

Research for a Changing World

IIASA STRATEGIC PLAN 2011–2020

Background

IIASA's strategic plan 2011–2020 is a product of contributions by many, including the original writing team with revisions based on comments by members of the IIASA Council, the IIASA Internal Research Committee, the IIASA Science Advisory Committee, and the IIASA Strategic Planning Steering Committee. This plan was approved by the IIASA Council on June 9, 2009.

IIASA COUNCIL, June 2009

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Executive summary

Today's world is undergoing a major transformation, characterized by increased globalization, fundamental shifts in economic and political power, environmental challenges, and unpredictable social conflict. Science and technology are playing an important part in helping policymakers identify and chart sustainable pathways through these complex and interlinked global processes.

Since 1972 the International Institute for Applied Systems Analysis (IIASA) has contributed to finding solutions to global problems by conducting independent and interdisciplinary systems analysis across a wide spectrum of environmental, social, technological, and economic issues. Now, as the Institute enters the second decade of the twenty-first century, it must focus its research on the major global challenges, identify science-based policy solutions, respond to the interests of a broader membership, and compete and collaborate with new research organizations that have been set up to study global problems.

Beginning in June 2008, IIASA undertook a year-long strategic planning process to develop a new strategy for the coming decade. Driving the new strategy is an ambitious vision, namely, that in ten years:

**IIASA will be the world leader in systems analysis
to find solutions to global problems
for the benefit of humankind.**

To accomplish this vision, the following mission will be adopted by IIASA:

**IIASA provides insights and guidance to policymakers worldwide
by finding solutions to global and universal problems through applied systems analysis
in order to improve human and social wellbeing and to protect the environment.**

IIASA's core strength is its leadership in applied systems analysis, which is:

PROBLEM-DRIVEN AND SOLUTION-ORIENTED Systems analysis provides a deeper understanding of global problems, helps find solutions, and guides the decisions of policymakers.

INTEGRATED AND INTERDISCIPLINARY Systems analysis considers a comprehensive range of options and impacts as well as the dynamic interactions among multiple affected systems and their interlinkages across a wide range of academic disciplines.

SCIENCE-BASED Systems analysis at IIASA is based on the best research, databases, and analytical tools to provide the strongest possible foundation for modeling and analysis.

INDEPENDENT AND INTERNATIONAL IIASA's unique position as an international body that is independent of governments, commercial organizations, and other interest groups allows it to conduct research that is unconstrained by political or commercial vested interests.

An important aspect of IIASA's strategy for the next decade was the decision to limit its research to a number of key global problems. The choice of new research areas was based on the following criteria: the importance of the problem on the global agenda; the interest of IIASA member countries in studying the problem; and IIASA's capabilities in terms of providing research solutions. As a result, three interlinked problem areas were selected:

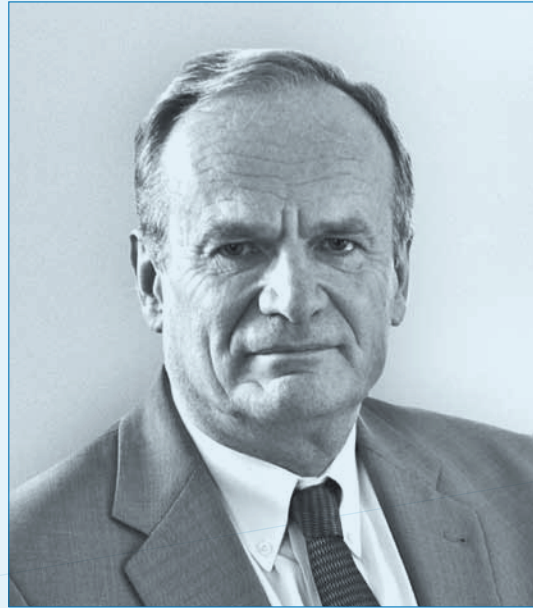
FOOD AND WATER Reducing hunger and starvation in the world and providing secure water supplies for agriculture, human consumption, industry, and the natural environment; improving land use planning and management to achieve a stable world food supply; addressing the interactions among fresh water, agriculture, forestry, food, fisheries, energy, and health; and analyzing the impacts of economic development, demographic change, environmental degradation, and climate change on ecosystem services.

ENERGY AND CLIMATE CHANGE Alleviating energy poverty in underserved regions and providing energy security worldwide; assessing the interactions among energy supply and end use, economic development, environmental impacts, particularly climate change and air pollution and loss of ecosystem services; guiding the way to economically and environmentally sustainable energy futures.

POVERTY AND EQUITY Reducing the gap between rich and poor; understanding gender and education inequities and how to reduce them; assessing the impacts of drivers of global change on inequities, including development and urbanization, globalization, population growth and migration.



Professor Peter Lemke
Chairman of the IIASA Council



Professor Detlof von Winterfeldt
IIASA Director

To study these problems requires an understanding of the major drivers of global transformations, including: development and urbanization; economic growth and globalization; population growth and demographic changes; and technological innovations and their diffusion. In addition, analyses of solutions in the three problem areas will need to consider a comprehensive set of impacts on human wellbeing (health and wealth); societal wellbeing (peace, stability, and sustainable development); and environmental quality (reduction of pollution, including atmospheric CO₂ concentration, protection of species and biodiversity).

Problems, drivers, and impacts are closely interlinked elements of systems analysis. With its emphasis on finding robust and adaptive solutions to given problems, systems analysis pays special attention to the interactions among multiple dynamic systems and the risks and uncertainties faced by policymakers. IIASA will build on its strengths in scenario development, risk and vulnerability assessment, and dynamic systems modeling to develop new capabilities in modeling and analyzing extreme destabilizing events and systemic risks.

IIASA's research will be structured into three sets of activities: crosscutting research that focuses on policies and solutions in the three problem areas; innovative and explorative research that examines the frontiers in systems analysis; policy, decision, and negotiation analysis that builds bridges between the scientific and policy worlds.

While research is IIASA's main mission, capacity building and education must also play an important role. Indeed, IIASA's new members have called for an increase in activities in this area. The new members have strengthened the Institute by broadening scientific collaboration, attracting new research talent, and bringing a greater global perspective to governance and the research agenda. To further foster these developments, IIASA will intensify its collaborative activities with research institutions in member countries, increase its work with developed countries, and expand its efforts to address the challenges being faced by developing countries. Moreover, IIASA will build on its successful Young Scientists Summer Program (YSSP) to create new educational capacities, offering courses and study opportunities at IIASA and around the globe. IIASA will also continue to build on and develop its large international network of researchers and analysts in partner institutions worldwide.

As part of its new research focus, IIASA will also seek to achieve higher visibility for its scientific achievements and a clearer identity for the Institute by embarking on a communication campaign to extend the reach and recognition of its work.

This strategy requires new financial resources and a dynamic recruitment and human resources development policy. Additional financial resources will primarily come from increasing IIASA membership and growing its endowment fund. Through its human resources policy, IIASA will aim to attract the best minds in systems analysis worldwide, maintain a dynamic flow of researchers, and retain those researchers with exceptional scholarly and leadership abilities.

Peter Lemke

Detlof von Winterfeldt

Global transformations

The global economic development of the past 50 years has substantially improved human wellbeing, but it has also created unprecedented social, economic, and environmental problems. The world economic product has increased to about US\$7,000 per person, which, if equally distributed, would be high enough to allow for the fulfillment of basic human needs. However, at the same time, the gap between the rich and the poor has widened, creating 10 million millionaires, while leaving one billion people to survive on less than a dollar a day. Regional environmental impacts are increasing, and climate change and biodiversity loss have become global problems. Furthermore, the interdependencies among nations and economies have created new risks and vulnerabilities, as demonstrated by the recent global financial crisis and the pandemic influenza threat.

Today's world is undergoing a major transformation, characterized by increased globalization, fundamental shifts in economic and political power, growing global environmental problems, and potentially explosive social conflicts. Science and technology are needed to help policymakers worldwide to identify and follow sustainable pathways through this transformation.

In this global context, the International Institute for Applied Systems Analysis (IIASA) plays an important role by conducting independent, international, and interdisciplinary systems analysis to identify and assess possible solutions to complex global problems and their interactions.

IIASA was founded in 1972 to bring together the best scientists from the East and the West to study the common problems of modern, industrialized societies arising from scientific and technological development. Since its inception, IIASA has been an independent, international research institution sponsored by National Member Organizations (NMOs) from many countries, typically national academies of sciences or equivalent organizations.

The original mission of IIASA was to build bridges between the East and the West by fostering scientific collaboration on common problems during the Cold War period. In the early years the focus was largely on the problems of industrialized countries. IIASA's purpose changed with the end of the Cold War. In 1991 the IIASA Council responded to these external events by setting a new agenda for IIASA to find new opportunities for international cooperation to investigate global change. IIASA's mission became:

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, national governments, and national and international institutions (IIASA Council, 1991).

This mission guided IIASA during the 1990s and was further endorsed by its Council in 1999:

IIASA's enduring objective is to provide science-based insights into critical policy issues in international and national debates on global change (IIASA Council, 1999).

Since then, the global focus of IIASA has attracted member organizations from new countries, namely China, Egypt, India, Pakistan, South Africa, and the Republic of Korea. By 2009 the 17 countries having IIASA member organizations accounted for over half the world's population and included the world's four largest economies.

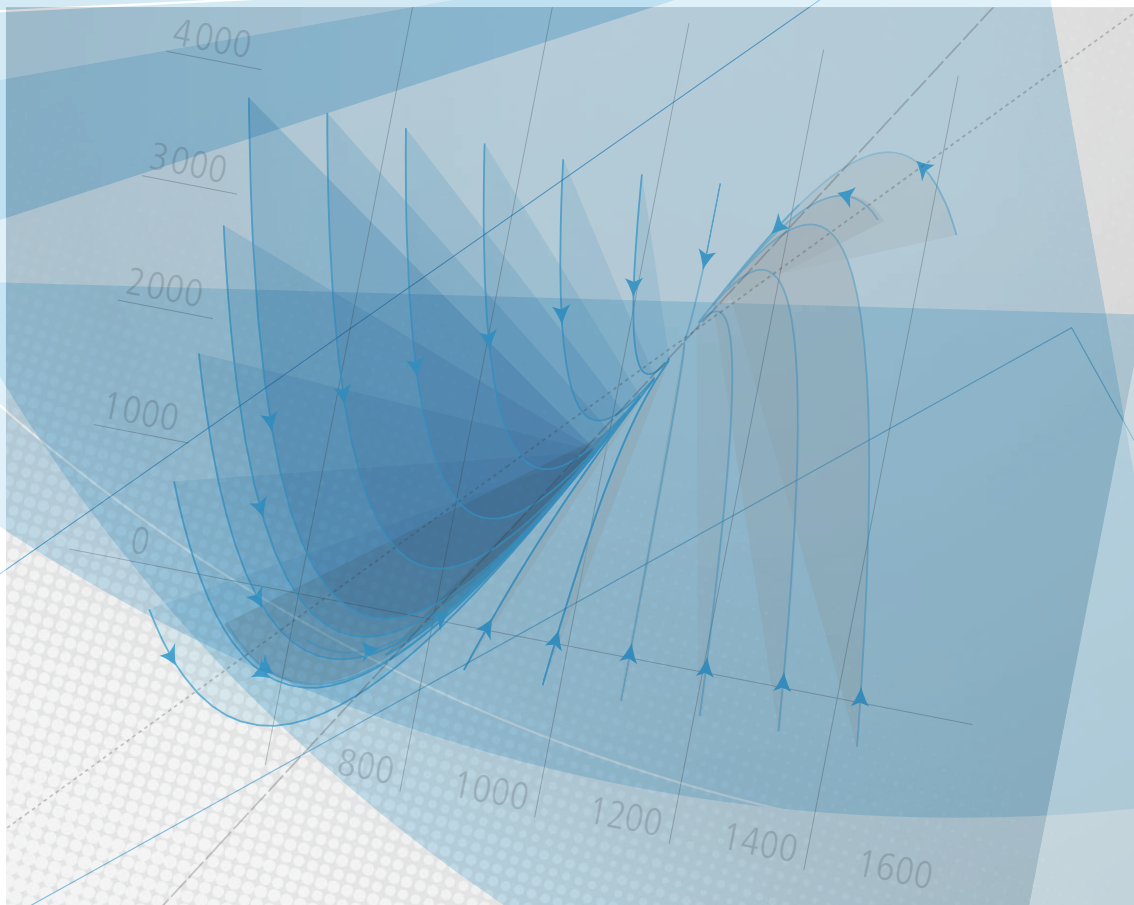
The new members have strengthened the Institute by broadening scientific collaboration, attracting new research talent, and bringing a more global perspective to governance and the research agenda. In order to strengthen further these developments, IIASA will intensify its collaborative activities with research institutions

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 the 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.



in member countries, enhance its efforts with developed countries, and expand its activities in addressing the challenges being faced by developing countries. This will enhance IIASA's visibility at national, regional, and international levels, and positively contribute to the transfer of knowledge and skills among its NMOs.

As IIASA enters the second decade of the twenty-first century, the Institute must analyze the new global challenges, respond to the interests of a broader membership, and position itself in an environment of increasing competition from new research organizations studying global problems. It is in response to such challenges that IIASA undertook a year-long strategic planning process from June 2008 leading to a new strategy and vision:

IIASA will be the world leader in systems analysis to find solutions to global problems for the benefit of humankind.

To accomplish this, IIASA adopts the following mission:

IIASA provides insights and guidance to policymakers worldwide by finding solutions to global and universal problems through applied systems analysis in order to improve human and social wellbeing and to protect the environment.

The remainder of this strategic plan provides the overall framework for this mission and guidance for the development of specific research activities.

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 has 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.



IIASA's strengths and challenges for the next decade

In today's world, economic, social, technological, and environmental systems are highly interconnected and interdependent. As a result, decision makers and stakeholders around the world are increasingly asking for the improved understanding of complex problems and comprehensive solutions that can only be obtained through interdisciplinary models and analysis. They also expect solutions for short- and long-term horizons, for interconnected sectors, and for the local, national, and global spatial scales. They may not know it, but they are asking for solutions based on systems analysis.

With its history as a leader in applied systems analysis, IIASA is well positioned to respond to these demands. IIASA has a demonstrated track record of excellence in conducting interdisciplinary research into real world problems, generally in collaboration with large international research and analysis networks, and advising governments and policymakers based on the results of that research. In addition, the Institute is truly international and independent, has members in both developed and emerging economies, and has the capacity for bringing together people from all over the world. Indeed, as one participant in the strategic planning process put it: "If IIASA didn't exist, it would need to be invented."

At the core of IIASA's strength is its leadership in applied systems analysis, which is:

PROBLEM-DRIVEN AND SOLUTION ORIENTED Improving the understanding of the important global challenges and assessing options to assist decision making by policymakers.

INTEGRATED AND INTERDISCIPLINARY Considering a broad range of options and impacts as well as the dynamic interactions among multiple affected systems and their interlinkages, including a wide range of academic disciplines.

SCIENCE-BASED Using the best science, models, databases and analysis tools to provide a foundation of modeling and analysis.

INDEPENDENT AND INTERNATIONAL Using its unique position as a truly international body that is independent of governments, commercial organizations, and other interest groups, to produce results that are both pertinent to world problems and based on complete scientific integrity.

In addition, systems analysis at IIASA research is characterized by emphasizing:

LONG-TERM TRENDS AND TRANSFORMATIONS Many important global challenges facing humanity evolve over very long time spans. In some cases—mitigation of climate change being one example—time lags between action and consequences extend beyond several human generations.

INTERACTIVE DYNAMICS OF COMPLEX SYSTEMS Systems analysis contributes to understanding the interactive dynamics characterizing complex human-environment systems, and understanding discontinuities and critical thresholds.

RISKS AND UNCERTAINTIES Many global problems involve substantial risks and often deep uncertainties, which make it impossible to predict the consequences of policies. Systems analysis addresses these risks and uncertainties and examines alternative policy responses, including robust solutions, adaptive decisions, and resilient strategies.

1977

The first Young Scientists Summer Program is a huge success and during the next 30 years IIASA attracts over 1,400 talented young scientists to spend a summer working with scholars from other nations and disciplines. Many will go on to take senior posts in academia, business, and government.

1980

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



GUIDANCE AND GOVERNANCE Systems analysis provides guidance to policymakers by offering high-quality models, data, and analyses in a format that decision-makers and stakeholders can themselves use to explore problems and solutions.

GLOBAL RESEARCH WITH REGIONAL AND NATIONAL IMPLICATIONS Global systems analyses are closely linked to regional and national solutions. This can be accomplished by conducting regional or national case studies in cooperation with national centers of excellence (partner institutions and NMOs).

Along with these strengths, IIASA also faces significant challenges, which were identified in the strategic planning process:

- To create a more focused research agenda;
- To increase the collaboration and integration across IIASA research programs;
- To achieve a clear identity and higher visibility;
- To maintain its worldwide leadership in applied systems analysis;
- To demonstrate its value to the current and future member organizations; and
- To attract research funding and talent to resource the strategic plan.

The following three sections will describe the elements of the strategic plan, followed by a discussion of how the plan addresses these challenges and what resources are needed for its implementation.

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 completes a study on eutrophication and management of Lake Balaton, central Europe's largest lake. Its findings influence water policy in Italy, Japan, the USA, and the USSR.



IIASA's focus on major global problems and their interdependencies

There are many global problems that urgently require solutions by nations working together: poverty, hunger, water scarcity, energy security, climate change, land use changes, biodiversity loss, economic crises, environmental degradation, international conflicts, and terrorism. Other problems are universal in that they are common to many countries and require national solutions: aging populations, education, traffic congestion, crime, pollution, and health care. Still other problems relate to the inequities and conflicts in this world: the gap between the rich and the poor, gender and educational inequality, conflicts about the control of resources, and racial and ethnic differences.

With limited resources and an increasing number of organizations working in some research areas originally pioneered by the Institute, IIASA needs to focus its research agenda on identifying solutions to a selected number of these problems. Three criteria motivated the selection:

- The importance of the problem on the global agenda;
- NMO interest in identifying solutions to the problem; and
- IIASA's capabilities to conduct research to find solutions.

Based on these criteria the following three problem areas were selected:

FOOD AND WATER Reducing hunger and starvation in the world and providing secure water supplies for agriculture, human consumption, industry, and nature; improving land use planning and management to achieve a stable world food supply; addressing the interactions between fresh water, agriculture, forestry, food, fishery, energy, and health; and analyzing the impacts of economic development, demographic change, environmental impacts, and climate change on ecosystem services.

ENERGY AND CLIMATE CHANGE Alleviating energy poverty in underserved regions and providing energy security worldwide; assessing the interactions between energy supply and end use, economic development, environmental impacts, particularly climate change and air pollution and loss of ecosystem services; guiding the way to economically and environmentally sustainable energy futures.

POVERTY AND EQUITY Reducing the gap between the rich and the poor; understanding gender and education inequities and how to reduce them; assessing the impacts of drivers of global change on inequities, including development and urbanization, globalization, population growth and migration.

These research areas were chosen because they are clearly very important to many national governments and international organizations around the world. IIASA is uniquely able to bring this set of issues to a focus in a single international, interdisciplinary research institution. They are also themes that have been called for by many international research organizations (for example, the Intergovernmental Panel on Climate Change, the International Geosphere–Biosphere Programme, the International Human Dimensions Programme, the Earth Systems Science Partnership, the Millennium Ecosystem Assessment, and the InterAcademy Council) and by national research institutions.

1983

Groundbreaking research by an IIASA scholar provides the intellectual underpinnings for the later US Department of Justice's antitrust case against Microsoft. The findings pioneered the modern approach to increasing returns which shows how powerful firms can exploit the particular 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.



Food and water are closely linked worldwide problems, since the dominant use of fresh water is for agricultural purposes. IIASA has substantial and unique strengths in land use, agriculture and forestry, and fisheries, which are closely related to food security. Because of the close link between food and water, it is important to build up a capacity in water research at IIASA as well.

Energy and climate change have been major research topics at IIASA since its inception and the global interest in this area has been increasing in recent years. As the international debate and negotiations about mitigating global warming and adapting to climate change evolves, IIASA will build on its capabilities in scenario development, integrated assessment of medium and long-term policies, and the development of robust adaptive strategies to reduce the impacts of climate change on human and societal wellbeing and to protect the environment.

Poverty and equity are very important national and global problems. IIASA has a long experience of working on issues leading to poverty, like lack of economic development, unsatisfactory education, lacking insurance mechanisms, insufficient social security systems, unsatisfied energy demand, food and water insecurities, natural disasters, climate change, etc. Research at IIASA has recognized that poverty causes environmental issues like deforestation, unsustainable food production, degradation of soils, and harmful pollution, thus creating a vicious cycle. IIASA also has expertise in analyzing inequities; this includes work in the World Population Program (investigating the issues of aging in developed countries and the benefits of education in developing countries) and the Risk and Vulnerability Program (investigating the burden of disasters in developing countries). In the future, IIASA will foster a systematic approach throughout the Institute on the factors underlying poverty and inequities, their impacts on human wellbeing, and options to reduce poverty and inequities.

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 for determining 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 agree to accept a single scientific model.

Systems analysis requires the exploration of the main drivers of, and interlinkages among systems, the consideration of a broad range of impacts, and awareness of risks and uncertainties. Therefore, in order to marshal the full capabilities and strengths of systems analysis to develop workable solutions to the three problem areas, IIASA's research will consider the major drivers of global transformations, namely:

- Development and urbanization;
- Economic growth and globalization;
- Population growth and demographic changes; and
- Technological innovations and their diffusion.

In addition, analyses of solutions in the three problem areas will need to consider the impacts on:

- Human wellbeing (health and wealth);
- Societal wellbeing (peace, stability, and sustainable development); and
- Environmental quality (reduction of pollution, protection of species and biodiversity).

Problems, drivers, and impacts are closely related elements of systems analysis. For example, economic growth and environmental quality are intimately linked. The general problem of sustainability in all its dimensions, from energy to food and fiber to other ecosystem services, requires a synthetic approach linking diverse complex dynamical systems, a challenge that IIASA is uniquely positioned to address.

Risks and uncertainties are crucial considerations when assessing policy options and their impacts. IIASA will build on its strengths in scenario development, risk and vulnerability assessment, and dynamic systems modeling to develop a new capability in modeling and analyzing extreme destabilizing events and tipping points. The current global economic crisis has focused much attention on the issue of systemic risk, in particular the potential for "contagious" spread of disturbances through financial and other systems. Epidemics of infectious diseases, the spread of forest fires, and systemic collapses of banking systems have unique features, but share common aspects as well, and are prototypical examples of situations in which a sophisticated complex system approach is essential. IIASA could and should be in the lead in developing a new conceptual and analytical framework for addressing such problems.

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 damaging emissions of sulfur dioxide. The following year, 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.

Structure of IIASA's research

INTEGRATED, CROSSCUTTING RESEARCH Systems analysis builds on scientific research, models and databases, and applied analytical tools to assess options for the solution of major problems. Integrated assessment is a form of systems analysis that emphasizes systems interlinkages and comprehensive impact assessment of options. As a leading institute in systems analysis and integrated assessment, IIASA will continue this practice, focusing on the three problem areas described in the "Focus" section (pages 10–12) of this plan. The integration of specific programs and activities will occur by emphasizing the importance of problem solving over disciplinary interests, the interlinkages among systems over studying subsystems, and comprehensive assessments over narrowly defined ones.

INNOVATION AND EXPLORATION In addition to the more traditional integrated and crosscutting research activities, IIASA will develop a capability to anticipate and cope with rapid changes and new crises and opportunities. Ideas and concepts for this type of research can be found in the studies of resilience, adaptive management, uncertainty and risk, and technological innovation. IIASA's emphasis will be on paradigm changing transformations, from the global to the sector and place-specific, from medium term to very long term.

Much of this research will examine unusual events, surprises, and extreme values of distributions, rather than averages or normally distributed phenomena. This research will be conducted as individual, mostly short-duration projects, lasting from a few months to a year. The projects will typically be feasibility studies encompassing exploratory in-house research and workshops.

An important part of innovation and exploration is to maintain the cutting edge in systems analysis. IIASA will establish an *advanced systems analysis team*, which initially will consist of IIASA researchers with specializations in advanced mathematical modeling techniques. Researchers with specialization in areas such as complexity theory, dynamical systems, game theory, agent-based modeling, behavioral and experimental economics, and artificial intelligence will be recruited to infuse new ideas, either as short-term visitors or to complement the innovations in existing programs.

POLICY GUIDANCE AND EXTERNAL COLLABORATIONS To foster relationships with policymakers and to establish a policy dialog, IIASA must build a strong capability in linking the research and policy communities. Some researchers have natural skills in making these connections and they will be involved in a team that seeks out and supports opportunities for IIASA to engage in the policy process at both the NMO government level and at the international level. In addition, researchers in policy, decision, and negotiation analysis will be brought to IIASA to assist with building bridges between IIASA's research and the external world's policy processes.

An important part of this activity is to establish collaborative relationships with policy and research institutions within IIASA's national member countries. While IIASA will maintain its focus on modeling and analysis at the global level, it will work closely with partners to translate the global frameworks, scenarios, models, and data into the regional and national context and so translate the global analysis into nationally-relevant decision support modeling and analysis. In return, NMO country research organizations will be valuable sources of data, national policy perspectives, and nationally-developed models. These research partners can also provide the link between IIASA's researchers and national decision makers in an effort to create a policy dialogue.

1995

Five IIASA scientists are chosen to be Lead Authors of the Second Assessment Report of the Intergovernmental Panel on Climate Change. Since then, eight 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.

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 probabilistic population scenarios (predicting world population will probably never double again) and new findings on population aging.

Capacity building and education at IIASA

While research is the major mission of IIASA, capacity building and education must also play an important role. Capacity building in this context means activities that strengthen the knowledge, abilities, and skills of researchers to conduct systems analysis. Capacity building can benefit IIASA's research in the long term by attracting and training new research talent; it can also benefit member countries through equipping their countries' researchers with the skills required to conduct effective interdisciplinary research in an international context. Indeed, new members have called for an increase of activities in this area.

The capacity building activity with the highest profile at the Institute is the widely praised Young Scientists Summer Program (YSSP). A more recent, but also very productive program is the Postdoctoral Program combined with several special fellowships and awards for mid-career scientists. The Institute will expand these activities to offer increased capacity-building services to its member organizations.

The responsibility for this expansion does not rest solely with the Institute but also with its member organizations. Financial support for these expansions has to come, to an increasing extent, from IIASA NMOs to make it possible for more young scientists to spend time at the Institute. Additional financial resources are needed to support students attending the summer program, provide more postdoctoral fellowships, and establish new fellowships and awards.

Capacity building also occurs in the context of active research collaborations. The Institute must therefore further identify and exploit opportunities for increased research partnerships with institutions and individual scientists in member countries. This form of capacity building has to be based on fully-fledged collaborations and relationships of mutual respect and trust in the pursuit of scientific excellence. The aim of these activities is that IIASA intensify collaborative efforts with regard to mutual development of theory and spearheading methodological advancements, and also to create research networks with wide use of nationally based capacities.



1998

The World Energy Council partners with IIASA in a unique study on Global Energy Perspectives. This analyzes how current and near-term energy decisions will have long-lasting implications throughout the twenty-first century. The findings of the five-year study are presented at the World Energy Congress in 1995 and 1998, and the results published in a Cambridge University Press book in 1998.

2000

IIASA scientists and models play a leading role in preparing the most comprehensive and sophisticated scenarios yet 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.



The central idea of these collaborations is that IIASA would provide the global modeling and analysis capabilities and databases to national collaborators, while the national collaborators would develop options and solutions in the national context, provide data at the national level, and conduct more detailed systems analyses to support national policymakers. This collaboration will include short- and medium-term exchanges of researchers between IIASA and the national institutions, as well as through international networks.

As a global institution with national collaborators, IIASA must explore new and innovative, decentralized approaches for capacity building. The Institute will expand its infrastructure for and supply of Web seminars and video presentations. Opportunities for IIASA scholars in residence to spend extended time in institutions of member countries will be stimulated and increased by the Institute. Moreover, regional, national, and international capacity building programs will be developed in collaboration with the member organizations.

There have been many discussions about whether IIASA should offer formal courses in systems analysis or collaborate with Masters and PhD programs at universities. IIASA will actively explore these opportunities, in particular those related to providing research *practica* and selected courses that are accredited and can be taken by PhD students working as research assistants at IIASA.

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.
- ▶ A UN-commissioned IIASA report, presented to the World Summit on Sustainable Development in Johannesburg, highlights 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.

Meeting IIASA's challenges

The strategic plan sets out the broad mission and direction for IIASA for the second decade of the twenty-first century. The new direction will help IIASA meet the challenges identified in the “Strengths and challenges” section (pages 8–9) of this plan:

DEVELOP A MORE FOCUSED RESEARCH AGENDA The proposed strategy focuses IIASA's research on three interlinked global problem areas: food and water; energy and climate change; poverty and equity. These global problem areas are affected by the major driving forces of global transformations: development and urbanization, economic growth and globalization, population growth and demographic changes, and technological innovation and diffusion, which are the subject of several IIASA programs. The three problem areas will be studied considering a broad range of policy options, risks and uncertainties and the impacts on individual and societal well being and on environmental quality.

INCREASE COLLABORATION AND INTEGRATION ACROSS IIASA'S RESEARCH PROGRAMS

The Institute will evolve its programmatic structure and funding mechanisms to foster cross-program collaborations on the major global problems of IIASA's new research agenda. This may involve combining some programs to lead the three problem areas while other programs will provide the important skills and methodologies to model and analyze the drivers of global transformations as well as risk and uncertainties. It is important that the benefits of the current program structure—especially the individual entrepreneurship of program leaders and their ability to secure significant amounts of external funding—is not undermined in this process. Thus, the challenge is to provide incentives and structures for cross-program collaboration, while encouraging individual program growth and entrepreneurship.

MAINTAIN IIASA'S INTERNATIONAL LEADERSHIP IN SYSTEMS ANALYSIS A new infusion of advanced systems analysis models and techniques in the exploratory and innovative research projects combined with a research agenda that focuses on a few interlinked global problem areas will help IIASA to achieve international recognition as the leader in systems analysis and integrated assessments on a global scale.

ACHIEVE A CLEARER IDENTITY AND HIGHER VISIBILITY This plan re-emphasizes the uniqueness of IIASA as an independent, international, interdisciplinary research institute and its worldwide leadership in systems analysis. By providing a focus on a few major global problems it sharpens the Institute's profile. It is important that research on global problems remain systems-oriented, that it involves integrated assessments, that it draws on the knowledge and techniques of the relevant disciplines, and that it uses advanced models for the analysis of dynamically coupled systems. IIASA will collaborate closely with high-quality science and policy institutions in its membership countries to help translate the global models and insights into policy-relevant information at the national level. It is also important that IIASA embarks on a communication campaign to extend the reach and recognition of its work.

DEMONSTRATING IIASA'S VALUE TO THE CURRENT AND FUTURE MEMBER ORGANIZATIONS

The Institute has been successful in recruiting new members from the emerging economies, which is necessary for its relevance and survival. This plan aims to better integrate new members into the Institute and demonstrate its value to all current and future members.

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. Documentation of these evolutionary changes could have provided a valuable early warning signal of the collapse of a fish stock such as the northern cod in the early 1990s.

The new members are particularly interested in capacity building and in selected global problems that are important to their nations. This strategic plan sees an increased role for capacity building at IIASA, primarily by increasing the scale of the Young Scientists Summer Program and Postdoctoral Program, as well as developing distance-learning and interactive capacity-building programs for all members. In addition, the plan foresees an important role for increased and strengthened collaborative arrangements between IIASA and national scientific and policy institutions.

While IIASA cannot study national problems in each member country, it can use global scenarios, models, databases, and analyses to guide NMO collaborators working on national problems. These collaborative activities will enhance IIASA's ability to demonstrate its value to all members and IIASA's future communications strategy will emphasize demonstrating this value.



2005

Disaster aid is often too little and too late. It also discourages governments and individuals from taking advantage of the high returns to preventive action. In a *Science* article, scholars from IIASA's Risk, Modeling and Society Program identified several innovative approaches to free vulnerable countries from dependence on unpredictable post-disaster assistance.

2007

IIASA scientists share the Nobel Peace Prize with authors of the IPCC reports 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." They follow in the footsteps of four Nobel Prize laureates who have worked at IIASA: Tjalling Koopmans and Leonid Kantorovich (Economics, 1975); Paul Crutzen (Chemistry, 1995); and Thomas Schelling (Economics, 2005).

Resources for IIASA's new strategy

Attracting and retaining top scientific talent along with increasing funding are vital for a successful implementation of this strategic plan. IIASA's research staff currently has a bi-modal age distribution and recruitment of mid-career scientists proves difficult. IIASA's recruitment policy should emphasize attracting the best minds in the world to work on the problems central to this strategic plan. They should initially be hired for short-term positions, but options should be provided for exceptional candidates to remain for longer periods of time, provided that they can attain leadership positions in their respective areas and retain a high level of scientific creativity and productivity. To achieve these goals, IIASA will develop a dynamic recruitment and human resources policy for the next decade.

At its inception, the Institute was funded almost exclusively from internal (NMO) contributions. In recent years, this profile has changed and now external funds are close to matching internal funds. Some research programs receive much more money from external funding compared to internal funding, as a large portion of the internal funds is used to support the overhead functions of the Institute. This has contributed to a sense of independence of the programs and created less incentive for collaboration among them. IIASA will develop a plan to establish the desired mix of internal and external funds and incentive mechanisms for programs to collaborate on the three major global problem areas identified in the "Focus" section (pages 10–12) of this plan.

Funding needs to be further increased in the future. This strategic plan requires a moderate increase in full time equivalent scientific staff and an increase in the financial and other resources for furthering research and its support functions. The Institute is currently operating on a very tight budget that would prohibit this growth unless new funds become available.

In order to increase the funding stream from NMOs, this plan foresees an initial moderate increase in National Members. Emphasis will be placed on attracting a mix of developed and developing countries (e.g., from Central and South America, Europe, Oceania). In addition, the plan includes a strong effort to create a third funding stream through the IIASA Endowment Fund and the engagement of alumni/ae and other private donors.

References

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2008

IIASA has its most successful year so far in terms of scientific publications. It published 109 journal articles according to the Thomson Web of Science in 2008 and IIASA research was cited over 2000 times.

2009

IIASA advises the United Nations Secretary-General, Ban Ki-moon, on energy and climate change as part of a regular series of briefings to provide system analytical input to the international organization.



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About IIASA

IIASA is an international, independent, and interdisciplinary research institution with thirty-seven years' experience in researching global change. IIASA is sponsored by its National Member Organizations (NMOs). On 1 June 2009 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)
- 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



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