



Activities with Member Countries

India

iiasa info sheet

Research collaborations between IIASA and India stretch back to the 1970s, but the relationship became far more productive after India became a national member of IIASA in 2007 through the Technology Information, Forecasting and Assessment Council (TIFAC). Multiple research collaborations with partners in India as diverse as the National Institute of Hydrology (NIH) and The Energy and Resources Institute (TERI) have brought new insights to the challenges that India faces. In particular, IIASA applied systems analysis has brought a global perspective, interdisciplinary research expertise, and policy relevance to issues ranging from the future of India’s energy system to increasing the country’s food production. Greater collaboration with IIASA has also brought Indian researchers into contact with the Institute’s global network of around 3,500 active researchers and 700 research partners. These often informal connections, along with the official projects of the India–IIASA program have resulted in over 250 joint publications since 2010. IIASA academic training programs have also been successfully building the next generation of systems analysts in India. This IIASA Info Sheet provides a summary of this growing and mutually beneficial relationship since 2010.

Highlights of Interactions Between IIASA and India (Since 2010)	
IIASA National Member Organization (NMO)	Technology Information, Forecasting and Assessment Council (TIFAC)
Membership start date	January 2007
Key research partners	59 organizations from India collaborate with IIASA including: <ul style="list-style-type: none"> ■ Centre for Water Resources Development and Management (CWRDM) ■ Department of Science and Technology (DST) ■ Indian Institute of Forest Management (IIFM) ■ Indian Institute of Management (IIM), Ahmedabad ■ Institute of Rural Management Anand (IRMA) ■ Institute for Social and Economic Change (ISEC) ■ Integrated Research and Action for Development (IRADe) ■ International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) ■ National Environmental Engineering Research Institute (NEERI) ■ National Institute of Hydrology (NIH) ■ National Institute for Transforming India (NITI) ■ The Energy and Resources Institute (TERI)
Areas of research collaboration	<ul style="list-style-type: none"> ■ Improving land, soil, and water management in India ■ India’s energy future ■ Smart ways to clean up India’s air ■ Energy and climate change modeling ■ Increasing India’s resilience to natural disasters ■ Projecting India’s future population ■ Managing India’s forests for the future
Capacity building (since 2007)	<ul style="list-style-type: none"> ■ 22 young scientists from India have participated in IIASA Young Scientists Summer Program ■ 1 in IIASA Postdoctoral Fellowship Program ■ 6 in the Southern African Young Scientists Summer Program ■ 16 training workshops for researchers and policymakers in India
Publication output	Over 250 publications have resulted from collaborations between IIASA and Indian nationals since 2010
Other interactions	<ul style="list-style-type: none"> ■ Over 140 Indian nationals have participated in IIASA events since 2010 ■ On average 6 Indian nationals have been employed by IIASA every year since 2010

Activities with Member Countries: India

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IIASA Info Sheets provide succinct summaries of IIASA activities. They do not necessarily reflect the views of IIASA staff, visitors, or National Member Organizations.

This Info Sheet summarizes IIASA interactions with India during 2010–2017; the research collaboration section covers 2010–2017. It includes highlights, with links to further information, but is not intended to be a comprehensive report on all interactions.

Feedback and updates are encouraged and should be sent to Kim Montgomery.

IIASA National Member Organization in India

In January 2007 India, through the Department of Science and Technology's Technology Information, Forecasting and Assessment Council (TIFAC) formally joined IIASA as a National Member Organization (NMO) and established the India–IIASA Programme to oversee research collaborations and capacity-building activities between the Indian research community and IIASA.

Professor Prabhat Ranjan, Executive Director of TIFAC, represents the Indian NMO on the IIASA Council, the governing body of the Institute. Professor Ranjan currently serves as Vice Chair of the IIASA Council.

TIFAC has established a national committee for the India–IIASA Programme which comprises the following members:

- Dr. Kirit Parikh (Chairman)** Former Member, Planning Commission; Chairman, Integrated Research and Action for Development (IRADe), New Delhi
- Professor A.K. Gosain** Department of Civil Engineering, Indian Institute of Technology (IIT), Delhi
- Dr. Devendra Pandey** Former Director General, Forest Survey of India (FSI), Delhi
- Professor Joyashree Roy** Department of Economics, Jadavpur University, Kolkata
- Dr. S.C. Sharma** OSD-Energy Division, Planning Commission, New Delhi
- Professor Leela Visaria** Gujarat Institute of Development Research, Ahmedabad
- Dr. Pramod K. Aggarwal** Regional Facilitator, Challenge Program on Climate Change, Agriculture, and Food Security, International Water Management Institute, New Delhi
- Professor B.K. Pattnaik** Director, Institute for Social and Economic Change, Bangalore
- Professor R. Sukumar** Centre for Ecological Sciences, Indian Institute of Science, Bangalore
- Dean, Faculty of Planning & Public Policy** CEPT University, Ahmedabad
- Mr. Soumitra Biswas** Adviser & Head, India–IIASA Programme, TIFAC, New Delhi
- Ms. Sangeeta Baksi** Director, India–IIASA Programme, TIFAC; NMO Secretary for India

TIFAC's membership of IIASA builds on collaborations between IIASA and India that started in the mid-1970s on food and energy research, including the development of a framework for agricultural policy and providing assessments of energy demand in India. Today, research collaborations focus on land, soil, and water management; pathways to sustainable energy systems; tackling air pollution; and disaster risk management, among others. In addition, its work with IIASA to build research capacity among Indian scientists has been highly productive.

Professor Kanchan Chopra, former Director of the Institute of Economic Growth in Gurgaon, was a member of IIASA Science Advisory Committee from 2007 until 2013.

Professor Joyeeta Gupta, of the Institute for Environmental Studies at the Free University Amsterdam, was a member of IIASA Science Advisory Committee from 2004 until 2010.

Dr. Sunita Narain, Director-General of the Center for Science and Environment in New Delhi, worked with IIASA on the Gulbenkian Think Tank on Water and the Future of Humanity.

Dr. Jyoti Parikh, Executive Director of Integrated Research and Action for Development (IRADe), has collaborated with IIASA in the areas of energy and development since she was an IIASA research scholar in the 1970s.

Dr. Kirit Parikh, Chairman of IRADe, built and led IIASA research programs in land use and agriculture from 1976 through 1986. He was IIASA Council Member for India from 2007 until 2013 and is now Chairman of the national committee for the India–IIASA Programme.

Dr. Leena Srivastava, Vice-Chancellor of TERI (The Energy and Resources Institute) University, was the Chair of IIASA Evaluation Committee on Energy and Technology in 2009.

India's Technology Information, Forecasting and Assessment Council (TIFAC) represents India and its scholarly community on IIASA governing Council



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Indian nationals with senior scientific roles at IIASA and other selected collaborators

Research Partners in India

IIASA has built links with India through recently working with 59 organizations in India via formal and informal connections

IIASA works with research funders, academic institutions, policymakers, and individual researchers in India. The following list includes the names of the organizations or the individual's affiliated institutions that have all recently collaborated with IIASA.

- Acharya N.G. Ranga Agricultural University
- All India Disaster Mitigation Institute (AIDMI)
- B.Borooah College
- Borlaug Institute for South Asia
- Centre for Study of Science, Technology and Policy (CSTEP)
- Centre for Policy Research (CPR)
- Centre for Water Resources Development and Management (CWRDM)
- Council of Scientific and Industrial Research (CSIR)
- Council on Energy, Environment and Water (CEEW)
- Department of Science and Technology (DST), Government of India
- Earthsafe Products and Services PVT. Ltd
- Gorakhpur Environmental Action Group (GEAG)
- Gujarat Institute of Development Research (GIDR)
- Guru Arjan Dev (GAD) Institute of Development Studies
- Himalayan Institute Hospital Trust University
- Indian Agricultural Research Institute (IARI)
- Indian Institute of Forest Management (IIFM)
- Indian Institute of Management (IIM)
- Indian Institute of Science (IISc)
- Indian Institute of Technology Bombay (IIT Bombay)
- Indian Institute of Technology Delhi (IIT Delhi)
- Indian Institute of Technology Kanpur (IIT Kanpur)
- Indian Institute of Technology Kharagpur (IIT Kharagpur)
- Indian Institute of Tropical Meteorology (IITM)
- Indira Gandhi Institute of Development Research
- InsPIRE Network for Environment
- Institute for Social and Economic Change (ISEC)
- Institute of Chemical Technology (ICT)
- Institute of Rural Management Anand (IRMA)
- Integrated Research and Action for Development (IRADe)
- International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
- International Institute for Population Sciences (IIPS)
- Invest India Economic Foundation
- Jadavpur University
- Lahmeyer International (India)
- Madras School of Economics (MSE)
- Ministry of Environment, Forest and Climate Change, Government of India
- Ministry of New and Renewable Energy, Government of India
- National Environmental Engineering Research Institute (NEERI)
- National Institute of Advanced Studies (NIAS)
- National Institute of Disaster Management (NIDM), Ministry of Home Affairs, Government of India
- National Institute of Hydrology (NIH), Roorkee
- National Institute of Industrial Engineering (NITIE)

- National Institute of Public Finance and Policy (NIPFP)
- National Institute of Science, Technology and Development Studies (NISTADS), Government of India
- National Institution for Transforming India (NITI), Government of India
- National Maritime Foundation
- National Thermal Power Corporation (NTPC)
- Public Systems Group, Indian Institute of Management
- Punjab Agricultural University
- Reliance Industries Limited
- Sardar Patel Institute of Economic and Social Research (SPIESR)
- Space Applications Centre (ISRO)
- Sri Ramachandra University
- Technology Information, Forecasting and Assessment Council (TIFAC)
- The Energy and Resources Institute (TERI)
- Vellore Institute of Technology
- Visva-Bharati University
- World Bank Group, New Delhi

IIASA work is underpinned by high-quality science, which is regularly published in high impact publications. A selection of current publications is presented here; the full list can be found in Appendix 4.

- Amann M, Purohit P, Bhanarkar AD, Bertok I, Borken-Kleefeld J, Cofala J, Heyes C, Kiesewetter G, Klimont Z, Liu J, Majumdar D, Nguyen B, Rafaj P, Rao PS, Sander R, Schopp W, Srivastava A, Vardhan BH (2017). Managing future air quality in megacities: A case study for Delhi. *Atmospheric Environment*, 161, 99-111.
- Asoka A, Gleeson T, Wada Y, Mishra V (2017). Relative contribution of monsoon precipitation and pumping to changes in groundwater storage in India. *Nature Geoscience*, 10(2), 109-117.
- O'Neill BC, Kriegler E, Riahi K, Ebi KL, Hallegatte S, Carter TR, Mathur R, van Vuuren DP (2014). A new scenario framework for climate change research: The concept of shared socioeconomic pathways. *Climatic Change* 122(3):387–400.
- Pachauri S (2014). Household electricity access a trivial contributor to CO₂ emissions growth in India. *Nature Climate Change* 4(12):1073–1076.
- Skirbekk V, James KS (2014). Abuse against elderly in India – The role of education. *BMC Public Health* 14(1):336.
- Sharma M, Chaturvedi V (2017). Long-term carbon dioxide and hydrofluorocarbon emissions from commercial space cooling and refrigeration in India: a detailed analysis within an integrated assessment modelling framework. *Climatic Change*, 143, 503-517.
- Sharma, U, Scolobig, A, Patt, A (2012). The effects of decentralization on the production and use of risk assessment: insights from landslide management in India and Italy. *Natural Hazards*, 64(2), 1357-1371.
- Dholakia HH, Purohit P, Rao S, Garg A (2013). Impact of current policies on future air quality and health outcomes in Delhi, India. *Atmospheric Environment* 75:241–248.
- Rao ND (2013). Distributional impacts of climate change mitigation in Indian electricity: The influence of governance. *Energy Policy* 61:1344–1356.

Selected publications resulting from IIASA–Indian collaborations

Recent Research Collaborations

Improving land, soil, and water management in India

IIASA researchers are collaborating with Indian institutions to identify smarter ways to manage India's land, soil, and water resources

South Asia—comprising Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka—has shown tremendous progress in the last four decades in food production and availability, yet a quarter of the world's hungry and 40% of the world's malnourished women and children live there. Further improving agricultural productivity is thus imperative, and a recent collaboration between IIASA and the International Crops Research Institute for the Semi-Arid Tropics in Hyderabad identified options for improving crop yields in the rain-fed systems of the semi-arid tropics.

Competition for land is also increasing. IIASA GLOBIOM model is helping CGIAR's Climate Change, Agriculture and Food Security (CCAFS) program to quantify competition for land between agriculture, bioenergy, and forestry in South Asia. CGIAR uses the resulting plausible and quantitative future scenarios to develop viable policies with decision makers in the region. A further study determined the trade-offs and synergies between ecosystem services and livestock grazing intensity on rangelands in West India. And a new study was launched in partnership with the Institute for Social and Economic Change (ISEC) on the *"Conservation of Agro-Biodiversity and Ecosystem Management: A Study in Indian Agroclimatic Sub-Zones."*

Additional stresses come from climate change; and quantitative analysis by IIASA risk team of farmer households in India revealed that access to crop insurance is crucial to increasing crop yields while adapting to climate change.

Declining soil fertility and deteriorating water quality and quantity also affect rural livelihoods. And improving land, soil, and water management are key to sustaining and improving rural livelihoods. Against this background, as part of the India-IIASA Program, TIFAC and IIASA are conducting the following collaborative cluster of projects to build an integrated decision support system that enables concurrent analyses of these multiple issues:

- "Climate Change Adaptive Behavior for Sustainable Livelihoods" in collaboration with the Institute of Rural Management Anand (IRMA). Researchers from IRMA visited IIASA in 2014 to develop the regional version of IIASA global agricultural model and the accompanying scenarios.
- "Modeling of Soil Nutrient Assessment Programme (SNAP): Developing a Decision Support System for Sustenance of Soil Fertility in Humid Tropics of Kerala" with the Centre for Water Resources Development and Management (CWRDM), Kozhikode. In 2015 researchers from CWRDM visited IIASA to further develop the decision support system.
- "Livelihood Issues for Sustainability of Water Management" with the National Institute of Hydrology (NIH), Roorkee.

Working with TIFAC, IIASA agricultural and water specialists have also trained Indian researchers in their methods. A workshop took place at the Madras School of Economics in 2010 on land use planning with a focus on agriculture, one in 2011 at NIH on integrated water resource management for India's water-scarce Bundelkhand region, another workshop was run in 2012 at IRMA on adapting rural livelihoods to climate change, and a fourth with the Gujarat Institute of Development Research (GIDR), in Ahmedabad in 2013 on changing land use in India and developing data base and research methods to plan for this. In addition the planning of IIASA new research area of food and water for 2011–2015 was greatly informed by a TIFAC and IIASA workshop in New Delhi in 2010.

Additional recent Indian-IIASA collaborations in this area include:

- An international research collaboration involving researchers from the Indian Institute of Technology and IIASA showed that changing monsoon patterns, which are tied to higher temperatures in the Indian Ocean, are an even greater driver of change in groundwater storage than the pumping of groundwater for agriculture. This research could potentially help to improve precipitation forecasts and aid in water resource planning. The study was published in *Nature Geoscience* in 2017.

- Research with the Indian Institute of Technology Kharagpur, investigated the sensitivity of the agro-ecosystem in the Ganges basin to variations in rainfall.
- A research collaboration with partners including the Acharya N.G. Ranga Agricultural University, analyzed the impact of new ways to manage water on the vulnerability of agriculture in India to climate change.

India's energy future

The Global Energy Assessment (GEA), published in 2012, defines a new global energy policy agenda—one that transforms the way society thinks about, uses, and delivers energy. Coordinated by IIASA and involving over 500 specialists from a range of disciplines, industry groups, and policy areas, GEA research aims to facilitate equitable and sustainable energy services for all, in particular for around three billion people who currently lack access to clean, modern energy.

Indian researchers played key roles in the GEA, including its Co-Chair (Professor Anand Patwardhan, who was at the Indian Institute of Technology, Bombay at the time), four Convening Lead Analysts, and several Lead Analysts. Various GEA events also took place in India, including stakeholder consultations and presentations of the report's findings at the Clean Energy Ministerial meeting in New Delhi in 2013.

IIASA produced a synthesis report of the GEA's insights into providing access to modern forms of energy to the 1.4 billion today that still live without access to any electricity and the 3 billion who still depend on solid fuels such as unprocessed biomass, coal, or charcoal for cooking and space heating. The report had a focus on India and was part of an outreach workshop for policymakers in New Delhi in 2012 about global energy transformation pathways and policy tools organized with UNIDO, the Global Environment Facility (GEF), and The Energy and Resources Institute (TERI). IIASA's energy experts continue to explore the issues that link household energy use to poverty and climate change. Specific attention has been paid to analyzing policies in India to promote universal access to clean and affordable energy services.

India was a significant partner in and contributor to the Global Energy Assessment (GEA). Subsequently, the GEA's results have been extended to help provide a future global energy vision for India and identify policies to achieve universal access to clean, modern energy

Through intense data gathering, computer modeling, and other advanced research methods, IIASA provides a country's researchers and their policymakers with the essential numbers and tools to select the most effective policies. For example:

- The air pollutant, fine particulate matter (PM_{2.5}), can travel far down into the lungs contributing to illnesses such as cardiovascular diseases, asthma, and lung cancer. Current levels of PM_{2.5} in most of India exceed the World Health Organization guideline of 10µg/m³ by more than a factor of four. And if the level of consumption of energy in India grows as expected, without additional air pollution controls, concentrations of PM_{2.5} in many parts of India will more than triple by 2030. However, if India implements advanced air pollution measures by 2030, life expectancy would increase by 2.8 years, and 2.5 million premature deaths per year would be saved. The costs of these new measures would also pay for themselves through the resulting health improvements which reduce lost work days and increase productivity. *Source: IIASA GAINS model. Research published in: Sanderson W, Striessnig E, Schoepp W, Amann M (2013). Effects on wellbeing of investing in cleaner air in India. *Environmental Science and Technology* 47:13222–13229.*

Many of the research projects summarized in this Info Sheet draw on analyses from IIASA models, tools, and data including:

1. Planning a sustainable energy system (MESSAGE model, Global Energy Assessment Scenario Database);
2. Reducing energy poverty (Energy Access Interactive Tool [ENACT]);
3. Improving food security through identifying yield gaps (GAEZ model) and assessing competition for land use between agriculture, bioenergy, and forestry (GLOBIOM model);
4. Financial disaster risk management (CATSIM model); and
5. Projecting future population (Demographic multistate modeling).

IIASA models, tools, and data

The GEA examined some 40 future pathways to reach a future energy system that is sustainable, secure, and accessible to all. These energy scenarios were explored from India's perspective in collaboration with Integrated Research and Action for Development (IRADe), New Delhi, and sponsored by TIFAC. The project has helped provide a future global energy vision for India till 2050 and identify the energy transitions needed for sustainable development, including combating climate change.

Outcomes from the GEA include the adoption of GEA's findings as the three key objectives of the UN Secretary-General Sustainable Energy for All (SE4ALL) initiative on energy access, energy efficiency, and renewable energy, which in turn have informed the targets of the Sustainable Development Goal on energy. IIASA and TERI are two of the leading institutions responsible for building up a global research and knowledge network for SE4ALL.

Subsequent IIASA studies have:

- analyzed the impact of growing household electricity access in India on the country's CO₂ emissions growth;
- developed a multidimensional Sustainable Energy Security (SES) index of the energy demand sub-system for India;
- assessed the potential of concentrating solar power projects in northwest regions of India;
- developed a new method to evaluate the status and progress of rural household energy sustainability in India;
- investigated how increasing the tax on coal would help develop renewable energy in India; and
- explored the potential, the costs, and the sustainability of second-generation biofuels in India.

IIASA global contributions

Many of today's most pressing challenges extend beyond international borders. IIASA research areas such as climate change, water scarcity, and poverty are affected by multiple factors across the globe. In turn, these global problems have impacts on nations, regions, and continents. Finding long-lasting solutions to these challenges requires scientific expertise that is free from the interests of a single nation. IIASA National Member Organizations recognize this need and their investment in IIASA is a contribution to a global public good. The benefit of this contribution is paid back to global researchers, policy makers, and citizens in multiple ways, as the following examples show:

- IIASA supports the climate change research community by hosting the Representative Concentration Pathways (RCP) database. The database provides data on greenhouse gas emissions for four different future scenarios that underpin the analysis of thousands of climate change researchers. IIASA also calculated the data for one of the scenarios, all of which have been developed for the world's most comprehensive analysis of climate change—the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report.
- IIASA research provides scientific guidance to the Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe. This international environmental treaty between 33 countries has slashed air pollution in Europe, improving people's health and countries' crop production. IIASA GAINS model guided negotiators and policy makers as they worked on the treaty to identify the most cost-effective approach to cleaning Europe's air. The negotiators chose the GAINS model not only because of its accuracy and usability but also because it had been developed by an international team with funding from multiple countries, which assured them that the model was nationally unbiased.

Smart ways to clean up India's air

Current economic growth will intensify air quality problems in India unless current pollution control laws are significantly upgraded. By selecting a smart mix of measures to simultaneously cut air pollution and greenhouse gas emissions, countries can further reduce air pollution control costs in addition to cutting greenhouse gas emissions.

IIASA GAINS model is a scientific tool that has been helping policymakers and researchers across the globe to select a smart mix of measures to simultaneously cut multiple air pollutants and greenhouse gas emissions. Experience from Europe, whose policy makers use GAINS, show this multiple pollutant approach is the most cost-effective.

IIASA has worked closely with The Energy and Resources Institute (TERI) in Delhi and other international partners to implement the GAINS model for Asia and for India. These versions of GAINS have underpinned various studies, including (1) an analysis of the effect of investments in clean air on human wellbeing in India (see box, *below*: IIASA models, tools, and data); (2) how to improve ozone in South Asia; and (3) the first estimates of anthropogenic VOC (volatile organic compound) emissions in India.

With other partners the GAINS model was also used to:

- conduct an integrated analysis of the air quality regulations across different sectors for Delhi; investigate climate-aerosol interactions in India;
- study how to control nitrous oxide emissions in a recent collaboration with the Indian Agricultural Research Institute among other partners; and
- assist Indian policy makers to design and implement practical policy interventions that lead to a phase-down in the consumption and production of hydrofluorocarbons (HFCs) with high global warming potential in cooperation with the Council on Energy, Environment and Water (CEEW) in New Delhi and supported by the ClimateWorks Foundation.

Training in GAINS has built capacity among researchers and policymakers in India to use the model to identify the costs and benefits of multiple measures to help clean up India's air. With support from TIFAC, workshops took place in Pune (2010), Ahmedabad (2011), and Nagpur (2012) with a significant number of policy leaders from India attending (e.g., Member of the Planning Commission and Adviser to the Prime Minister on National Strategic Knowledge Mission on Climate Change; the former Secretary of India Central Pollution Control Board of the Ministry of Environment and Forestry).

Other recent Indian-IIASA collaborations in this area include the following:

- Researchers from IIASA have collaborated with researchers at the National Environment Engineering Research Institute (NEERI) to develop a GAINS-City model for Delhi. The research study found that only about 40% of PM_{2.5} that the average inhabitant of Delhi is exposed to originates from within the city. Instead, the majority (60%) comes from outside Delhi with half from the surrounding states of Haryana and Uttar Pradesh, a quarter from sources even further away including neighboring regions, and a quarter from natural sources. This research demonstrates that to address Delhi's air quality problems, authorities need to target a variety of sources both inside and outside city limits. The research was published in *Atmospheric Environment* in 2017.
- An international collaboration with researchers from the Council on Energy, Environment and Water and IIASA modeled the energy consumption and the emissions from space cooling and refrigeration applications from the commercial building sector in India. The researchers found that the total greenhouse gas emissions from space cooling and refrigeration from commercial buildings likely will increase significantly over time and direct hydrofluorocarbons could be 40%. The study was published in *Climatic Change* in 2017.
- Joint research with the Indian Institute of Management (IIM) in Ahmedabad and the Indian Institute of Technology in Kanpur (IITK) explored the potential for improving energy efficiency in industry in India and the impact such measures would have on future emissions of carbon dioxide and air pollutants.

Energy and climate change modeling

A collaboration between IIASA and the Indian Institute of Management in Ahmedabad is advancing energy and climate change modeling and better articulating the role of Asia and India in these studies

In 2010 Asia accounted for 60% of the global population, 39% of Gross World Product, 44% of global energy consumption, and nearly half of the world's energy system carbon dioxide emissions. Thus, Asia is an important region to consider in any discussion of climate change or climate change mitigation. IIASA worked with the Indian Institute of Management (IIM), Ahmedabad, and other partners to better articulate the role of Asia in mitigating climate change by comparing the results of 23 energy–economy and integrated assessment models. A journal special issue and a scenario database document the results of this study.

IIASA also collaborates with researchers from IIM in the:

- Energy Modeling Forum to learn from state-of-the-art developments in Integrated Assessment Modeling;
- EU funded project, LIMITS, on the co-benefits of climate policy for air pollution, energy security, and economic growth; and
- EU funded project, AMPERE, to explore climate change mitigation pathways.

IIASA has also collaborated with TERI among other partners to develop the Shared Socioeconomic Pathways (SSPs)—part of a new framework of scenarios that the climate change research community has adopted to facilitate the integrated analysis of future climate impacts, vulnerabilities, adaptation, and mitigation.

In 2015 climate change experts from IIASA and the Center for Policy Research (CPR) in Delhi started to ascertain India's future greenhouse gas emissions scenarios and climate mitigation impacts to help inform the Indian discussion over the country's contribution to a global agreement on climate that many hope will be negotiated at the UN Climate Change Conference in Paris in 2015.

Increasing India's resilience to natural disasters

IIASA risk and vulnerability team and a variety of Indian research collaborators have evaluated the risks posed to India by natural disasters including financial vulnerability to extreme weather events

India ranked the third worst affected country by natural disasters in the last two decades and is at risk for natural disasters, including cyclones, droughts, earthquakes, floods, landslides, and tsunamis. IIASA risk experts analyze how to increase resilience against a range of hazards.

An international research collaboration between the Indian Institute of Technology and IIASA compared India and Italy and their responses to landslide risk to evaluate whether a decentralized risk assessment system would lead to better outcomes. The researchers found a causal relationship between decentralization and outcomes such as decentralization leading to a more rapid and more complete assessment of risks in local places and decentralization fostering greater and more transparent communication of risk assessment tools, like maps. The study suggests that decentralized risk systems have greater potential for better landslide management outcomes. The research was published in *Natural Hazards* in 2012.

Additional studies have assessed ways to improve proactive disaster risk management through

- retrofitting buildings against disaster risk;
- an empirical assessment of how well disaster micro-insurance has helped farmers to emerge from poverty traps following droughts, floods, and other extreme weather events;
- exploring how well poor households in Uttar Pradesh have rebuilt their lives since the devastating 1998 floods; and
- a case study of how Odisha dramatically reduced the impact of a 2013 tropical cyclone compared with a similar storm in 1999 through a range of risk reduction measures.

Indian research partners on these projects have included the All India Disaster Mitigation Institute, Gujarat; the InsPIRE Network for Environment, New Delhi; National Institute of Disaster Management (Ministry of Home Affairs, Government of India); and Gorakhpur Environmental Action Group. In addition, IIASA has collaborated with TIFAC to organize a conference in New Delhi, which took place in October 2015 on Integrated Disaster Risk Reduction: Challenges and Opportunities for Sustainable Growth. The above projects and conference have also brought in other IIASA research partners including

the UK Department for International Development (DFID), The World Bank, and the United Nations Environment Programme (UNEP).

Key research findings include the most effective way to increase the resilience of poor households to extreme weather events is an integrated strategy that combines micro-insurance with physical adaptation measures.

Projecting India's future population

IIASA demographers study and project the changing composition of population for all countries of the world. They produce one of the few independent alternatives to the demographic projections of the UN Population Division. As a testament to the quality of IIASA demography, the IPCC in 2011 adopted IIASA population projections as its source data in all modeling for the Fifth Assessment Report; and UNESCO has adopted IIASA demographic methods as part of its literacy forecasting.

The Institute's interdisciplinary setting has encouraged its demographers to research beyond the traditional boundaries of demography and to explore how changes in society, economy, and the natural environment influence the health and mortality, migratory patterns, and reproductive behavior of human society.

A recent innovative example of this broader approach has been the development of research methods to project population by level of education. This equips researchers with the tools to explore the implications of different education policies on a country's future fertility, life expectancy, migration, and population level as well as economic growth and ability to adapt to climate change. In 2014 IIASA published the first projections of educational attainment by age and sex for 195 countries in the *Oxford University Press* volume *World Population and Human Capital in the Twenty-First Century*. Findings for India show how different policies over the next few decades could lead to the country's 2010 population of 1.22 billion could lead to a population of between 1.5 billion and 2.1 billion by the end of the century. Additionally, in 2016, *Who Survives? Education Decides the Future of Humanity*, a book summarizing scientific research conducted at IIASA was published detailing the importance of education for societal and economic development. The researchers found that education is often more important than income when looking at health, resilience, and wellbeing.

Business can benefit from science through the analysis and knowledge it provides. In turn, science can benefit from business through its experience on the ground and in implementation. IIASA also recognizes that closer collaboration between business and its researchers can increase the impact of the Institute's work. Not surprisingly, IIASA is seeing a growing number of contracts with commercial partners, including:

- The global insurer, **Zurich Insurance Group**, began working with IIASA in 2013 to identify and address research gaps on flood resilience and community based disaster risk reduction, demonstrate the benefits of pre-event risk reduction over post-event disaster relief and to improve public dialogue around disaster resilience.
- The German carmaker, **Daimler AG**, has collaborated with IIASA researchers to assess biofuel potential from marginal and degraded lands in India and Brazil.
- The Brazilian energy company, Petrolero Brasileiro, was one of 19 sponsors of IIASA Global Energy Assessment.
- The research institute of the Japanese carmaker, **Toyota**, has an ongoing collaboration with IIASA to research measures to reduce ozone emissions in Asia.
- The multinational consumer goods company, **Unilever**, funded IIASA agricultural experts from 2008–2010 to analyze yields and land suitability of key agricultural crops under a changing climate.

In addition, IIASA is exploring ways that it can work more closely with multinational corporations, particularly through input to the development of their global sustainable business plans.

IIASA working with business

Demographers from IIASA extended these analyses by projecting the population of Indian States by not only age, gender, and level of educational attainment, but also by rural or urban residence. This research is part of a larger project to create a common platform of concepts and data to represent human social and economic heterogeneity in IIASA models.

IIASA and TIFAC organized two workshops in 2010 to train Indian researchers in IIASA probabilistic population projection methodology. The first seminar in Mumbai was in collaboration with India's International Institute for Population Sciences. The second was in Bangalore with the Institute for Social and Economic Change (ISEC), whose Head of Population Research, K.S. James, is a long-term collaborator and regular visitor to IIASA. Additionally, in 2014 IIASA demographers in collaboration with ISEC and TIFAC organized an eight-day training workshop on demographic computations, in particular on multistate population projection models for demographic analysis in Excel and R in Bangalore.

Other recent demographic studies related to India include:

- A joint study with ISEC explored the role of education on the prevalence of abuse against the elderly in India;
- An investigation with the International Institute for Population Studies into the influence of older generation's fertility behaviors on daughter's desired family size in Bihar;
- An analysis of the impact of Buddhism on childbearing;
- IIASA demographers are also researching the consequences of climate change on future human societies and examining the ability of those societies to cope with the coming changes in a major five-year study. The study, funded by the European Research Council, will inform policymakers of options available for climate adaptation and includes a case study on the adaptive capacity of India's Nicobar Islands; and
- Recent research with collaborators in the Indian Institute of Technology in Delhi on the coastal zones of India has explored if education plays an important role in improving local people's response to cyclone warnings.

Research to support science diplomacy

IIASA was established in 1972 to use scientific cooperation to build bridges across the Cold War divide and research growing global problems on a truly international scale. Today the soft power of science diplomacy continues to help IIASA member countries through using scientific cooperation to improve international relations, and through international teams jointly researching controversial issues to find consensus such as through integrative assessments of the future for the Arctic or of the economic integration of Eurasia.

In addition, IIASA also maintains its original bridge-building objective through attracting member countries that represent a range of geo-political interests (see full list of IIASA members, back page). For instance, both Russia and the US are members, as are Brazil, China, India, and South Africa. Several key factors also unite all IIASA member countries: their interest in systems analysis, scientific and academic infrastructure, economic stability, and the geopolitical role in future global transitions. With this in mind, IIASA recently negotiated membership with Iran and is also negotiating membership with Israel.

Managing India's forests for the future

From 2007 to 2009, IIASA forest researchers and collaborators in India, including TIFAC, conducted an in-depth analysis of Indian forests. It identified the key issues facing the forest sector and the policies to help it develop sustainability and meet future national needs. IIASA subsequently built on this research, in collaboration with the Indian Institute of Forest Management (IIFM) in Bhopal, to analyze forest carbon accounts for sustainable policy options as part of the India-IIASA Programme. The project focused on the implications for managing forest resources in Himachal Pradesh and Sikkim. It also had a capacity-building aspect with:

- a training workshop on ecological modeling—with special reference to the forest sector—at IIFM in 2010; and
- three Indian researchers spending several months in 2011 working with IIASA researchers to apply IIASA models and build national versions.

A further five-day workshop, in partnership with TIFAC and Jadavpur University, on "Accounting for Ecosystem Services: Theory and Practice" took place in May 2014.

Other policy input

In addition to the interactions with policymakers as part of the research projects already mentioned in this Info Sheet, IIASA worked with the Ministry of New and Renewable Energy, Government of India. IIASA researchers provided technical assistance to the Small Hydro Power Program of the ministry on the subsidy structure for small hydro power projects (< 5MW) in northeastern states of India.

While in Venice in 2012, IIASA experts advised chief climate negotiators and key modeling teams of the EU, USA, China, and India on the strengths and weaknesses of current greenhouse gas mitigation models.

Forest researchers from India and IIASA analyzed ways to develop India's forests sustainably, thereby ensuring the forests would meet future national needs

IIASA has advised India's Ministry of New and Renewable Energy and its chief climate negotiators

Capacity Building

Young Scientists Summer Program

Since 2010, 22 Indian students have developed research skills and networks by taking part in IIASA Young Scientists Summer Program

IIASA Young Scientists Summer Program (YSSP) develops the research skills and networks of talented PhD students. Program participants conduct independent research within the Institute's research programs under the guidance of IIASA scientific staff. Funding is provided through IIASA National Member Organizations. Since 2010, the following 22 Indian students have participated in this program:

YSSP'17

Nemi Vora, an Indian national studying for her PhD in the USA at the University of Pittsburgh, carried out research to better understand the US Food-Energy-Water nexus through quantifying opportunities and interventions in food trade networks. (Funded the Ferrero-IIASA YSSP Fellowship)

YSSP'16

Sudhanya Banerjee, working with the IIASA Ecosystems and Services and Management Program (ESM), he evaluated the biological use and geological sequestration of CO₂. Sudhanya, an Indian national was a PhD graduate student at the Department of Bioproducts and Biosystems Engineering at the University of Minnesota – Twin Cities, USA, when he took part in the YSSP. (Funded by IIASA)

Pooja Rathore, investigated the roles of functional traits and eco-evolutionary dynamics in determining forest-biodiversity processes and patterns. She was studying for her PhD at the Forestry and Ecology Department at the Indian Institute of Remote Sensing, Indian Space Research Organization, Dehradun, India when she took part in the YSSP. (Funded by Indian NMO, TIFAC)

Ankita Shukla, used comparative risk assessment methods to calculate the mortality effects of environmental risk factors in India. She was pursuing her PhD at the International Institute for Population Sciences (IIPS), Mumbai, when she took part in the YSSP. (Funded by Indian NMO, TIFAC)

Selected presentations in or on India by IIASA researchers

Narasimha Rao on "How Much Energy do Indians 'Need'?" at the Conference on Conservation Science and Sustainable Development in New Delhi (2017).

Keywan Riahi on "Climate-Water-Energy-Food Nexus" at the World Sustainable Development Summit in New Delhi (2016).

Joanne Linnerooth-Bayer at the IDRiM 2015 Conference "Disaster Risk Reduction: Challenges and Opportunities for Sustainable Growth" in New Delhi (2015).

Pavel Kabat on "Re-thinking Development" and **Nebojsa Nakicenovic** on "The Energy, Water, Food Triangle" at 14th Delhi Sustainable Development Summit in New Delhi (2014).

Shonali Pachauri on "GEA Scenarios for Universal Access" at a side event to the 4th Clean Energy Ministerial meeting in New Delhi (2013).

Günther Fischer on "Multi-scale Approaches for Global and National Climate Change Adaptation" at the TIFAC-IIASA-IRMA International workshop on Adapting Rural Livelihoods to Climate Change in Anand (2012).

Florian Kraxner on "REDD-PAC and Biodiversity" at COP11 of the United Nations Convention on Biological Diversity in Hyderabad (2012).

Fabian Wagner and **Pallav Purohit** on "Regional Air Pollution and Greenhouse Gas Mitigation" at the Center for Environmental Planning and Technology (CEPT), Ahmedabad and on "Economic Development and Atmospheric Pollution" at NEERI, Nagpur (2012).

Hannes Böttcher, **Oskar Franklin**, and **Anatoly Shvidenko** on "Ecological Modelling" at the Indian Institute of Forest Management in Bhopal (2010).

Selvamani Yesuvadian, investigated measuring the aging speed based on observed characteristics, in order to better understand the aging speed in developing countries. The study used physiological markers of aging such as grip strength, cognitive ability, functional ability and lung function to examine the aging speed in selected countries. While participating in the YSSP, Selvamani was also a second year PhD scholar at the International Institute for Population Sciences (IIPS) in Mumbai. (Funded by Indian NMO, TIFAC)

YSSP'15

Kakoli Borkotoky, researched the nutrition transition, the nutritional status of children and the demand for food in India. Kakoli holds a bachelors and master's degree in Statistics from the Dibrugarh Univeristy in Assam, India and she was enrolled in the PhD program at the International Institute for Population Sciences (IIPS), while at IIASA. (Funded by Indian NMO, TIFAC)

Jaideep Joshi, investigated whether in spatially heterogeneous environments, the tragedy of the commons can be averted when harvesting rates and dispersal rates coevolve. During his time at IIASA, Jaideep was also a third year PhD student at the Indian Institute of Science in Bengaluru. (Funded by Indian NMO, TIFAC)

Dolly Kumari, studied the role of social cohesion in the life satisfaction and happiness of the elderly, controlling for demographic and socioeconomic characteristics in urban areas, in order to examine the role of the informal care giver as a mediating factor in life satisfaction. She was also in her third year as a PhD candidate at the International Institute for Population Sciences (IIPS), Mumbai, during her time participating in the YSSP. (Funded by Indian NMO, TIFAC)

Devyani Singh, researched uncertainties in carbon emissions and the impact of biomass renewability, by analyzing the impact of non-Kyoto emissions and of the differences in biomass harvesting on household carbon emissions within India. An Indian national, when participating in the YSSP, Devyani was also studying her PhD in the Faculty of Forestry at the University of British Columbia, Canada. (Funded by IIASA)

YSSP'14

Abhishek Kumar, investigated the influence of older generations' fertility and fertility preferences on the family size preferences of younger generations rural Bihar. He was studying for his PhD at the International Institute for Population Sciences when he took part in the YSSP. (Funded by Indian NMO, TIFAC)

Niharika Tripathi, from the International Institute for Population Sciences explored preferred life-expectancy and its correlations among elderly women in Uttar Pradesh. (Funded by Indian NMO, TIFAC)

YSSP'13

Kalai Ramea Kubendran, researched with the IIASA energy team to bring consumer behavior into one of the team's models that explores vehicle technology decisions (the MESSAGE-Transport model). During her time at IIASA, she was an Indian national studying for his PhD in the USA at the University of California, Davis (Funded by USA NMO, the National Academy of Sciences).

Praveen Kumar Pathak, empirically explored the role of social networks in shaping fertility behavior of woman in rural India under the guidance of IIASA demographers. Pathak is a PhD candidate at the International Institute for Population Sciences in Mumbai. (Co-funded by Indian NMO, TIFAC, and IIASA)

YSSP'12

Hem Dholakia, was studying for his PhD at the Indian Institute of Management, Ahmedabad when he joined IIASA's air pollution experts to evaluate how air pollution policies in Delhi and Mumbai will shape future air quality and health impacts in the city. (Funded by Indian NMO, TIFAC)

Anubhab Pattanayak, worked with IIASA risk and vulnerability researchers to characterize the sensitivity of Indian farmers' incomes to climate change. At this time, Pattanayak was a PhD student at the Madras School of Economics. (Co-funded by Indian NMO, TIFAC, and IIASA)

Angan Sengupta, came from the Institute for Social and Economic Change in Bangalore, India, to take part in the YSSP. Under the guidance of IIASA demographers, he explored how education policies will impact India's future population and whether a demographic dividend would emerge. (Co funded by Indian NMO, TIFAC, and IIASA)

YSSP'11

Pallavi Marrapu, was studying at the University of Iowa when she participated in the YSSP. She worked with the IIASA GAINS team to analyze the impacts of pollutant emissions on air quality and radiative forcing in South Asia. (Funded by USA NMO, the National Academy of Sciences)

Kapil Narula, explored extending the modeling of decentralized, renewable-energy generation to include off-grid renewable energy options under the guidance of IIASA energy experts. He was studying for his PhD at the Indira Gandhi Institute of Development Research in Mumbai at this time. (Funded by Indian NMO, TIFAC)

Architesh Panda, was from the Institute for Social and Economic Change at the Centre for Ecological Economics and Natural Resources (CEENR) in Bangalore. Under the guidance of IIASA risk and vulnerability researchers, Panda explored the vulnerability of farm households in western Orissa, India to climate variability and their adaptive capacity. (Co-funded by Indian NMO, TIFAC, and IIASA)

Thiagu Ranganathan, evaluated marketing strategies for farmers facing systemic yield risk, input credit repayment and liquidity constraints in the Dewas district of Madhya Pradesh under the mentorship of IIASA risk and vulnerability researchers. He was also studying his PhD at the Indian Institute of Technology, Bombay. (Co-funded by Indian NMO, TIFAC, and IIASA)

YSSP'10

Sarthak Gaurav, while studying for her PhD at the Indira Gandhi Institute of Development Research, Mumbai, conducted an analysis of the risk and vulnerability of water-stressed farm households in Vidarbha Region of India—an area that has witnessed a high incidence of farmer suicides in recent years. (Co-funded by Indian NMO, TIFAC, and IIASA)

Quick facts on IIASA interactions with India

- Over 140 Indian nationals have participated in IIASA events since 2010.
- Over 250 publications have resulted from collaborations between IIASA and Indian nationals since 2010.
- On average 6 Indian nationals have been employed by IIASA every year since 2010.
- Since 2010, 22 Indian nationals have gained international and interdisciplinary research experience from participating in IIASA Young Scientists Summer Program, 6 took part in the Southern African Young Scientists Summer Program, and 1 was a IIASA Postdoctoral Fellow.
- Over 70 researchers, advisors, and diplomats from India have visited IIASA since 2010, while IIASA scientists have visited India over 90 times.

Appendices

The details behind the above facts can be found in the following appendices to this Info Sheet. The appendices are either attached or available on request from Tom Danaher (danaher@iiasa.ac.at):

1. Indian visitors to IIASA (2010–2017)
2. Conference participants from India to IIASA (2010–2017)
3. Travel by IIASA scientists to India (2010–2017)
4. Publications relevant to Indian–IIASA collaborations (2010–2017)

Preeti Preeti, conducted an analysis of future longevity increases in India and its major states with the objective of improving longevity forecasting in India. At the time, he was at the International Institute for Population Sciences, Mumbai. (Co-funded by Indian NMO, TIFAC, and IIASA)

Regional Young Scientists Summer Program

In 2012 IIASA launched its first regional YSSP—the Southern African Young Scientists Summer Program (SA-YSSP), organized jointly by the South African National Research Foundation, the South African Department of Science and Technology, the University of the Free State in Bloemfontein, South Africa, and IIASA. The following Indian nationals have participated in the program:

Six Indians have taken part in the regional Young Scientists Summer Program in South Africa

Arnab Banerjee (SA-YSSP'14/15, Visva-Bharati University) developed a model to study the variation of certain physico-chemical factors and plants on the dynamics of a reservoir.

Shelly Bogra (SA-YSSP'14/15, TERI University) studied the physical, economic and policy implications of the Indian water-energy-material nexus.

Joyita Mukherjee (SA-YSSP'12/13, Visva-Bharati University) analyzed measures of robustness in aquatic ecosystems.

Mayank Prakash (SA-YSSP'14/15, International Institute for Population Science) explored water-sanitation-hygiene-related morbidity and its socioeconomic impact on the slum dwellers of Mumbai.

Tejas Rawal (SA-YSSP'14/15, Indian Institute of Technology, Roorkee) researched how to plan a sustainable transportation system in Kanyakumari District, Tamil Nadu.

Fatima Sumbul (SA-YSSP'13/14, Aligarh Muslim University) explored governance in water management during the SA-YSSP.

Postdoctoral Program

Postdoctoral researchers at IIASA work in a rich international scientific environment alongside scientists from many different countries and disciplines. The Institute's research community helps its postdoctoral researchers to develop their research from fresh angles, to publish widely in journal articles, and to establish their own global network of collaborators. One postdoctoral fellow from India has participated in the program since 2010:

One postdoctoral fellow from India has participated in the IIASA Postdoctoral Program since 2010

Upasna Sharma (2009–2011) researched issues related to the communication of uncertainty associated with climate forecasts and climate hazard warnings, particularly, how the target audience of these forecasts and warnings interpret, understand, and respond to uncertainty. Collaboration on micro-insurance in India between IIASA and Sharma has followed since she returned to India where she is now researching at the Indian Institute of Technology in Delhi. (PhD in public policy and climate change [2009] from the School of Management at the Indian Institute of Technology, Bombay)

Other capacity-building activities

Apart from the other training workshops mentioned elsewhere in this Info Sheet, IIASA and TIFAC have also organized workshops on:

- Disaster risk reduction at the Sardar Patel Institute of Economic and Social Research (SPIESR) in Ahmedabad (2011)
- Indian perspectives on global energy scenarios (2011)
- Indian participants in the Young Scientists Summer Program at TIFAC (2013)

IIASA and TIFAC have held 16 training workshops for Indian researchers and policymakers in India since 2010

Prospects for Future IIASA–Indian Activities

Enhancing the IIASA–Indian relationship offers benefits for Indian research, government policy, and international relations

This Info Sheet summarizes recent research collaborations and capacity building activities between IIASA and India. Significant potential remains to further intensify the IIASA–India relationship through developing a range of new joint activities including:

Enhancing Indian expertise in applying system analysis to national problems

Developing bespoke Indian versions of IIASA global models would allow researchers and policymakers to look at complex global problems and their impact on India in a holistic and integrated way. For example, IIASA has been developing a national version of the IIASA GAINS model for India, which will identify cost-effective measures to improve air quality and reduce greenhouse gas emissions in India.

Conducting international assessments in areas of Indian strategic interest Indian researchers contributed to IIASA Global Energy Assessment which brought together over 500 specialists to transform the way society thinks about, uses, and delivers energy. At the request of its member countries, IIASA is currently embarking on several new assessments, whose focus will be on issues of strategic interest also to India, including global water challenges and tropic forests. In addition, IIASA is exploring the development of a quantitative foresight capability for Asia to explore future resource security (materials, energy, land, and water) for nations in the region.

Academic training opportunities for young Indian scientists Numerous doctoral students have developed research skills in systems analysis by participating in the Young Scientists Summer Program and the Southern African version (see page 14: Capacity Building). There is potential to further enhance participation by young Indian scientists by, for example, becoming a partner in IIASA forthcoming International School of Excellence.

New partnerships between IIASA and Indian institutions to win grants from international research funders IIASA high-quality research and international research network makes it highly competitive in its applications for international research funds. Between 2010 and 2015, this additional funding reached €51 million. This was part of a total funding portfolio of €250 million, the total awarded to external projects featuring collaborations between IIASA and member countries. For example, researchers from IIASA, the Indian Institute of Technology Bombay and Winrock International India worked jointly on the Risk to Resilience project funded by the UK's Department for International Development, which shows the potential for Indian researchers to collaborate with IIASA to access funds from third parties.

Using international scientific cooperation to support diplomacy IIASA was established in 1972 to use scientific cooperation to build bridges across the Cold War divide and research growing global problems on a truly international scale. Today the soft power of science diplomacy continues to help IIASA member countries through using scientific cooperation to improve international relations, and through international teams jointly researching controversial issues to find consensus, free from the constraints of national self-interest (see box, page 12: Research to support science diplomacy). IIASA recently launched a new global project to evaluate issues arising at the nexus of food, water, energy, and climate change.

About IIASA

Founded in 1972, the International Institute for Applied Systems Analysis (IIASA) conducts policy-oriented research into problems of a global nature that are too large or too complex to be solved by a single country or academic discipline. IIASA research is across and at the intersection of natural, human, social, knowledge and technology systems to support the development of integrated solutions to global sustainability challenges.

IIASA is at the center of a global research network of around 3,500 scholars and over 700 partner institutions in over 65 countries. It is funded and supported by its National Member Organizations which represent the scholarly community in the following countries:

Australia, Austria, Brazil, China, Egypt, Finland, Germany, India, Indonesia, Iran, Malaysia, Japan, Netherlands, Norway, Pakistan (Observer), Republic of Korea, Russia, South Africa, Sweden, Ukraine, United Kingdom, United States of America, Vietnam.

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