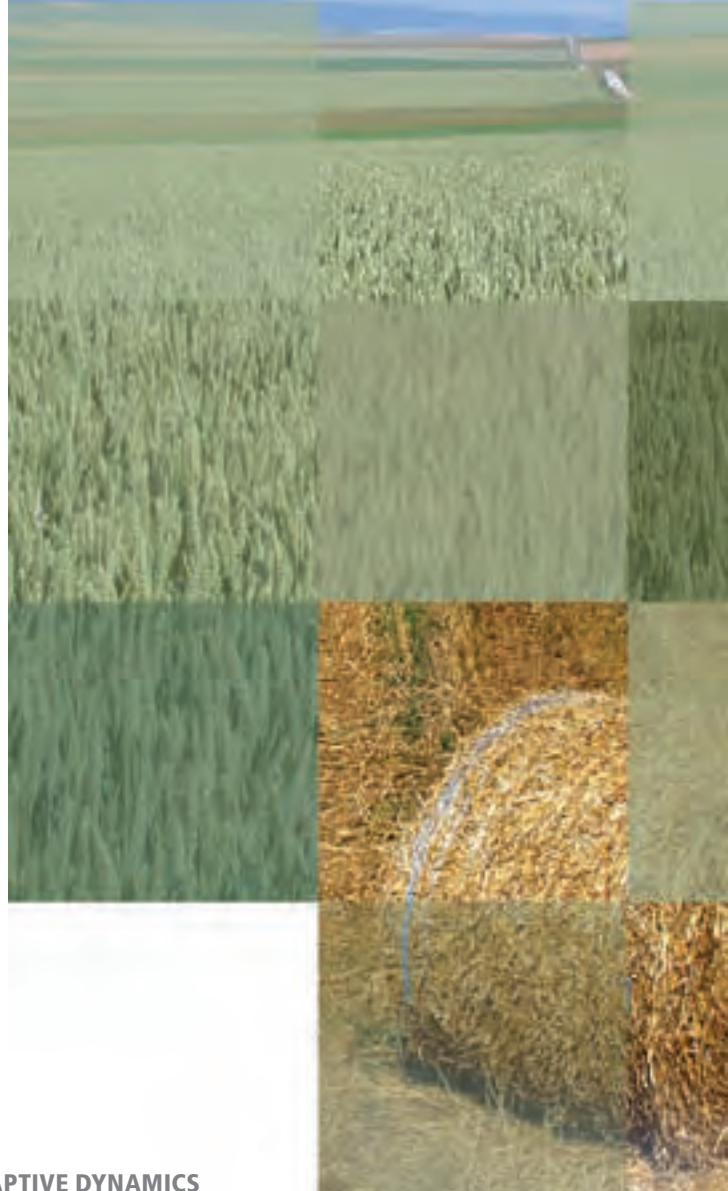
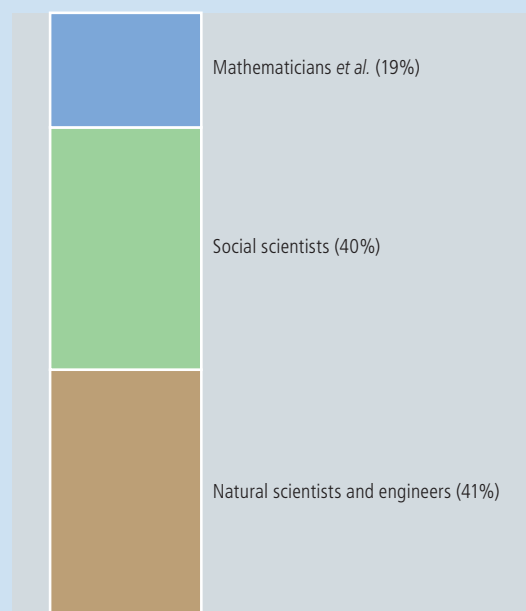
Efficient policy setting in a country's forest sector is one crucial element in achieving sustainable development. IIASA's Forestry Program assessed the policy processes in different countries and found that without a systematic framework for policy setting, many nations would fail to achieve sustainable development of their forests. The research presents a generic framework on how elements and principles of the policy process have to be linked together.

COLD WAR RADIOACTIVE LEGACY

Discussions were held in Japan using results from IIASA's Radiation Safety of the Biosphere Program to develop a master plan to minimize nuclear contamination from the decommissioning of the Russian Pacific nuclear fleet.

Global change is incredibly complex and cannot be analyzed effectively by a single academic discipline. This is why IIASA puts together interdisciplinary teams of researchers to investigate real world problems in their entirety.

THE MANY DISCIPLINES OF IIASA RESEARCHERS IN 2005



ADAPTIVE DYNAMICS

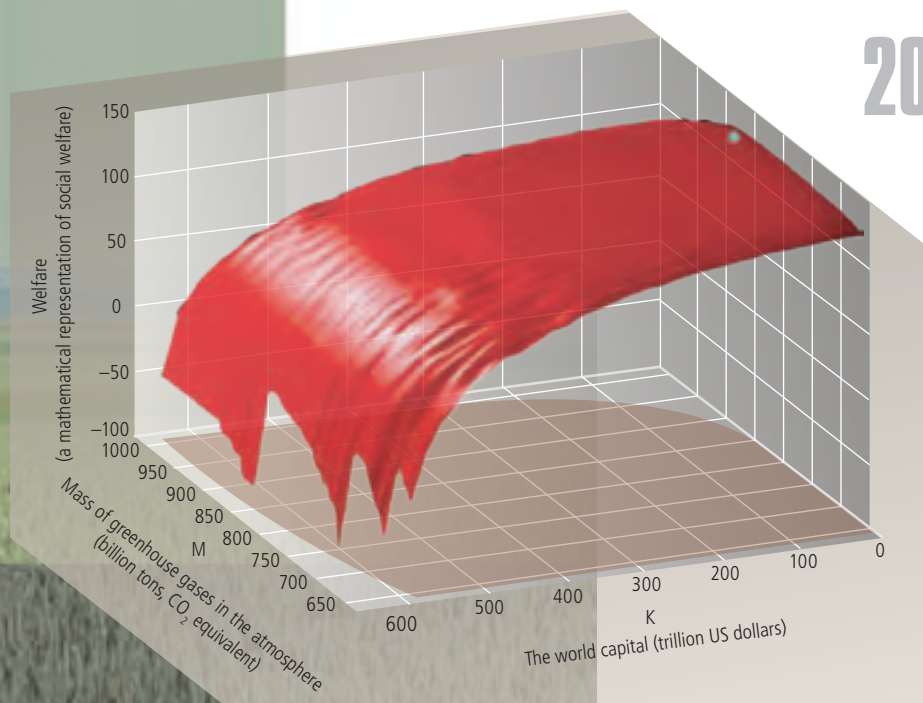
Evolution shapes the biosphere. At IIASA, ecologists, geneticists, physicists, and mathematicians join forces to predict evolutionary changes based on the demography and interaction of species. Known as adaptive dynamics theory, this approach resulted in 2005 in innovative studies on the role of omnivory in structuring food webs, on adaptation in complex traits, and on the processes underlying the formation of biodiversity. Such achievements have helped make IIASA's Adaptive Dynamics Network the major international driver in the development and application of adaptive dynamics theory.

FORESTS AND INNOVATION

IIASA's forest experts led a unique study into the challenges and opportunities that information technology poses for the forest sector. Typically for IIASA, the research combined the skills of engineers, economists, ecologists, social scientists, and many more disciplines to investigate the issue from all angles. It concluded while new technologies can help increase the productivity and viability of the forest industry, they also affect the consumption of its products. The study also showed that technological changes will contribute to a shift in production to Asia and Eastern Europe.

UNCERTAINTY AND LEARNING

Every year we learn more about the climate change issue and the most effective means of responding to it. Some argue we should postpone substantial emissions reductions until we learn more about possible climate change impacts, while others insist we should act now. Mathematicians, demographers, economists, and an earth systems scientist at IIASA have come together to investigate the most effective ways that climate change policy can deal with such uncertainty. Preliminary results on one project suggest that it is not worth waiting 20 years for more accurate global population forecasts, despite population being one of the key drivers of greenhouse gas emissions.



THE ECONOMICS OF GLOBAL WARMING IN 2020 The green spot on the red utility surface marks the point at which welfare can be maximized for all the possible combinations of economic development and accumulations of greenhouse gases that may have happened by 2020.

3-D GRAPHS OF SCIENTIFIC MODELS

Scientists from IIASA's Dynamic Systems Program along with experts from IIASA's Forestry and Population and Climate Change Programs developed a new methodology to help researchers observe all possible states of a model on the economics of global warming. In the graph above, the flatness of the red surface around the green spot demonstrates that a range of possible combinations of economic development and greenhouse gas accumulations will provide a level of welfare that is only slightly less than the maximum attainable. Indicating such a range of outcomes provides a useful range of options for policy makers and other stakeholders from which to negotiate a mutually acceptable target.

SUSTAINABLE DEVELOPMENT STRATEGY IN EUROPE

Making the right policy decisions to promote social well-being and economic growth for European countries without damaging the environment requires a thorough understanding of the economic, social, and environmental domains. IIASA's interdisciplinary team of land use experts was chosen to join a Europe-wide project to identify exactly these policy decisions. The team found that, contrary to popular assumptions, Europe can develop policies that are both conducive to economic growth and less environmentally taxing. However, on a sectoral level, significant economic and employment losses would occur in agriculture from such change, although some losses would be offset by growing more combustible biomass as renewable energy sources.

GREENHOUSE GAS EMISSIONS

IIASA's new activity, the Greenhouse Gas Initiative, combines the skills of IIASA's interdisciplinary teams to provide the huge and necessary range of expertise to explore how the world can stabilize the atmospheric concentrations of greenhouse gases. From demographers to economists, engineers to ecologists, and geographers to mathematicians, IIASA's scientists are systematically integrating their research, data, and models. Early findings illustrate that the energy sector will remain by far the largest source of greenhouse gas emissions during the twenty-first century and should remain the prime target of emission reduction. This could lead to a complete restructuring of the global energy system, as climate mitigation may significantly change the relative economics of traditional versus new, and may lead to more climate-friendly products and services.

METHODOLOGY FORUM

2005 saw the launch of the Methodology Forum to share best practice among IIASA scientists on methodological advances through a series of seminars. These popular events resulted in, for example, close collaboration between IIASA's mathematicians and land use experts to reliably downscale agricultural data from a national to a local level. Scientists and governments can then see the future consequences of their decisions at local, regional, national, and global levels.

SELECTED LECTURES

Unlike most research organizations IIASA does not view the world as divided into academic disciplines, one reason why IIASA's scientists are so regularly invited to speak at prominent events to distinguished audiences.

ULF DIECKMANN "Theoretical advances in evolutionary conservation biology" at the First DIVERSITAS Open Science Conference on Integrating Biodiversity Science for Human Well-Being, Oaxaca, Mexico, 9–12 November.

GÜNTHER FISCHER "Climate change impacts on agriculture: An integrated assessment" at an informal meeting of Europe's Agriculture and Environment Ministers, London, UK, 11 September.

LEEN HORDIJK "Systems analysis for modeling global change" at Government College University, Lahore, Pakistan, 11 January.

ARKADY KRYAZHIMSKIY, YAROSLAV MINULLIN, LEO SCHRATTENHOLZER "Global long-term energy–economy–environment scenarios with an emphasis on Russia" at a workshop on Energy Relations between the European Union and Russia, Paris, France, 18–19 April.

JOANNE LINNERTHOOTH-BAYER "Disaster risk transfer for developing countries" at the 2005 American Geophysical Union's Fall Meeting, San Francisco, USA, 5–9 December.

WOLFGANG LUTZ "Families: The generators of human resources" keynote address at the General Assembly of the International Commission on Couple and Family Relations, Vienna, Austria, 3–6 June.

MAREK MAKOWSKI "Virtual modeling laboratories for knowledge integration and creation" at the first international congress of the International Federation of Systems Research, Kobe, Japan, 14–17 November.

NEBOJSA NAKICENOVIĆ "Development and diffusion of innovative technologies" at the International Symposium on Climate Change in the 2005 World Exposition, Aichi, Japan, 27 August.

MICHAEL OBERSTEINER "Potential contributions of sustainable forest management in global long-term climate mitigations scenarios" keynote address at the Asia–Europe Environment Forum, Jakarta, Indonesia, 22–25 November.

SHONALI PACHAURI "Energy poverty and development" at the 28th annual conference of the International Association of Energy Economics, Taipei, Taiwan, 3–6 June.

FABIAN WAGNER "Linkages with greenhouse gas policy" at the 30th meeting of the UN/ECE Task Force on Integrated Assessment Modeling, Berlin, Germany, 25–27 May.

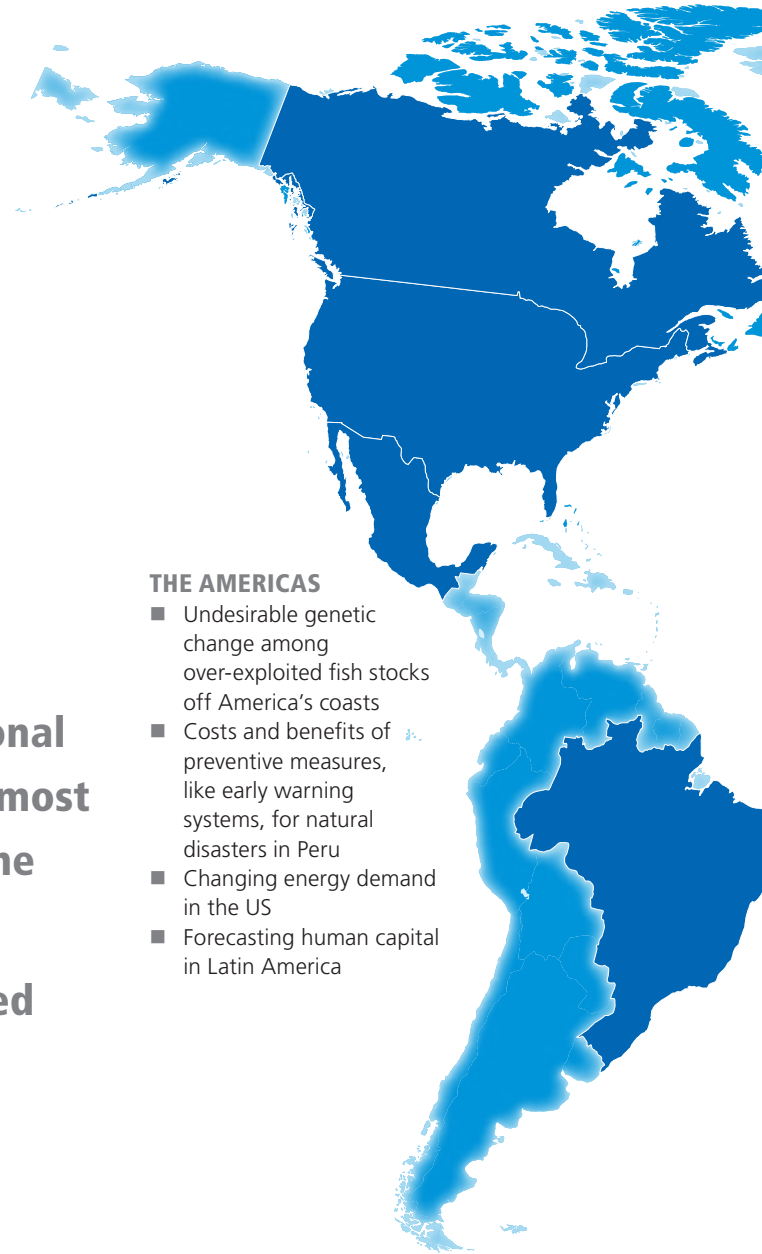
I. WILLIAM ZARTMAN "Negotiating with terrorists" at the second International Biennale on Negotiation, Paris, France, 17–18 November.

From climate change to aging population, many countries across the world face the same problems. As an independent organization, free from the constraints of national self-interest and with a truly international approach, IIASA is able to identify the most appropriate solutions to problems at the local, regional, and global levels.

Here are a few of the issues investigated by IIASA in 2005, as well as a selection of international conferences IIASA organized and international networks that IIASA leads.

THE MANY NATIONALITIES OF IIASA RESEARCHERS IN 2005

In 2005, IIASA's researchers came from 38 countries, indicated in dark blue on the map. The chart shows the percentage of researchers that come from each continent.



GLOBAL

- Achieving long-term climate change goals
- Future transportation that does not depend on oil
- The impact of climate change on world agriculture
- Global Energy Assessment
- Impacts of climate change on irrigation water requirements
- Information technology and the forest sector
- Analysis of technology and energy development
- Literacy projections for all countries in the world
- Proactive measures for preventing disasters and preparing for recovery

EUROPE

- Reducing air pollution without slowing economic development
- Analysis of Russia's forest and land resources
- Searching for a sustainable development strategy in Europe
- Negotiating energy and environmental issues among the five littoral states of the Caspian Sea

ASIA

- Rebuilding a sustainable Asian coastline following the 2004 tsunami
- The economic impact for Japan of the Kyoto Protocol
- China's agriculture toward 2030
- Reducing greenhouse gas emissions in Asia

AFRICA AND OCEANIA

- Deforestation among the tropical forests of Africa in the twenty-first century
- Increasing the resilience to disaster of farmers in South Africa
- Egypt's future population as its fertility decline stalls
- Development challenges in sub-Saharan Africa

ASIA 20%

OCEANIA 1%

INTERNATIONAL NETWORKS

- The European Research Training Network on Fisheries-induced Adaptive Changes in Exploited Stocks (FishACE) combines 11 leading fisheries research institutions
- The Processes of International Negotiation (PIN) steering committee unites seven leading negotiations researchers and a network of 4,000 researchers and practitioners
- The Integrated Sink Enhancement Assessment (INSEA) connects 14 research organizations to investigate carbon sinks
- The Asian MetaCentre for Population and Sustainable Development Analysis brings together four institutions to study Asia's population

INTERNATIONAL CONFERENCES

- Intergovernmental Panel on Climate Change (IPCC) Workshop on new emissions scenarios
- International Energy Conference on energy and climate change in Kyoto, Japan
- Workshop on global air pollution trends up to 2030
- International conference on the Chinese forest sector
- Nineteenth international workshop on complex systems modeling and the sixth international symposium on knowledge and systems sciences

Environment and Natural Resources

The world is changing, affecting people's basic necessities—the food they eat, the air they breathe, and the environment they live in. Many of these environmental issues cross national boundaries, so requiring solutions that do not favor one country over another.

In this research theme, IIASA's studies help policy makers face the complexity of global environmental challenges by offering well-researched practical options and answers.



Gathering fish data in Canada at the Harkness Laboratory of Fisheries Research (Adaptive Dynamics Network)

ADAPTIVE DYNAMICS NETWORK

The Adaptive Dynamics Network program analyzes how evolution shapes our environment and ecology along with the species living within it.

Achievements in 2005 included new insights into the evolution of cooperation—a ubiquitous characteristic of human societies. Research looked at how voluntary participation and punishment encourage and sustain cooperation. Other investigations analyzed how well reputation maintains cooperation in complex groups where direct exchanges (A helps B and B helps A in return) are unlikely and reciprocity is typically indirect (A helps B, B helps C, until, eventually, help may be returned to A).

New findings shed further light on undesirable genetic changes in fish stocks and strengthened the conclusion that such changes are a likely result of commercial fishing. The maturation schedules of cod and plaice in the Northwest Atlantic was shown to decline toward younger ages and smaller sizes, and mature cod and herring in the Northeast Atlantic were demonstrated to forego reproduction more often. Fisheries-induced evolution in the maturation schedule of freshwater fish was studied for the first time for smallmouth bass in Canadian lakes.

The program's interdisciplinary combination of mathematics and biology provides ongoing analyses of extinction risks among species, how ecological interactions between species evolve, and what drives a species to split into two or more species.

MORE INFORMATION www.iiasa.ac.at/Research/ADN

FORESTRY

The Forestry Program investigates how to manage the forest sector so it benefits economies and societies without damaging the environment and ensuring that valuable forest resources are available for our grandchildren.

New research into China's forest sector reveals a booming domestic demand which means imports of forest products are likely to soar from 125 million m³ (Round Wood Equivalents) in 2005 to about 280 million m³ in 2015. These increased imports are often associated with unsustainable harvesting, corruption, and illegal logging in the exporting countries.

Other successes in 2005, not mentioned elsewhere in this report, include combining the work of 13 external research partners to investigate how forests and agricultural lands could be used effectively to absorb greenhouse gas emissions. A scientific model that assesses the global potential for establishing forests to absorb carbon from the atmosphere is just one of the results from this collaboration.

Crucial research continues to ensure the Kyoto Protocol and its implementation does not run ahead of science. This involves verifying the effectiveness of carbon sinks, such as forests, to absorb greenhouse gases. Under Kyoto, countries are currently rewarded for creating carbon sinks but science does not know for sure how well some sinks take up carbon.

MORE INFORMATION www.iiasa.ac.at/Research/FOR



MODELING LAND-USE AND LAND-COVER CHANGES

The Land Use Change Program (LUC) identifies national and international strategies to effectively manage land and water resources to produce food and bio-energy, achieving long-term sustainability and promoting rural development.

Research revealed that policies to mitigate climate change over the next 75 years would have significant positive effects on agriculture, compared to not mitigating. Specifically, the global economic costs of climate change impacts on agriculture were reduced by between 75 and 100 percent by successful mitigation that would limit atmospheric CO₂ concentrations to below 550 parts per million.

The program's scientists published a new methodological approach to investigate ways to reduce undernourishment and the risk of infectious diseases and to increase access to safe water. The research method involves an integrated spatial analysis of how global change may exacerbate these food, water, and health problems in the twenty-first century.

Planning for three major projects began in 2005. One will develop a biofuel roadmap for Europe to encourage a greater market penetration of biofuels that is supported by stakeholders involved in the biofuels field. The second project will support the Ukraine government in policy formulation and evaluation for agricultural sector reforms in the transition to a market economy and in preparation for joining the World Trade Organization.

The third project will analyze the past and future global water cycle, and LUC will provide spatially detailed data and scenarios on the driving forces, including land cover and land use, and estimates of agricultural, domestic, and industrial water demands.

MORE INFORMATION www.iiasa.ac.at/Research/LUC

RADIATION SAFETY OF THE BIOSPHERE

The Radiation Safety of the Biosphere Program independently researches how the world is tackling nuclear waste left over from half a century of building nuclear weapons and nuclear power stations.

In 2005, researchers focused on the problems of radioactive waste that is often stored under inadequate conditions within cities. They have highlighted security, environmental, and health implications resulting from the building of nuclear research and testing centers on the outskirts of big cities from the 1940s to the 1970s, which now stand well within the enlarged cities.

Findings from the program updated an assessment of the uranium mill tailings and uranium-leaching sites in the Chinese nuclear program. Further studies analyzed which countries are at risk from radioactive contamination in the event of an accident during decommissioning nuclear submarines from the Russian Pacific fleet.

MORE INFORMATION www.iiasa.ac.at/Research/RAD



*Researching Siberian forests
(Forestry Program)*

TRANSBOUNDARY AIR POLLUTION

The Transboundary Air Pollution Program has helped shape European policy making on air pollution for more than 10 years. By combining the economic and physical aspects for many environmental problems caused by air pollution, the program has revealed important synergies among pollution control measures. And by using quality data, scientists have assisted policy makers to develop control strategies that minimize the burden on economic development.

The culmination of five years' work saw the program deliver the central analytical tool for the European Commission's strategy to further clean the continent's air.

These policy successes, along with new scientific understanding of the hemispheric nature of the transport of air pollutants, is encouraging interest in this research from other regions of the world.

The program's core scientific model (RAINS—Regional Air Pollution Information and Simulation) is being applied to China to develop cost-effective solutions to tackle its acid rain problem and the damaging health effects from particulate matter and the current increase in ground-level ozone pollution.

To effectively understand the hemispheric scale transport of pollutants, a global version of the RAINS model has been developed. Its findings show that the predicted drastic growth in future air pollution from developing countries is unrealistic.

The program also began researching synergies between controlling air pollution and mitigating greenhouse gases in Europe and Asia.

MORE INFORMATION www.iiasa.ac.at/Research/TAP

Population and Society

Studying demographic change is crucial to understanding the strains that changing populations place on resources and society, both globally and within nations. IIASA's pioneering work in population forecasting plays a key role.

With people come differences, and IIASA's unique network of negotiations experts contributes to our knowledge about how international agreements are negotiated.

Increasing the resilience of areas and peoples most vulnerable to natural disaster, and helping them better manage the risks they face, is another focus of this research theme.



POPULATION AND CLIMATE CHANGE

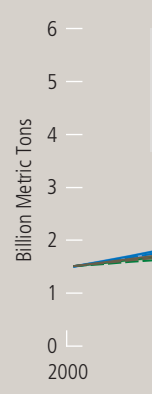
Newly established in 2005, the Population and Climate Change Program researches climate change in three areas: the links between demography, energy, and emissions; dealing with uncertainty; and analysis of medium-term response strategies.

New findings show the substantial impact that the aging population of the USA will have on energy consumption. The fall in energy use could reduce future greenhouse emissions in the USA by as much as one-third, relative to what would be expected if aging were ignored.

Is it better to wait until we know more about climate change before reducing greenhouse gas emissions? Or is it better to reduce emissions more now in case we find out that climate change is more severe than originally thought? The program's scientists are analyzing how policy makers can deal with this uncertainty and the prospect of future learning. In one project, tentative findings suggest it is not worth waiting 20 years to find out how fast the global population will grow in the twenty-first century before substantially reducing emissions.

Another key research area identifies medium-term climate change policies that would begin to stabilize atmospheric concentrations of greenhouse gases and keep policy options open in the long term.

MORE INFORMATION www.iiasa.ac.at/Research/PCC



Families of groundnut farmers in Malawi are reducing their vulnerability to drought through new innovative insurance schemes (Risk, Modeling and Society Program)



RISK, MODELING AND SOCIETY

The Risk, Modeling and Society Program studies the risks of natural disasters, especially the economic impacts of climate-related disasters in developing and transition countries. It also investigates the sustainable development of communities in major river systems. Supporting these studies and other IIASA research, the program develops advanced modeling methods and tools.

In 2005, researchers investigated innovative insurance schemes and other financial instruments to help prepare countries financially for natural disasters rather than rely on the vagaries and indignities of post-disaster aid. In Mexico, the program's scientists helped the government design a catastrophe bond to raise money from the international financial markets for disaster relief and reconstruction funds.

These financial instruments combine well with preventive measures, such as early warning systems, to minimize destruction from natural disasters. Scientists investigated the costs and benefits of precautionary action in Peru and Indonesia.

New research reduced the vulnerability of populations living in river basins prone to flooding. Scientists continued to design and carry out long-distance learning courses on disaster risk management for developing-country participants.

The program developed a catastrophe simulation model to help governments design the most cost-effective strategies to finance the rescue, recovery, and rebuilding operations following a disaster.

The modeling section of the program continued to develop advanced models and tools to analyze complex problems for which standard methods do not provide adequate support. For instance, new functionality was developed for the program's Web-based modeling system based on structured modeling technology, which provides clear advantages over general-purpose modeling environments.

MORE INFORMATION www.iiasa.ac.at/Research/RMS

WORLD POPULATION

The World Population Program studies the changing size and structure of the world's human population and has pioneered both demographic methods and applications.

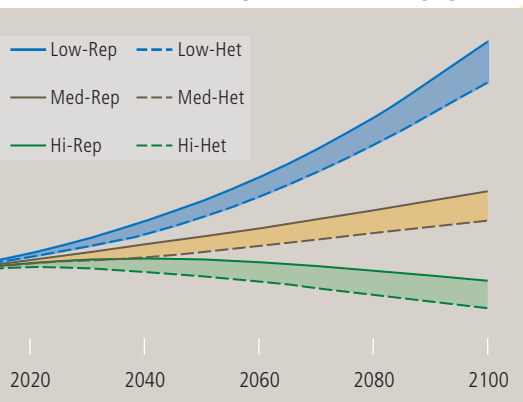
In 2005, an article in *Nature* analyzed populations based on the number of years that people have left to live, rather than the years they have already been alive. This new perspective on population aging could help policy makers develop sustainable pension systems in countries such as the USA, Germany, and Japan.

Education is seen as a vital factor in development, as it has social and economic benefits which help break the cycle of poverty, improve health, and drive economic growth. The program's demographers are currently producing population forecasts by level of education for every country in the world until 2030. These projections will provide an insight into the economic potential of a country based on the size of its educated population.

The significance of the program's work has been widely recognized. Early in 2005 the UNESCO Institute for Statistics (UIS) in Montreal decided to abandon its old methodology for literacy projections and instead move to this new approach developed by IIASA. On 7 September 2005 Wolfgang Lutz testified to the US Senate Committee on Social Security about ways to forecast future international migration.

MORE INFORMATION www.iiasa.ac.at/Research/POP

Three scenarios of future USA carbon dioxide emissions for three population scenarios with and without accounting for the effects of aging.



PROCESSES OF INTERNATIONAL NEGOTIATION NETWORK

The nucleus of a network of over 4,000 negotiations researchers and international negotiators is headquartered at IIASA. As the world becomes increasingly global and more and more issues cross national boundaries, research into what helps and hinders international negotiations is vitally important. The Processes of International Negotiation Network is led by seven experts who, typically for IIASA, come from seven different countries and have seven different research disciplines.

Two new books were published by the network in 2005. *Escalation and Negotiation in International Conflicts* researches how the escalation of a conflict due to, say, a crisis may provide the turning point that leads two opposing parties to form an agreement.

Peace versus Justice examines the costs and benefits of ending the fighting in a range of conflicts. It probes the reasons why some negotiations only stop the shooting but fail to look ahead to prevent a recurrence of the conflict. The book introduces a new term—"translateral negotiation"—to explain how separate parallel bilateral negotiations are interconnected through informal communication such as talks in corridors.

Current research includes investigating how formal models can help negotiations, mediating a dialog among the Caspian states, facilitating climate talks, and negotiating with terrorists and over hazardous issues.

MORE INFORMATION www.iiasa.ac.at/Research/PIN

Energy and Technology

Energy and technology drive development. Historical studies attribute about half of economic growth to technological change. Without energy, the world loses a key ingredient of its modern way of life. Yet one-third of the world's population cannot access commercial energy and the other two-thirds' consumption of energy is damaging the environment.

This research theme sees IIASA's scientists improving our understanding of how we can harness energy and technology to power our future without harming our planet.

DYNAMIC SYSTEMS

The Dynamic Systems Program develops mathematical models and other methods to help IIASA's scientists in their research.

In 2005, its scientists analyzed the race to innovate between two large, competing technology companies. The results showed how different research and development strategies influence which company wins such innovation races. The researchers' investigation was so innovative that it has made a valuable addition to mathematical theory.

Other crucial work included designing an algorithm to downscale GDP data from the national level to show how it varies at the local level of small towns and farms. This means IIASA scientists can explore the implications of global changes not only for individual countries but for individual towns within the country.

Finding the best routes to lay natural gas pipelines across Europe and Asia, along with analyzing the costs for Canada, Europe, Japan and Russia of complying with the Kyoto Protocol, were two other projects that the mathematicians of the Dynamic Systems Program investigated (see map).

MORE INFORMATION www.iiasa.ac.at/Research/DYN

TRANSITIONS TO NEW TECHNOLOGIES

The Transitions to New Technologies (TNT) Program's long-term goal is to better understand and describe the diffusion of new technologies and their economic, social and environmental implications. In 2005, research activities included modeling based on empirical case studies, analysis, and international scientific assessments.

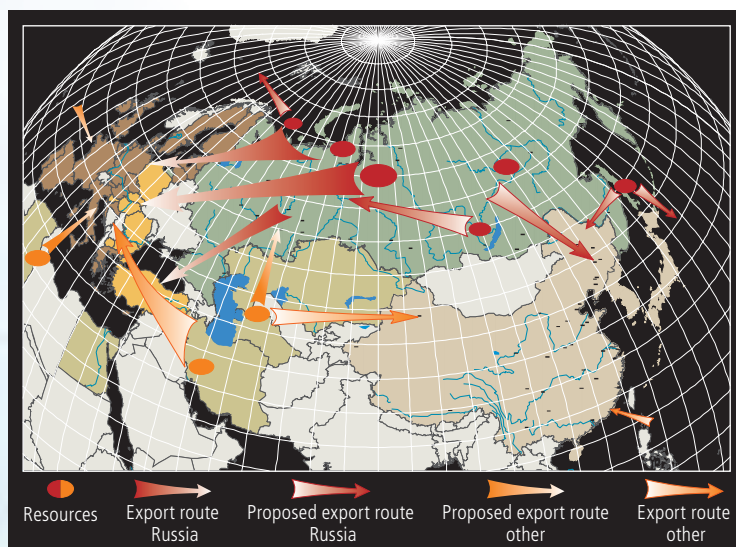
The program's researchers were lead authors of the *Millennium Ecosystem Assessment* and the IPCC *Special Report on Carbon Dioxide Capture and Storage*, both published in 2005. Three TNT scientists also serve as lead authors of the IPCC Fourth Assessment Report. The program hosted the IPCC Workshop on New Emission Scenarios, held from 29 June to 1 July 2005 in Laxenburg. Another assessment on "Harnessing Science Technology and Innovation for Sustainable Development" under the auspices of the International Council for Science was also completed and published. Other collaborative efforts include the InterAcademy Council Study on Energy and Climate Study and the United Nations Sigma Xi Scientific Expert Group on Climate Change and Sustainable Development.

A major multiyear international assessment, the Global Energy Assessment (GEA), was initiated at IIASA in 2005. TNT scientists developed the proposal and organized the first meeting of GEA's organizing committee.

Other advances include developing a prototype, stylized model of the dynamics of technology choice under uncertainty, increasing returns as well as environmental surprise. The program also made an important step toward modeling the intricate issue of technological inter-relatedness and interdependence by developing a series of experimental agent-based simulation models where individual technologies act as "agents" that can merge into new combinations. Other achievements in this research area include a Web-based model for the analysis of multiple technological substitutions and a scenario database and analysis package that is used extensively in the work of the IPCC and in a number of TNT publications.

Finally, the major part of the program's research effort in 2005 contributed to IIASA's Greenhouse Gas Initiative (see page 24).

MORE INFORMATION www.iiasa.ac.at/Research/TNT



Strategic routes for natural gas infrastructure in Eurasia.

ENVIRONMENTALLY COMPATIBLE ENERGY STRATEGIES

The Environmentally Compatible Energy Strategies Program researches how to build an energy system that produces affordable energy for all without destroying the environment.

During 2005, its scientists researched the transport sector which consumes some 33 percent of the world's energy. They identified the critical developments that are needed for a sustainable global passenger system to emerge, as well as exploring the potential of new technologies to meet people's future demands for transport, such as hydrogen fuel vehicles or stationary vehicles that generate electricity.

Other findings from the program identified government policy to encourage investment and development of renewable energy, as well as carbon capture and storage technologies.

Scientists began to play a key role in one of China's largest international research projects to develop technologies to control the country's greenhouse gases and to advise the Chinese government on the best policies to achieve such control.

The program's expertise on the natural gas markets expanded with further research into several factors—price, time, logistical, and commercial points—which signal the best opportunity to invest in natural gas pipelines (see map).

MORE INFORMATION www.iiasa.ac.at/Research/ECS

Institute-wide research

The combined research activities presented here produce results far greater than the sum of the Institute's individual parts.

METHODOLOGY FORUM

Set up in 2005 to facilitate the sharing of experiences and problems in methodological issues, the Methodology Forum ran five seminars on topics ranging from uncertainty analysis to scaling issues.

One seminar examined the common challenge for systems scientists of combining economic data, environmental information, and social statistics for different geographical areas that range from global to small local areas. The data often need to be reliably scaled up or down to relate to a common geographical location. Similarly, data from different sources often cover different time periods, and some innovative algorithms to deal with this were discussed.

MORE INFORMATION www.iiasa.ac.at/Research/MF

WATER ACTIVITIES

During 2005, six research programs continued to build on IIASA's past achievements in water research.

Mathematicians developed an integrated model to identify an environmentally sound strategy to improve mussel cultures along the Italian coastline in the Adriatic Sea.

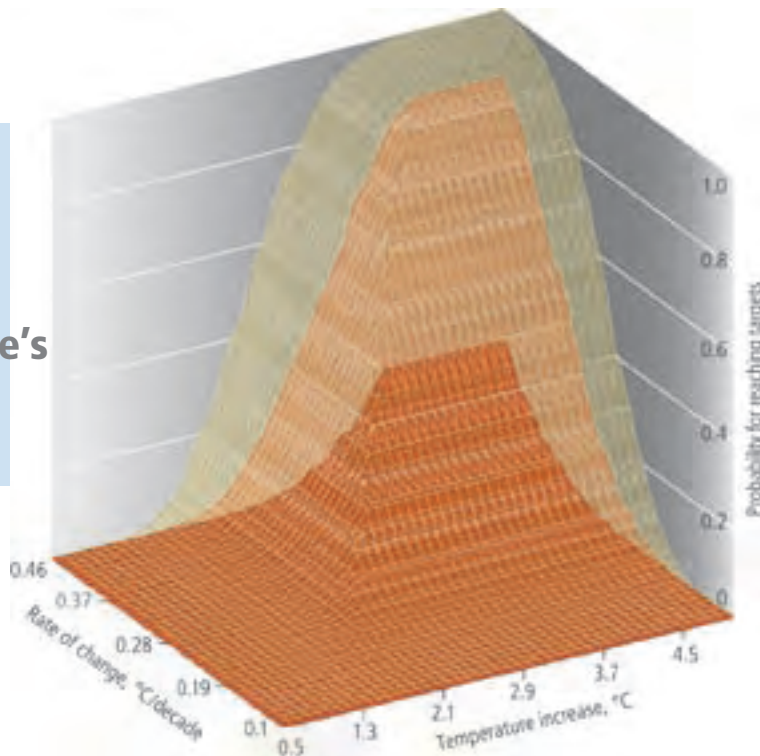
IIASA forest experts have helped develop methods to use remote sensing from satellites or airplanes to assess the size of water bodies, wetlands, and moisture conditions, and how these change over time.

Potential changes in global and regional agricultural water demand for irrigation until 2080 were investigated by IIASA's land use change and agriculture experts within a new socioeconomic scenario. Results suggest that socioeconomic and technological trends alone would increase global irrigation water use by some 25 percent. Climate change, if not mitigated, would double the required increases between 2000 and 2080.

The five countries that border the Caspian Sea need to jointly and amicably tackle issues such as water pollution and biological resources, which all naturally cross their borders. IIASA's negotiations experts are helping the countries to identify long-term agreements by mediating biannual dialog sessions.

IIASA's scientists helped thousands of Hungarians become more prepared to meet the costs of damage to their houses and livelihoods from the regular flooding of the Tisza river.

MORE INFORMATION www.iiasa.ac.at/Research/WA



PROBABILITY OF REACHING CLIMATE CHANGE TARGETS The three colors show the probability of three scenarios meeting simultaneous targets for the rate of temperature change and absolute levels of temperature change by 2100 (red, no climate target; orange, intermediate; and green, stringent climate target).

GREENHOUSE GAS INITIATIVE

The Greenhouse Gas Initiative (GGI) is a collaborative research effort involving seven IIASA programs. It aims to address questions critical to advancing scientific understanding and to inform policy processes related to the challenge of climate change. The Initiative takes as its context the ultimate goal of the UN Framework Convention on Climate Change to stabilize atmospheric concentrations of greenhouse gases.

The overall research objective is to bridge temporal and spatial scales of the climate change challenge, from shorter-term national and place-specific policies and measures directed at mitigating and adapting to climate change to the longer-term global objective of stabilizing atmospheric concentrations of greenhouse gases.

In 2005, progress continued in the initiative's principal research activities. These include the development of long-term, global scenarios that meet the UN Framework Convention on Climate Change (Article 2, UNFCCC, 1992) objective; the identification of robust mitigation strategies to hedge against salient long-term climate-related uncertainties; the assessment of near- to medium-term mitigation and adaptation measures for specific countries; and the development of an integrated policy assessment framework to analyze national policy approaches within the global context.

Through these activities, GGI aims to integrate IIASA's expertise in global and long-term analyses of population, technology, energy systems, and agriculture with more place-specific assessments of land use, forestry, and air pollution, both for industrialized and developing countries.

MORE INFORMATION www.iiasa.ac.at/Research/GGI

HITTING THE HEADLINES

In 2005, IIASA was mentioned 338 times in the media—up by 120 percent from 2004.



Institute-wide activity

IIASA builds capacity for international research among the world's junior scientists by running its popular Young Scientists Summer Program. And its outreach activity ensures IIASA's work is disseminated as widely as possible.

OUTREACH

IIASA's outreach activity disseminates information about IIASA to the public, scientific community, and national and international institutions. It achieves this by organizing events, generating media coverage, and hosting the IIASA Society for former IIASA staff.

In 2005, over 800 participants attended 40 IIASA conferences, and more than 300 scientific collaborators were welcomed as visitors. In turn, IIASA scientists were invited to or took part in numerous external conferences and symposia, including, for example, the 2005 meeting of the American Association for the Advancement of Science. Here, Ulf Dieckmann, leader of IIASA's Adaptive Dynamics Network, talked on fisheries-induced evolution and Transboundary Air Pollution Program leader Markus Amann spoke on the use of the RAINS model in international negotiations. This symposium was organized by Rudolf Avenhaus and I. William Zartman, both members of the Processes of International Negotiation Steering Committee.

IIASA also attracted 16 distinguished speakers to give guest lectures to IIASA's researchers, including, for example, Professor Ralph H. Abraham of the Visual Math Institute, Santa Cruz, California who gave a talk on "Landscape dynamics: A new agent based modeling strategy for financial markets and other social systems," as part of the IIASA Koopmans Lecture Series.

The IIASA Society continued to grow, and about 100 more alumni became members in 2005. The society regularly supports events to bring alumni together. The most popular event in 2005 took place when Roger Levien, IIASA's second Director (1975–1981), returned to IIASA with his wife Carla to celebrate his 70th birthday. He invited all the alumni from that time to a luncheon at the Institute. The Society searched and found many former colleagues of whom about 80 attended the event.

MORE INFORMATION

www.iiasa.ac.at/Admin/OSR and www.iiasa.ac.at/IIASA_Society

NEW GENERATION OF SCIENTISTS

Sixty-two junior scientists from 27 different countries took part in IIASA's Young Scientists Summer Program (YSSP) in 2005. This program sees the young scientists gain international research experience and make valuable international research contacts, while studying and socializing during the summer at IIASA's beautiful location in Austria.

Many of the young researchers made impressive scientific advances during their stay, including Geir Halmes of Norway who constructed a new food web generating algorithm which includes the role that dead organisms play in returning energy to other species in the food system. Bartosz Kozłowski of Poland investigated new approaches to analyzing the impact of the weather on crop yields by using the mathematical theory of wavelets.

Writing in *Nature* in 2005, Sarah Elizabeth Staveteig of the University of California, Berkeley, reflected on her time as a YSSP student at IIASA in the summer of 2004. "The YSSP helped me look at my research from fresh angles," she wrote. "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."

A lecture series is also organized for YSSP students, and in 2005 included lectures by Nobel Prize Laureate Paul Crutzen and by W. Brian Arthur, winner of the International Schumpeter Prize in Economics.

MORE INFORMATION www.iiasa.ac.at/YSSP



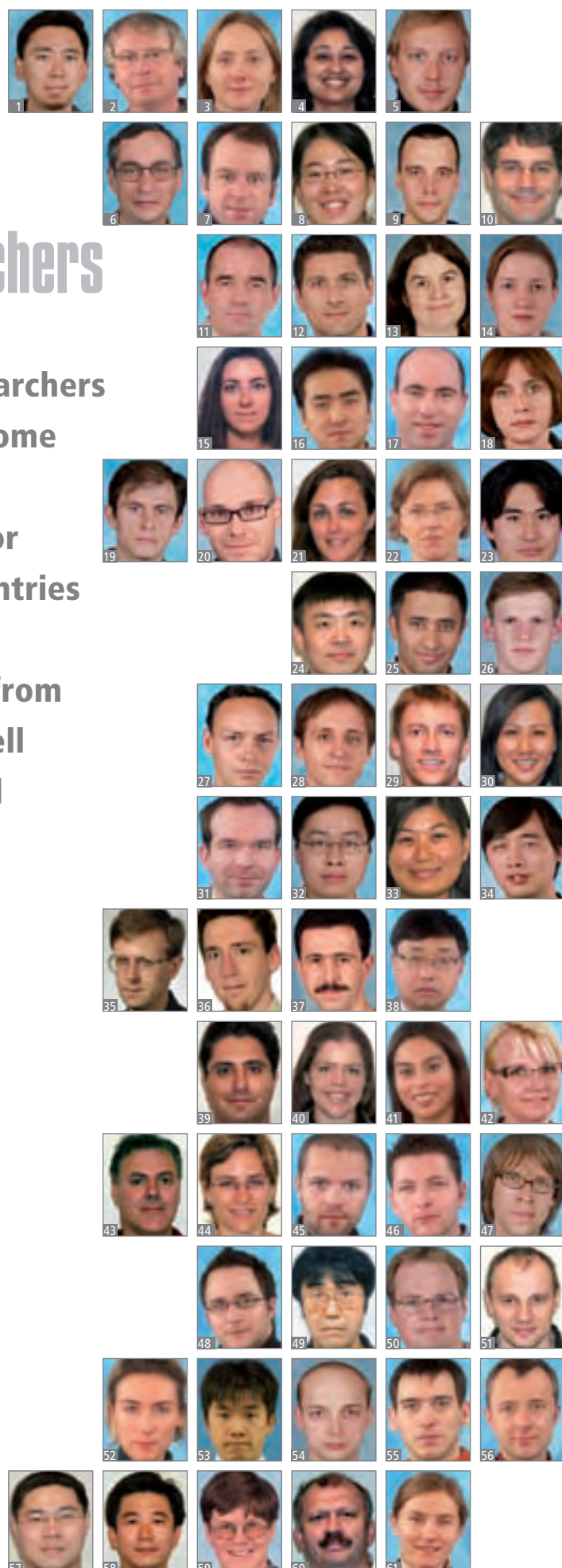
The scientists from IIASA's Young Scientists Summer Program in 2005.

New and returning researchers

Sixty-one promising and leading researchers joined or returned to IIASA in 2005. Some stayed for as little as a month, while others plan to work at the Institute for several years. They come from 23 countries and have a wide range of disciplinary backgrounds. IIASA's strength stems from the expertise of its researchers, as well as the huge networks of international scientists with whom they interact.

NEW AND RETURNING RESEARCHERS: NAME AND NATIONALITY

1 Kentaro Aoki, Japan 2 Glen Armstrong, Canada 3 Catherine Ashcraft, USA 4 Anamika Barua, India 5 Per Berglund, Sweden 6 Tesselano Campos Devezas, Portugal 7 Adam Chambers, USA 8 Jing Chen, China 9 Cezary Chudzian, Poland 10 Michael Dalton, USA 11 Alexey Davydov, Russia 12 Stephane de Cara, France 13 Erin Dunlop, Canada 14 Varvara Fazalova, Russia 15 Ligia Fernandes Azevedo, Portugal 16 Michinobu Furukawa, Japan 17 Joshua Goldstein, USA 18 Moema Goncalves Bueno Figoli, Brazil 19 Mykola Gusti, Ukraine 20 Stefan Hochrainer, Austria 21 Kristina Holmgren, Sweden 22 Anna Hörnell Willebrand, Sweden 23 Hiroshi Ito, Japan 24 Leiwen Jiang, China 25 Samir K.C., Nepal 26 Alexey Kadiyev, Russia 27 Georg Kindermann, Austria 28 Bartosz Kozlowski, Poland 29 Sylvain Leduc, France 30 Catherine Lee, USA 31 Sander Lensink, Netherlands 32 Hualou Long, China 33 Nan Luo, China 34 Tiejun Ma, China 35 Piotr Magnuszewski, Poland 36 Maciej Makowski, Poland 37 Nikolai Melnikov, Russia 38 Kee Yung Nam, Republic of Korea 39 Kiarash Nasserasadi, Iran 40 Tova Norlen, Sweden 41 Shonali Pachauri, India 42 Maarit Pallari, Finland 43 Roberto Pastres, Italy 44 Nathalie Peyrard, France 45 Peter Rafaj, Slovakia 46 Fernando Riosmena Rodriguez, Mexico 47 Eric Sanderson, Canada 48 Robert Sandler, Austria 49 Akira Sasaki, Japan 50 Erwin Schmid, Austria 51 Uwe Schneider, Germany 52 Dagmar Schwab, Austria 53 Takahiro Shiga, Japan 54 Alexey Smirnov, Russia 55 Kuno Strassmann, Switzerland 56 Peter-Wilhelm Tramberend, Germany 57 Shaoqiang Wang, China 58 Hongyang Wen, China 59 Wilfried Winiwarter, Austria 60 Volodymyr Zaslavsky, Ukraine 61 Katarina Zigova, Slovakia



IIASA's program leaders

IIASA's twelve research programs in 2005 were directed by leading international researchers.

ENVIRONMENT & NATURAL RESOURCES



Dr. Markus Amann (Austria)
Transboundary Air Pollution



Dr. Ulf Dieckmann (Germany)
Adaptive Dynamics Network



Dipl. Ing. Günther Fischer (Austria)
Modeling Land-Use and
Land-Cover Changes



Prof. Sten Nilsson (Sweden)
Forestry



Prof. Frank Parker (USA) and
Dr. Vladimir Novikov (Russia)
Radiation Safety of the Biosphere

POPULATION & SOCIETY



Dr. Joanne Linnerooth-Bayer (USA)
Risk, Modeling and Society



Prof. Wolfgang Lutz (Austria)
World Population



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



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 Kremenjuk (Russia), Prof. Gunnar Sjöstedt (Sweden)

ENERGY & TECHNOLOGY



Dr. Arkady Kryazhimskiy (Russia)
Dynamic Systems



Prof. Nebojsa Nakicenovic (Austria)
Transitions to New Technologies



Dr. Leo Schrattenholzer (Austria)
Environmentally Compatible
Energy Strategies

In 2005, 184 research scholars, assistants, and postdoctoral scholars worked at IIASA. Many worked part-time or on short-term contracts. Together, the 184 scientists contributed 85 person-years to IIASA's research—an expansion from 73 person-years in 2004.

International funding for international research

IIASA's research is funded by 16 prestigious National Member Organizations (NMOs) along with contracts, grants, and donations from government, academia, business, individuals, and other organizations. The large number of financial contributors from all over the world ensures that IIASA performs entirely independent research. IIASA would like to thank all those who have given their financial support.

IIASA NATIONAL MEMBER ORGANIZATIONS

AUSTRIA The Austrian Academy of Sciences
CHINA The National Natural Science Foundation of China
CZECH REPUBLIC The Academy of Sciences of the Czech Republic
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
HUNGARY The Hungarian Committee for Applied Systems Analysis
JAPAN The Japan Committee for IIASA
NETHERLANDS The Netherlands Organization for Scientific Research (NWO)
NORWAY The Research Council of Norway
POLAND The Polish Academy of Sciences
RUSSIAN FEDERATION The Russian Academy of Sciences
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 (NAS)

Income

NMO contributions	64%
Grants and contracts	33%
Investments and other	3%

IIASA's 2005 income was €11.4 million, 64% of which came from National Member Organizations (NMOs) and 33% from contracts, grants, and donations.

Operating Expenditure

Research program	64%
Infrastructure	22%
Scientific services	14%

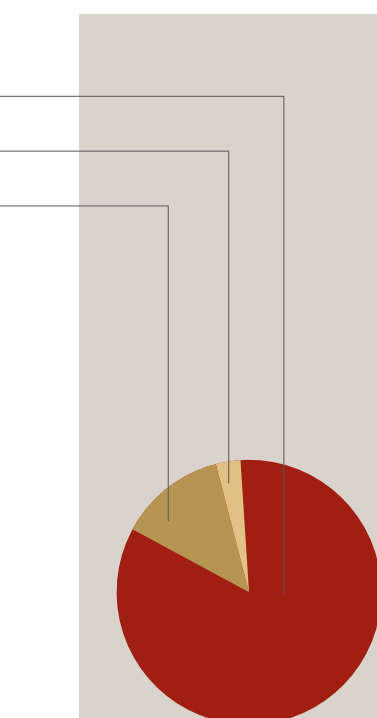
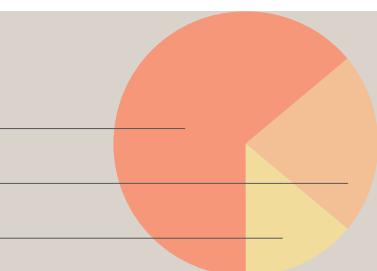
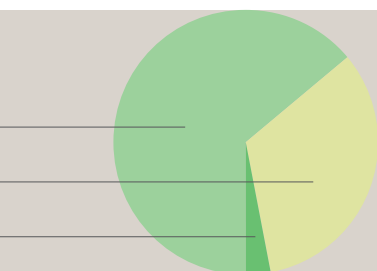
In 2005, research represented 64% of total expenditure, with 22% spent on infrastructure and only 14% on scientific services.

New Expenditure in 2005

Research	84%
Infrastructure	3%
Scientific services	13%

SUMMARY OF FINANCIAL ACTIVITIES

INCOME	2005 (€)	2004 (€)
NMO contributions	7,287,146	7,408,499
Contracts, grants, and donations	3,746,278	3,367,298
Other income	350,866	124,580
TOTAL	11,384,290	10,900,377
EXPENDITURE	2005 (€)	2004 (€)
Research	6,870,989	5,941,176
Infrastructure	2,340,049	2,303,630
Scientific services	1,449,050	1,309,182
TOTAL	10,660,088	9,553,988



In 2005, IIASA's expenditure rose by €1.1 million, 84% of which was invested in research.

CONTRACTS, GRANTS, AND DONATIONS 2005

Commission of the European Communities, DG Environment, Brussels, Belgium
 Commission of the European Communities, DG Research, Brussels, Belgium
 The Oil Companies' European Organization for Environment, Health and Safety, Brussels, Belgium
 Austrian Exchange Service, Vienna, Austria
 Austrian Federal Ministry for Education, Science and Culture, Vienna, Austria
 Austrian National Bank, Anniversary Fund, Vienna, Austria
 Austrian Federal Ministry for Agriculture, Forestry, Environment and Water Management, Vienna, Austria
 Institute of Social Ecology, IFF Vienna, Klagenfurt University, Vienna, Austria
 Austrian Science Fund, Vienna, Austria
 Vienna Institute for Demography, Vienna, Austria
 Friedrich Schiller University Geoinformatics, Jena, Germany
 CEDIM, am Institut für Massivbau und Baustofftechnologie, University of Karlsruhe, Karlsruhe, Germany
 National Technical University of Athens, Athens, Greece
 The International Crops Research Institute for the Semi-Arid Tropics, Pradesh, India
 Food and Agriculture Organization of the United Nations, Rome, Italy
 Italian Agency for New Technology, Energy, and the Environment, Rome, Italy
 Toyota Central Research and Development Laboratories, Inc., Aichi, Japan
 Kyoto University, Kyoto, Japan
 Acid Deposition and Oxidant Research Centre, Niigata-shi, Japan
 Tokyo Gas Co., Ltd., Tokyo, Japan
 Tokyo Electric Power Company, Tokyo, Japan
 Central Research Institute of Electric Power Industry, Tokyo, Japan
 Environment Research Centre, Orogana Tsukuba, Japan
 National Institute of Public Health and the Environment, Bilthoven, Netherlands
 University of Bergen, Bergen, Norway
 The Research Council of Norway, Oslo, Norway
 Norwegian Meteorological Institute, Oslo, Norway
 Russian Academy of Sciences, Moscow, Russia
 Swiss Agency for the Environment, Forests and Landscape, Bern, Switzerland
 United Nations Economic Commission for Europe, Geneva, Switzerland
 The World Meteorological Organization, Geneva, Switzerland
 The Met Office, Exeter, United Kingdom
 Department for Environment, Food and Rural Affairs, London, United Kingdom
 The James Martin Institute for Science and Civilization, The University of Oxford, Oxford, United Kingdom
 AEA Technology Environment, Oxfordshire, United Kingdom
 The William and Flora Hewlett Foundation, Menlo Park, CA, USA
 Electric Power Research Institute, Palo Alto, CA, USA
 Howard Raiffa, Boston, MA, USA
 Columbia University, New York, NY, USA

About IIASA

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

IIASA is sponsored by its National Member Organizations. In 2005 these were:

AUSTRIA The Austrian Academy of Sciences

CHINA The National Natural Science Foundation of China

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International Institute for Applied Systems Analysis
Schlossplatz 1, A-2361 Laxenburg, Austria
Tel: +43 2236 807 Fax: +43 2236 71313
www.iiasa.ac.at