Malaysia officially became a member of IIASA in 2011 through the Academy of Sciences of Malaysia. Since joining IIASA, Malaysian researchers have started collaborating with IIASA researchers on projects focused on understanding and improving air quality, sustainable land management, the changing energy landscape, and projecting demographics in Malaysia.

Beyond continuing these new research collaborations, there is significant opportunity to grow the relationship between IIASA and Malaysia’s scholarly community. Opportunities for additional collaborations include developing bespoke Malaysian version of IIASA global models, conducting international assessments in areas of Malaysian strategic interests, partnering with Malaysian institutions to win international research grants, and contributing to Malaysian science diplomacy.

Additionally, capacity building through greater scientific exchange via researching at or visiting IIASA, or taking part in IIASA programs for young scientists, will also be a priority for the partnership. This IIASA Info Sheet provides a summary of this expanding relationship since 2011.

### Highlights of Interactions Between IIASA and Malaysia (since 2011)

<table>
<thead>
<tr>
<th>IIASA National Member Organization (NMO)</th>
<th>The Academy of Sciences of Malaysia (ASM)</th>
</tr>
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<tbody>
<tr>
<td>Membership start date</td>
<td>2011</td>
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</tbody>
</table>
| Selected research partners               | - Academy of Sciences Malaysia (ASM)  
- Malaysian Palm Oil Council 
- Ministry of Science, Technology and Innovation of Malaysia (MOSTI)  
- Universiti Teknologi Malaysia (UTM) |
| Areas of research collaboration          | - Understanding and Improving Air Quality  
- Tropical Futures Initiative  
- Changing Energy Landscape  
- Projecting Demographics in Malaysia |
| Capacity building                        | 5 doctoral students from Malaysia have participated in IIASA young scientists summer programs since 2008 |
| Publication output                       | 7 publications have resulted from collaborations between IIASA and researchers at Malaysian institutions since 2008 |
| Other interactions                       | 22 Malaysians have participated in IIASA events since 2008  
2 researchers, advisors, and diplomats from Malaysia have visited IIASA since 2008, while IIASA scientists have visited Malaysia 20 times |
Activities with Member Countries: Malaysia

IIASA Info Sheet 2016/8
November 2016

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www.iiasa.ac.at/malaysia

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

This Info Sheet summarizes IIASA’s recent relationship with Malaysia.
It includes highlights with links to further information, but it is not a
comprehensive report on all interactions.

Feedback and updates are encouraged and should be sent to Kim Montgomery.
IIASA National Member Organization in Malaysia

The Academy of Sciences Malaysia (ASM) is the National Member Organization representing Malaysian membership of IIASA.

Tan Sri Dr. Ir. Dr. Ahmad Tajuddin Ali, President of the Academy of Sciences Malaysia, is the Council Member for Malaysia.

The NMO Secretary is Ms. Hazami Habib, Chief Operating Officer, Academy of Sciences Malaysia.

Research Partners in Malaysia

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

- Academy of Sciences Malaysia (ASM)
- Malaysian Palm Oil Council (MPOC)
- Ministry of Science, Technology and Innovation of Malaysia (MOSTI)
- Universiti Teknologi Malaysia (UTM)

Some leading Malaysian personalities from government and academia who are associated with IIASA (recent and past)

Academician Tan Sri Datuk Dr. Yusof Basiron FASc, CEO of Malaysian Palm Oil Council (MPOC) and Senior Fellow of Academy of Sciences Malaysia (ASM)

Academician Tan Sri Dr. Salleh Mohd Nor FASc, Pro Chancellor, Universiti Teknologi Malaysia (UTM) and Senior Fellow of Academy of Sciences Malaysia (ASM)

Dr. Zakri Abdul Hamid is Science Advisor to the Prime Minister of Malaysia and Chairman of the National Professors Council. He serves as Chairman of the Governing Bureau of the Intergovernmental Platform for Biodiversity and Ecosystem Services.
Recent Research Collaborations

Understanding and Improving Air Quality

Malaysia faces significant issues of haze associated with agricultural fires in Southeast Asia. Pollutants in the haze can cause serious health problems. For example, fine particulate matter (PM2.5) is dangerous because it can penetrate deeply into the lungs and has been linked to respiratory illnesses.

IIASA has substantial expertise in understanding air pollution and has developed scientific tools to help policymakers make informed decisions that will improve air quality. IIASA Greenhouse Gas-Air Pollution Interactions and Synergies (GAINS) model enables searches for sets of measures that simultaneously meet environmental targets on air quality and greenhouse gas reductions at least costs. An analysis using GAINS to project the emissions of major air pollutants to 2035 for 25 regions, including Malaysia, demonstrates the synergies between climate change and air pollution control policies. The results were published in the International Energy Agency’s World Energy Outlook 2011.

Through the Toyota Clean Air Project, IIASA works toward systematic improvement of GAINS ozone and particulate matter emissions inventories in collaboration with scientists from 5 Asian nations.

Tropical Futures Initiative

60% of Malaysia is covered by forests. However, in recent years Malaysia has faced significant deforestation. It is estimated that between 2000 and 2012, Malaysia has lost over 45,000 square kilometers of forest.

Tropical forests have been globally recognized as a significant sink and source for greenhouse gas emissions, with the implementation of initiatives such as Reduced Emissions from Deforestation and Forest Degradation (REDD) and REDD+. In Malaysia, around eighty percent of Malaysia’s greenhouse gas emissions are generated from land-use change, particularly deforestation.

Moreover, tropical forests exist in countries and regions that face intensive development pressures, leading to a need for transformation options that both reserve natural assets and create development pathways and that reflect both the complete value of ecosystem services and the complex social structures of the localities.

The Tropical Futures Initiative is a multiyear project developed and coordinated by IIASA to focus on tropical deforestation, greenhouse gas emissions, air pollution, agriculture, and water.

Selected presentations in Malaysia


Anna Lorant on “Comparing National Insurance and Safety Net Arrangements” at the conference on ‘Evidence for Disaster Risk Reduction and Climate Change Adaptation Effectiveness of Insurance: Challenges and Opportunities’ at the University Kebangsaan Malaysia in 2014.

Keywan Riahi and Luis Gomez-Echeverri attended the IPCC Fourth Core Writing Team Meeting for the AR5 Synthesis Report in Putrajaya in 2014.

Florian Kraxner delivered a keynote presentation at the Strategic Consultation 4 on Inter-sector Water Demand Management in Kuala Lumpur in 2013.
The first step of the initiative is to carry out a consistent quantitative global, regional, and national REDD+ assessment for Indonesia. As part of this assessment, researchers will assess policy options, mitigation potential, investment costs in forestry and agriculture, linkages to carbon markets, and synergies, as well as trade-offs with other environmental policies and the bio-economy in general.

The project will use GLOBIOM and the Global Forestry Model, G4M, as a basis for developing tailored national and regional models that help to identify REDD+ and other development policies that are economically efficient, socially fair, safeguard and enhance ecosystem values, and help meet the goals of the Convention on Biological Diversity.

In addition to the Tropical Futures Initiative, IIASA researchers assessed the area of suitable land for sustainable palm oil and investigated the limits of future palm oil expansions. The researchers found that Malaysia might face land scarcity for sustainable palm oil production. This research was published in *Global Environmental Change* in 2016.

**Changing Energy Landscape**

The energy sector is a vital part of Malaysia’s economy making up almost 20% of the total GDP. Malaysia is the world’s second-largest exporter of natural gas and second-largest oil and natural gas producer in Southeast Asia.

In addition to traditional energy sources, Malaysia has significant potential for renewable energy generation. Hydropower is part of the Malaysian energy mix already, but Malaysia has potential for solar and biomass energy sources as well. The Malaysian Government has recognized this potential and has implemented a “five fuels” policy, which includes adding renewable energy sources to the mix of oil, gas, coal, and hydropower. Furthermore, the Malaysian Government has set a target energy mix that includes at least 5.5% of energy from renewable energy sources.

IIASA has substantial expertise in understanding global energy systems and their connections with economic, environmental, and societal systems. Additionally, IIASA has developed tools, including the crowdsourcing tool Geowiki that could improve how to estimate the extent of biomass in Malaysia.

Recent Malaysian-IIASA collaborations in this area include researchers from the Universiti Teknologi Malaysia (UTM) and IIASA researchers developing a spatial-techno-economic optimization model of biogas generation and utilization network.

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


**Selected publications resulting from Malaysian-IIASA collaborations**

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Projecting Demographics in Malaysia

In 2013, Malaysia had almost 30 million people. Malaysia’s population is uneven with more than 20 million Malaysians living in Peninsular Malaysia and the minority of Malaysians living in East Malaysia.

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 research, 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 Malaysia show how different policies
over the next few decades could lead to the country’s 2013 population of almost 30 million reaching over 60 million by 2060 depending on which policies are adopted. 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.

Many of today’s most pressing challenges do not stop at 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 that their investment in IIASA is a contribution to a global public good. The benefit of this contribution is paid back to global researchers, policymakers, 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 IPCC’s (Intergovernmental Panel on Climate Change) 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 policymakers 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.
Capacity Building

**Young Scientists Summer Programs**

The 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. The YSSP has attracted over 1800 participants from over 80 countries since it was established in 1977.

In 2012 IIASA launched its first regional YSSP called the Southern African Young Scientists Summer Program (SA-YSSP) aimed primarily at PhD students based in the southern hemisphere. The Program is 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.

Since 2011, the following five Malaysian students have participated in these programs:

- **Ms. Poh Ying Hoo** (YSSP ’16 & Universiti Teknologi Malaysia) developed a spatial-techno-economic optimization model of biogas generation and utilization network. (Co-funded by Malaysian NMO and self)
- **Ms. Sie Ting Tan** (YSSP ’15 & Universiti Teknologi Malaysia) evaluated the energy and climate change mitigation potential of municipal solid waste in Malaysia. (Funded by Malaysian NMO)
- **Ms. Nur Rosni** (YSSP ’14 & International Islamic University Malaysia) studied determining urban sprawl geospatial indices using remote sensing and GIS. (Funded by Malaysian NMO).
- **Ms. Maragatham Kumar** (YSSP ’12 & Malaysian Nuclear Agency) assessed the different air pollution and greenhouse gases mitigation strategies in Malaysia using the GAINS model. (Funded by Malaysian NMO).
- **Ms. Pin Pin Oh** (YSSP ’12 & University of Nottingham, Malaysia Campus) developed a novel process scheme for biodiesel production in a multiphase membrane reactor system. (Co-funded by Malaysian NMO and IIASA) Ms. Oh won the Mikhalevich Award, which are given annually for outstanding work by participants in IIASA’s YSSP, in 2012. Awardees are provided with financial support to return to IIASA for an additional three months of research.

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. For example, researchers and policymakers from Austria (Vienna Institute for International Economic Studies), the European Commission, Finland, Germany, Russia, and Ukraine are jointly analyzing the challenges and opportunities for greater economic integration in 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 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 negotiating membership with Israel.
Prospects for Future Malaysian-IIASA Activities

This Info Sheet summarizes recent research collaborations between IIASA and Malaysia. Since Malaysia recently joined IIASA, there is significant opportunities for strengthening the IIASA-Malaysian relationship through developing a range of new joint activities including:

- **Enhancing Malaysian expertise in applying system analysis to national problems:** Developing bespoke Malaysian versions of IIASA global models would allow researchers and policymakers to look at complex global problems and their impact on Malaysia in a holistic and integrated way. For example, the Dutch government worked with IIASA to develop a Dutch version of the IIASA GAINS model. The new model helps ministries to identify cost-effective measures to improve air quality and reduce greenhouse gas emissions in the Netherlands at the same time as complying with the country’s obligations under European air quality agreements.

- **Conducting international assessments in areas of Malaysian strategic interest:** IIASA recently completed the Global Energy Assessment which brought together over 500 specialists to transform the way society thinks about, uses, and delivers energy. IIASA has proposed several new assessments, at the request of its member countries that will focus on issues of strategic interest to Malaysia.

- **New partnerships between IIASA and Malaysian 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 is part of a funding portfolio of €250 million, the total awarded to external projects featuring collaborations between IIASA and its member countries.

- **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 Research to support science diplomacy, page 8). IIASA recently launched a new global project to evaluate issues arising at the nexus of food, water, energy, and climate change.

- **Academic training opportunities for young Malaysian scientists:** There is significant potential to enhance participation by young Malaysian researchers in IIASA programs to develop international and interdisciplinary research skills (see page 8: Capacity Building).

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- 22 Malaysians have participated in IIASA events since 2008.
- 7 publications have resulted from collaborations between IIASA and researchers at Malaysian institutions since 2008.
- 2 researchers, advisors, and diplomats from Malaysia have visited IIASA since 2008, while IIASA scientists have visited Malaysia 20 times.

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

1. Visitors from Malaysia to IIASA (2008-2016)
2. Conference participants from Malaysia (2008-2016)
3. Travel by IIASA scientists to Malaysia (2008-2016)
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’s 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 2,500 scholars and almost 600 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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