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THE IIASA FLAGSHIP REPORT

*Illuminating the path to
sustainable wellbeing*

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NORWAY AND IIASA

*Collaboration across
sectors and borders*



PURSuing THE URBAN UTOPIA

How can we ensure that tomorrow's cities serve
both people and the planet?

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WWW.IIASA.AC.AT/OPTIONS

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FROM THE EDITOR

It is our pleasure to present you with the winter 2023 edition of *Options* magazine.

In this edition's cover feature, we take a look at how we can create green, sustainable, and inclusive cities that will serve both the people that live in them and the planet (pages 16-19). A year in the making, the IIASA Flagship Report was launched in September 2023 at an official UN event in the framework of the 78th session of the UN General Assembly. Find out more about the future challenges and solutions to help ensure sustainable wellbeing for all in our feature on this landmark publication (pages 8-9). In our member feature, we highlight the fruitful collaboration between IIASA and Norway and how it has helped to shape the political discourse at national, regional, and global levels (pages 12-13).

As we strive to present our readers with the best content on IIASA research and activities, we would be grateful if you could share your valuable feedback in our short readership survey – a link is available on the back page of the magazine. Your insights matter to us, and we thank you for your continued support.

Ansa Heyl: hey@aiaa.ac.at

ABOUT OPTIONS

Editorial team: Nina Cabala and Ansa Heyl

Writers: Tyseer Aboulnasr, Monika Bauer, Bettina Greenwell, Ansa Heyl, Stephanie Okeyo, Langit Rinesti, Jessica Slater, Jeremy Summers, Fanni Daniella Szakal, Vladimir Tarakanov

Expert reviewers: Zuelclady Araujo Gutierrez, Edward Byers, Michael Clegg, Giacomo Falchetta, Brian Fath, Christian Folberth, Dilek Fraisl, Adriana Gomez-Sanabria, Miguel Gonzalez-Leonardo, Gerid Hager, Petr Havlík, Stefan Hochrainer-Stigler, Roman Hoffmann, Martin Jung, Ali Kharrazi, Zbigniew Klimont, Marta Kozicka, Volker Krey, Mia Landauer, JoAnne Linnerooth-Bayer, Wolfgang Lutz, Guillaume Marois, Inian Moorthy, Shonali Pachauri, Pratik Patil, Narasimha Rao, Elena Rovenskaya, Thomas Schinko, Linda See, Michael Thompson, Sylvia Tramberend, Albert van Jaarsveld, Bas van Ruijven, Fabian Wagner, Wilfried Winiwarter

Graphic design: Bekhzod Makhkamov

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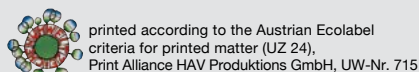
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RESEARCH ROUNDUP

IIASA welcomes its 12th Director General

Hans Joachim (“John”) Schellnhuber will join the institute as IIASA Director General effective from 1 December 2023.

By *Ansa Heyl*



Schellnhuber will bring a wealth of experience gained in both leadership and academic positions to IIASA. He founded and headed the Potsdam Institute for Climate Impact Research (PIK) from 1992 until 2018, and also served as research director of the Tyndall Centre in the UK from 2001 to 2005. His expertise in climate change has earned him worldwide recognition, leading to memberships in prestigious learned societies such as the Pontifical Academy of Sciences, the German National Academy Leopoldina, the US National Academy of Sciences, the Academia Europaea, and the Academy of Athens.

He has been active in various scientific fields, including quantum physics, complexity theory, earth system analysis, climate change modeling, and sustainability science. He is listed as a Highly Cited Researcher (Cross Field) by Clarivate.

His exceptional influence on science, politics, and business in the field of sustainability was recognized by the German Sustainability Prize, which awarded him its Honorary Edition. In addition, he has received honors from various countries, including being named a Commander of the Most Excellent Order of the British Empire by Queen Elizabeth II and a Chevalier de la Légion d’Honneur of the French Republic by President Macron. He received the Order of Merit of the State of Brandenburg, the Order of Merit of the Federal Republic of Germany, the Order of the Rising Sun from the Japanese Government, and the Grand Cross of Merit of the Federal Republic of Germany from President Frank-Walter Steinmeier.

As a scientific advisor, Schellnhuber has lent his expertise to prominent public and religious leaders, including former German Chancellor Angela Merkel, European Commission Presidents José Manuel Barroso and Ursula von der Leyen, and Pope Francis. He also served as member and chair of the German Advisory Council on Global Change (WBGU) from 1992 to 2020. Additionally, his contributions to the Intergovernmental Panel on Climate

Change (IPCC) were instrumental in the panel receiving the Nobel Peace Prize in 2007.

More recently, he has focused on the transformation of the built environment and the climate restoration potential of regenerative architecture. He founded the not-for-profit company Bauhaus Earth and became a member of the High-Level Roundtable of the New European Bauhaus initiative, further demonstrating his commitment to sustainable solutions.

“John Schellnhuber’s extensive experience, profound expertise, and visionary leadership will bring significant advancements to the IIASA mission of tackling global challenges through applied systems analysis. His appointment marks an exciting new chapter for IIASA, and we eagerly anticipate the positive impact he will have on the institute and its mission,” said IIASA Council Chair, Michael Clegg.

Schellnhuber expressed his commitment to his new position saying: “IIASA was founded in 1972 to build bridges between the West and the East through the universal power of scientific truth. This power is needed even more today in a multipolar world shaken by unprecedented crises.”

Further information: www.iiasa.ac.at/news-23/schellnhuber
Michael Clegg mclegg@uci.edu

Making climate problems and solutions visible

By *Vladimir Tarakanov*

Climate change is difficult to quantify and twice as difficult to visualize. Recently, IIASA launched the Climate Solutions Explorer – a comprehensive resource that visualizes and presents vital data about climate mitigation, climate impacts, and risks arising from development and climate change. In addition, the platform offers country-specific national dashboards focusing on socioeconomics, emissions, mitigation options, and climate impacts at varying levels of exposure and risk.

The platform also features narratives written by local experts. These stories document national transitions towards sustainable, net-zero societies and offer insightful analyses on the associated trade-offs and co-benefits to net-zero pathways, as well as highlight unique challenges and opportunities faced by different countries.

By providing easy access to the latest data, cutting-edge models, and expert analysis, this comprehensive website empowers individuals, businesses, and policymakers to make informed decisions and contribute to a more sustainable future.

“The platform offers a diverse range of content, including an interactive map that visualizes climate change impacts, national and regional data dashboards showcasing impacts and mitigation pathways, and articles covering climate-related topics and countries. This tool can help users to delve deep into their preferred areas of exploration,” explains Edward Byers, a researcher in the IIASA Energy, Climate, and Environment Program and coordinator of the website.

The Climate Solutions Explorer is the result of a long-standing collaboration and contributions from various sources within and external to the ENGAGE project – a global consortium consisting of nearly 30 partners, coordinated by IIASA and co-led by several other institutions.

Further information: www.iiasa.ac.at/news-23/climate-solutions-explorer

Edward Byers byers@iiasa.ac.at



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Monitoring agricultural production from space

By *Vladimir Tarakanov*

Accurate estimates and forecasts of crop area and yield play an important role in guiding policy decisions related to food security, which is particularly important due to the stressors posed by climate change.

To address current limitations and enhance crop monitoring globally, the WorldCereal project, funded by the European Space Agency (ESA), has created an open-source, highly scalable system, which uses satellite data from the EU Copernicus program, offering high-resolution, data-rich agricultural information.

The system could be used for a variety of purposes. In 2021, it demonstrated the capability to provide seasonal cropland information, crop-specific maps for maize and cereals, and irrigation maps, offering critical inputs to food security and sustainability planning.

In their paper published in *Nature Food*, IIASA researcher Linda See and colleagues from ESA, the Flemish Institute for Technological Research's VITO Remote Sensing, Stellenbosch University, and the Food and Agriculture Organization of the United Nations (FAO), highlighted the potential for the system to incorporate greater crop-specific data, thereby boosting the accuracy of subnational and national agricultural statistics. This enhancement in data quality and gap-filling techniques could significantly improve capacity to monitor domestic situations and contribute to established international protocols.

A key innovation of the project is its community-based, open, and harmonized global reference database, which contains 75 million samples from 2017 onwards, collected by many different organizations and individual projects worldwide.

Further information: www.iiasa.ac.at/news-23/food-security

Linda See see@iiasa.ac.at

Turning the tide on plastic pollution in Ghana

By *Ansa Heyl*

Marine litter poses severe threats to ecosystems, wildlife, and human health. Understanding the full extent of the marine plastics problem, however, remains challenging due to the vastness of the Earth's oceans and the complex circulation of plastic litter. Traditional monitoring methods are costly and often outdated, leaving significant data gaps.

Ghana generates approximately 1.1 million tons of plastic waste annually, with only 5% being collected and recycled. Working with IIASA researchers, the country has adopted an innovative approach to address the issue through citizen science, becoming the first country to integrate this type of data on marine plastic litter into its official monitoring and reporting processes.

“Citizen science is more than just plugging data gaps; it is a powerful bridge between the public, the world of science, and policy. It not only raises awareness and inspires action to tackle challenges, but also fosters a democratic approach to policymaking, where the voice of the people becomes integral to shaping our collective future,” explains IIASA researcher Dilek Fraisl.

IIASA researchers outlined Ghana's success with this approach in a recent study, showing how the Ocean Conservancy's standardized approach to collecting and categorizing plastic pollution data during cleanup campaigns has become a powerful tool in this context.

According to the authors, the impact of this initiative could extend beyond Ghana to influence the development of policies in other countries as well. In addition, the collaboration allowed government partners and civil society organizations involved to gain insights into citizen science methodologies.

“Ghana's experience serves as a replicable pathway for other nations seeking to incorporate citizen science data into SDG monitoring and emphasizes the critical role of citizen science in addressing data deficiencies and fostering inclusive data ecosystems for sustainable development,” concludes IIASA researcher Linda See.

Further information: www.iiasa.ac.at/news-23/Ghana-citizen-science

Dilek Fraisl fraisl@iiasa.ac.at

Linda See see@iiasa.ac.at

USING EXISTING TECHNOLOGIES TO CURB NITROUS OXIDE EMISSIONS

Just a few dozen industrial installations globally are responsible for a significant share of nitrous oxide (N₂O) emissions. Researchers from IIASA and the University of Maryland quantified these emissions and their reduction potentials. N₂O is the third-largest greenhouse gas, with a global warming potential 300 times greater than carbon dioxide. Its emissions are mainly from agriculture, but the findings suggest that industrial sources, especially in the production of certain chemicals, can readily adopt available low-cost technologies to almost eliminate these emissions. The private sector, driven by consumer preferences for climate-friendly products, along with government initiatives, could play a pivotal role in this reduction effort.

Further information: www.iiasa.ac.at/news-23/n2o-emissions

EXPLORING GLOBAL RISK MITIGATION WITH CAMBRIDGE COLLEAGUES

Earlier this year, the IIASA Transformation within Reach Initiative organized a visit by researchers from Cambridge University's Centre for the Study of Existential Risk (CSER) to explore strategies for the mitigation of global risks in a 'People and Patterns' workshop, which analyzed dominant narratives, current systems, and underlying paradigms contributing to global risks. Inclusive thinking with multiple perspectives was emphasized as crucial to overcoming systemic crises. The workshop enriched CSER's understanding of global risk patterns, while also fostering collaboration and discussion on alternative narratives and systems for safeguarding collective futures amid crises.

Further information: www.iiasa.ac.at/news-23/people-patterns



Addressing justice in wildfire risk management

By **Bettina Greenwell**

The frequency and severity of wildfires have become increasingly alarming in recent years, substantially due to the effects of climate change.

An IIASA-led study addressed the unequal distribution of wildfire risk, which is influenced by social vulnerabilities and intersecting forms of inequality, including gender, age, ethnicity, or disability. The authors call for more integrated and inclusive wildfire risk management approaches and propose a novel framework mapping different justice aspects.

Together with colleagues from the Fraunhofer Institute for Technological Trend Analysis and the Forest Science and Technology Centre of Catalonia, IIASA researchers argue that to proactively address potential conflicts between actors on the transition to more integrative management approaches, it is key to understand diverging perceptions on justice in outcomes and processes.

The framework's objective is to provide a comprehensive categorization of three forms of justice, namely distributional justice, procedural justice, and restorative justice, against the four phases of the wildfire risk management cycle: prevention, preparedness, response, and recovery and adaptation.

"The insights from applying the framework provide a foundation for wildfire risk management and governance practices. This is particularly relevant when working towards a just transition to more holistic risk management strategies," explains lead author Thomas Schinko, who leads the Equity and Justice Research Group in the IIASA Population and Just Societies Program.

This work lays the groundwork for further in-depth analyses in wildfire risk management such as a focus on indigenous communities.

Further info: www.iiasa.ac.at/news-23/wildfire

Thomas Schinko schinko@iiasa.ac.at

Solar powered irrigation: A game-changer for small-scale farms in sub-Saharan Africa

By **Bettina Greenwell**

In sub-Saharan Africa 80% of agricultural production is from smallholder farmers, who face constraints on increasing farm productivity, resulting in a large yield gap. Extensive rain-fed agriculture (90% of all cropland) under unpredictable rainfall patterns is a leading cause of food insecurity in Africa.

An IIASA-led study published in *Environmental Research Letters*, found that standalone solar photovoltaic irrigation systems may have the potential to meet more than a third of the water needs for crops in small-scale farms across sub-Saharan Africa.

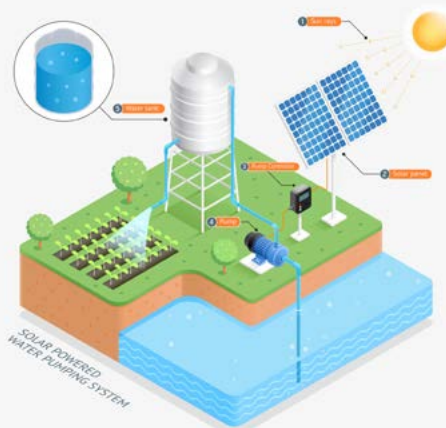
As part of the research project Renewables for African Agriculture (RE4AFAGRI), an international team of researchers developed an open-source modeling framework that used various datasets related to agriculture, water, energy, expenses, and infrastructure. It was employed to calculate local irrigation needs, determine the cost of technology components like water pumps and solar PV modules, and assess the economic prospects and sustainable development impacts of adopting solar pumps.

"We estimate an average discounted investment requirement of US\$ 3 billion per year, generating potential profits of over \$ 5 billion per year from increased yields to smallholder farmers," explains Giacomo Falchetta, lead author of the study and a researcher in the Integrated Assessment and Climate Change Research Group of the IIASA Energy, Climate, and Environment Program.

"Reducing the irrigation gap with cost-effective solar pumps can boost food production and contribute to Sustainable Development Goal (SDG) 2 (zero hunger). Furthermore, surplus electricity generated by these systems could serve other energy needs, aligning with SDG 7 (Affordable and Clean Energy)," he concludes.

Further info: www.iiasa.ac.at/news-23/solar-irrigation

Giacomo Falchetta falchetta@iiasa.ac.at





GREENER DIETS TO SUPPORT A SHIFT TO GLOBAL SUSTAINABILITY

A recent IIASA-led study suggests that replacing just half of the meat and milk products in our diets with plant-based alternatives by 2050 could lead to a significant reduction in agriculture and land-use related greenhouse gas (GHG) emissions.

By **Ansa Heyl**

According to the research published in *Nature Communications*, reforesting land spared from livestock production when meat and milk products are substituted by plant-based alternatives could more than double the climate benefits and halve future declines of ecosystem integrity by 2050. The restored area could ultimately contribute up to 25% of the estimated global land restoration needs under Target 2 of the Kunming Montreal Global Biodiversity Framework by 2030.

The scenarios developed by the authors involve substituting beef, pork, chicken, and milk with plant-based alternatives, ensuring nutritional equivalence and compatibility with existing food manufacturing capabilities. The results indicate substantial reductions in the environmental impacts of food systems by 2050 compared to a reference scenario. Compared to 2020, global agricultural area decreases by 12%, the decline of forested and natural lands is halted, nitrogen inputs to cropland are reduced by nearly 50%, and water use by 10%. Without accounting for carbon sequestration on spared land, GHG emissions could decline by 31% in 2050. Globally, undernourishment would decline to 3.6%, reducing the number of undernourished people by 31 million compared to the reference scenario.

In addition, the results indicate that the full environmental benefit of diet shifts can be realized by restoring agricultural land spared from livestock and feed production through biodiversity-minded afforestation. The 50% substitution scenario would reduce predicted declines in ecosystem integrity by more than half, while the 90% scenario could reverse biodiversity loss between 2030 and 2040.

However, the study emphasizes that these dietary shifts must be accompanied by targeted production-side policies to fully realize their potential, and that production extensification and resulting losses in GHG and land-use efficiency could undermine the benefits. The authors also acknowledge that the impacts may vary across regions due to differences in population size, diets, agricultural productivity, and participation in international trade.

“A global introduction of all novel alternatives has additional benefits compared to the scenarios with limited product or geographical scope, but regional substitution of specific products may be highly effective, especially if combined with regional strategies and purposeful selection of recipes,” explains study lead author Marta Kozicka, a researcher in the IIASA Biodiversity and Natural Resources Program.

While the results support the increased use of plant-based meat substitutes, the authors recognize that livestock are a valuable source of income and nourishment for smallholders in low- and middle-income countries, and have significant cultural roles, reduce risk, and diversify smallholder income. Simultaneously, climate change threatens the livelihoods of smallholder farmers. Rapid policy and management action to avoid environmental risk and support farmers and other livestock value chain actors for a socially just and sustainable food system transition will therefore be crucial. This is particularly important considering recent setbacks to achieving food security globally.

Further information: www.iiasa.ac.at/news-23/plant-food

Marta Kozicka kozicka@iiasa.ac.at

Petr Havlík havlikpt@iiasa.ac.at



THE IASA FLAGSHIP REPORT: ILLUMINATING THE PATH TO SUSTAINABLE WELLBEING

**Looking back and moving forward: Systems analysis for sustainable wellbeing.
50 years of IASA research, 40 years after the Brundtland Commission,
and contributing to the post-2030 global agenda.**

By Bettina Greenwell



After a year in the making, the IASA Flagship Report was launched in September 2023 at an official UN event in the framework of the 78th session of the UN General Assembly. Co-sponsored by the Permanent Missions of Austria and South Africa to the UN and supported by the Department of Science and Technology of South Africa, the launch event unveiled crucial insights from the report. Notably, the publication features a foreword contribution by H.E. Alexander Van der Bellen, the Federal President of the Republic of Austria, who has been a steadfast supporter of IASA and its research initiatives.

The event brought together policymakers, scientists, and representatives from various sectors to discuss key aspects of the report and the importance of advancing the 2030 Agenda. Several leading IASA researchers and high-level collaborators including Csaba Kőrösi, President of the 77th session of the UN General Assembly; Stefan Pretterhofer, Deputy Permanent Representative of Austria to the UN; Sepo Hachigonta, Director of Strategic

Partnerships at the National Research Foundation of South Africa; Nyovani Janet Madise, Director of Research for Sustainable Development Policies and Head of the Malawi office of the African Institute for Development Policy (AFIDEP); and Adil Najam, President of WWF International and IASA Peter de Jánosí Visiting Fellow, participated as speakers.

A CALL TO ACTION

At this critical mid-term review point of the 2030 Agenda, the report focuses on future challenges and solutions to help ensure sustainable wellbeing for all. As such, the publication closely tied into the overall theme of the General Assembly on “Rebuilding trust and reigniting global solidarity: Accelerating action on the 2030 Agenda and its Sustainable Development Goals towards peace, prosperity, progress, and sustainability for all”.

“THIS REPORT IS A TESTAMENT TO THE UNWAVERING DEDICATION OF IIASA TO ADDRESSING GLOBAL CHALLENGES FOR THE PAST FIVE DECADES AND ITS COMMITMENT TO CONTINUE TO DO SO”

The publication is organized in six parts, summarizing past and current IIASA research highlights, and pointing toward future challenges and solutions:

- Systems analysis for a challenged world.
- Population and human capital.
- Food security, ecosystems, and biodiversity.
- Energy, technology, and climate change.
- Global systems analysis for understanding the drivers of sustainable wellbeing; and
- Moving into the future: Three critical policy messages.

“This report is a testament to the unwavering dedication of IIASA to addressing global challenges for the past five decades and its commitment to continue to do so. It showcases our evolution from a cooperative scientific venture during the Cold War to a global institute at the forefront of solving humanity’s most pressing issues today,” notes IIASA Interim Deputy Director General for Science, Wolfgang Lutz.

LOOKING BACK

In 1972 – at the height of the Cold War – representatives of the Soviet Union, the United States, and 10 other countries from the Eastern and Western blocs met in London to sign the charter establishing IIASA. It marked the beginning of a remarkable project to use scientific cooperation to build bridges across the Cold War divide and to confront growing global problems on an international scale.

In the 1970s most research organizations focused on national issues. Few encouraged researchers from different countries or disciplines to work together for the greater good. To achieve its ambitious research vision, IIASA would have to break down the barriers between nations and disciplines. This it did, building international interdisciplinary teams that used advanced systems analysis to study global challenges, both long-standing and emerging. For example, a study on water pollution carried out by a team of IIASA chemists, biologists, and economists in the 1980s, still forms the basis of modern water policy design in Japan, the USA, and the former USSR.

“We cannot talk about systems analysis without referring to IIASA,” said Najam during the launch, reminding participants of the institute’s pioneering role. “The report demonstrates that we have the knowledge, the resources, and the ability to change gears and directions, and know what we need to do within the next one, five, and 50 years.”

MOVING FORWARD

“This report is the first and only summary of IIASA contributions over five decades. Not only is it a written account of the institute’s impactful history, but it is also a blueprint for building a better and more sustainable future,” says coeditor Shonali Pachauri, who leads the Transformative Institutional and Social Solutions Research Group at IIASA.

In the final chapter, the authors offer three critical policy messages to stimulate discussions about a post-2030 Agenda for Sustainable Development:

- Suboptimization is suboptimal: Mainstream a systems analysis approach into policymaking at all levels to ensure that broader, longer-term considerations are incorporated.
- Enhance individual agency: Provide equal access to quality primary and secondary education for all, and in particular for women, as a means of promoting gender equality and empowerment.
- Strengthen collective action and global governance: Harness global cooperation and representation to support the global commons.

“The official launch was only the beginning. I am excited about many more events presenting and discussing this important document, and what IIASA research can offer to the world,” concludes Lutz.

“THE OFFICIAL LAUNCH WAS ONLY THE BEGINNING. I AM EXCITED ABOUT MANY MORE EVENTS PRESENTING AND DISCUSSING THIS IMPORTANT DOCUMENT, AND WHAT IIASA RESEARCH CAN OFFER TO THE WORLD”

Further info: www.iiasa.ac.at/flagshipreport

Wolfgang Lutz lutz@iiasa.ac.at

Shonali Pachauri pachauri@iiasa.ac.at

SCIENCE INTO POLICY



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IIASA AND THE G20: SYSTEMS THINKING TO HELP REFORM MULTILATERALISM

The G20 is a global platform for the discussion of cooperation, policy, and governance pathways aligned with the common interests of its member states. This year, India held the Presidency of the G20 under the banner of One Earth, One Family, One Future. To support India's Presidency, IIASA produced four policy papers providing insight into the complexities of potential multilateral institutional reforms.

By **Vladimir Tarakanov**

Multilateral institutions are the key tool to bring countries together to work toward a common and sustainable future. However, multilateralism is currently in crisis. Multilateral institutions are underfunded and somewhat disempowered to do what they were created for – to facilitate global cooperation on major and shared global problems.

IIASA was invited to produce inputs for the G20 process on the future of multilateralism and key multilateral institutions. The institute convened a consultative process involving 25 renowned external experts from around the world to produce a series of policy papers presenting recommendations that explored several areas of reform, including reforms of the United Nations, climate finance, the World Health Organization (WHO), and the World Trade Organization (WTO).

The policy papers were prepared through joint efforts of IIASA researchers under the leadership of IIASA Director General Albert van Jaarsveld, IIASA Advancing Systems Analysis Program Director, Elena Rovenskaya, and IIASA Distinguished Visiting Fellow and President of the UN Sustainable Development Solutions Network, Jeffrey Sachs.

“IIASA conducts policy-oriented research into pressing concerns that affect the future of all of humanity, such as climate change, energy security, population aging, and sustainable development. By deploying systems thinking, IIASA can coordinate knowledge sharing, synthesis, and

the co-development of policy recommendations, such as these policy papers,” notes Rovenskaya.

Many of the recommendations made in these policy papers found traction and resonance in the G20 New Delhi Leaders' Declaration. Among those key recommendations were: strengthening the role and reach of the global multilateral system while increasing the representativeness, transparency, equity, and accountability of its major institutions; strengthening the voice of developing countries in global decision making; renewing the commitment to open, inclusive, equitable, fair, transparent, and sustainability-promoting global trade with the WTO at its core; scaling up a diversity of affordable financial sources to support the achievement of the global developmental and Agenda 2030 objectives; and enhancing the capacity of the Multilateral Development Banks to contribute to this goal.

These key principles are expected to be carried forward into the upcoming G20 sessions in 2024 and 2025, helping to foster global solidarity for a sustainable future.

Further info:

pure.iiasa.ac.at/19117

pure.iiasa.ac.at/19118

pure.iiasa.ac.at/19119

pure.iiasa.ac.at/19120

www.g20.org/content/dam/gtwenty/gtwenty_new/document/G20-New-Delhi-Leaders-Declaration.pdf

Elena Rovenskaya rovenska@iiasa.ac.at

Albert van Jaarsveld jaarsveld@iiasa.ac.at



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Facilitating action on air pollution in the ASEAN region

By *Jessica Slater*

Air pollution is a serious global health and environmental issue, causing around 7 million premature deaths per year globally, while also contributing to climate change and biodiversity loss. Solutions to reducing air pollution exist and could have multiple benefits for human health, the environment, and other development goals.

There are however multiple barriers that can delay or prevent the implementation of those solutions including the perceived economic cost of air pollution mitigation and a lack of financing for the implementation of associated policies. IIASA researchers worked with partners in three Association of Southeast Asian Nations (ASEAN) countries (Cambodia, Indonesia, and Thailand) on a UNEP funded project to help increase the evidence base challenging this perception to overcome this barrier.

The IIASA Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) model was used to quantify the health costs from air pollution exposure in the region and to develop alternative future scenarios on air pollution mitigation. These initial assessments directly estimate the economic costs due to the health impacts of air pollution and show that without further action, future economic costs related to air pollution exposure will be high. However, implementing a set of mitigation measures could significantly reduce these economic costs and have other benefits for improved air quality and human health.

IIASA researchers also developed a guidance document to summarize key steps and requirements for ASEAN countries to assess the costs of not taking further action on air pollution, which will enable them to build stronger investment cases for action and develop more integrated, science-based policy measures. These outputs will help ASEAN countries improve their overall national capacity for air quality management and facilitate the exchange of good practices across government agencies and countries in the region.

Further info: www.iiasa.ac.at/pb40
Zbigniew Klimont klimont@iiasa.ac.at

ENGAGING TO ADDRESS GLOBAL WARMING

The ENGAGE project, coordinated by IIASA, addresses the urgent need to combat climate change by developing new integrated assessment pathways for achieving the goals of the Paris Agreement. The new pathways are both global and national for many G20 countries, take feasibility considerations into account, and were developed in collaboration with policymakers, industry leaders, and civil society. A recently published summary for policymakers summarizes the project findings on the need for early mitigation to avoid temperature overshoots and impacts, the need for international support for institutional capacity, and for increasing ambition on net-zero targets to fulfill the goals of the Paris Agreement.

Further info: www.iiasa.ac.at/ENGAGE_Summary

NATURE-BASED SOLUTIONS FOR INNOVATION AND PROGRESS

Nature-based solutions (NBS) can play a crucial role in tackling a wide variety of global issues such as climate change, biodiversity loss, and disaster risk, but still face many policy and financing barriers hampering their implementation. Two new policy briefs provide insight into the challenges limiting NBS potential, focusing on governance and potential policy reforms that could help foster a favorable environment for the popularization of NBS. The authors highlight that updating national policies and mandatory instruments for NBS, switching the burden of proof from NBS to grey infrastructure, de-risking NBS, divesting from nature-negative activities, and increasing support for public-private partnerships could help overcome existing challenges.

Further info:
www.iiasa.ac.at/pb38
www.iiasa.ac.at/pb39



NORWAY AND IIASA: COLLABORATION ACROSS SECTORS AND BORDERS

IIASA and Norway have enjoyed fruitful collaboration spanning multiple sectors for over two decades, helping to shape the political discourse at national, regional, and global levels. Represented by the Research Council of Norway, the country has been among the most active contributors to the work of IIASA.

By Vladimir Tarakanov

“Ties between Norway and IIASA date back to the 1990s, with many groundbreaking achievements resulting from this collaboration across multiple spheres and disciplines,” says Thomas Hansteen, Special Adviser at the Research Council of Norway, representing the country at the IIASA Council. “Systems analysis is a powerful tool, which can help the global community tackle a variety of contemporary challenges — from fighting air pollution to safeguarding the Arctic”.

Key areas of research between Norway and IIASA include, among others, identifying strategies to address air pollution and greenhouse gas emissions to mitigate climate change, examining the impacts of climate change and infrastructure projects on Arctic populations, evaluating methods to preserve biodiversity, and examining pathways toward a circular economy.

ANALYZING AIR POLLUTION AND CLIMATE CHANGE

Climate change and air pollution are two problems at the very heart of the IIASA-Norway research collaboration.

Most notably, through analysis of particulate matter concentrations across Europe, IIASA researchers and Norwegian colleagues compiled the data and helped to warn policymakers that under current legislation, air pollution hotspots will remain in Eastern Europe, Southern Poland, and some major European cities.

IIASA also seeks to identify ways to fill such policy gaps. Numerous studies have used the IIASA integrated assessment models, including the Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) model, to explore potential strategies of simultaneously cutting air pollution and greenhouse gas emissions. As part of this work, the Norwegian Meteorological Institute and IIASA supported the revision of the Ambient Air Quality Directive, having developed respective air pollution scenarios that formed the basis for the developed proposal. In the past, the GAINS model was also applied to draw up the Convention on Long-Range Transboundary Air Pollution — one of the first international treaties that helped Europe slash air pollution.

PRIORITIZING BIODIVERSITY

The IIASA-Norway collaboration focuses on a variety of other pressing issues within the realm of environmental politics. With partners from the Norwegian University of Science and Technology (NTNU), IIASA researchers are supporting stakeholders to produce innovative policy pathways to improve biodiversity across Europe. As part of this work, they are applying the latest modeling tools to understand the impact of worldviews and differing equity principles on biodiversity policy outcomes.

Another project, co-developed with partners from the Norwegian Institute for Water Research, addresses the limited availability at the EU-scale of harmonized, long-term, spatially explicit, and regularly updated biodiversity data. The project seeks to increase the availability of such data and ultimately mitigate biodiversity loss by closing knowledge gaps, thereby helping to formulate new transformative policy options.

Norwegian institutes also support other large-scale initiatives at IIASA, such as the Food, Agriculture, Biodiversity, Land-Use, and Energy (FABLE) Consortium, which seeks to establish a model-aided decision-support environment for sustainable development pathways in the land use space. Through the adoption of a holistic approach, FABLE helps to analyze a mixture of different factors across a variety of spheres to advance transitions towards sustainable food and land use systems, while taking into account biodiversity preservation and global energy concerns.

SAFEGUARDING THE ARCTIC AND ITS POPULATIONS

Arctic temperatures have risen at twice the global average rate over the past few decades, which impacts both fragile Arctic environments and the livelihoods of local populations. The IIASA-Norway collaboration explores the effect of climate change on Arctic permafrost and its socioeconomic impacts, as well as causal factors such as black carbon emissions, which accelerate Arctic permafrost meltdown. Black carbon is produced by incomplete burning of wood and fossil fuel and upon landing on snow or ice, it tends to absorb heat from the sun, increasing the rate of melting. IIASA collaborates with the Norwegian Institute for Air Research (NILU) and other institutions to analyze this problem and explore potential black carbon emission reduction strategies.

In addition, in partnership with Norwegian experts, IIASA researchers contribute to a variety of other projects focusing on the protection of Arctic populations and environments including a project that focuses on how indigenous and non-indigenous residents of the Arctic, including in Norway, engage with new and upgraded infrastructure in the region, examining the intended and unintended consequences.

“TIES BETWEEN NORWAY AND IIASA DATE BACK TO THE 1990S, WITH MANY GROUNDBREAKING ACHIEVEMENTS RESULTING FROM THIS COLLABORATION ACROSS MULTIPLE SPHERES AND DISCIPLINES”

ACHIEVING A NET-ZERO EMISSION CIRCULAR ECONOMY IN THE EU

The NTNU also collaborates with IIASA on integrating circular economy and climate mitigation strategies, for example, as part of the CircEUlar project. Researchers from IIASA, NTNU, and other partners develop new modeling approaches for analyzing circularity from a systems perspective in order to broaden the understanding of dynamics and levers for societal transformation toward a net-zero emission circular economy.

“Together with colleagues from NTNU, we are mostly collaborating on combining energy systems and materials modeling,” explains Volker Krey, Integrated Assessment and Climate Change Research Group Leader in the IIASA Energy, Climate, and Environment Program and Adjunct Professor at NTNU. “Looking at it from a solutions perspective, we combine the circular economy and climate change mitigation research agendas with the ultimate goal of catalyzing the transition toward a circular economy and net-zero emissions”.

TRAINING YOUNG PROFESSIONALS

Young Norwegian scientists have had opportunities to hone their skills in systems analysis through various IIASA capacity building activities. Four researchers from Norway worked at IIASA in the past five years, three of which were participants in the Young Scientists Summer Program (YSSP).

PATHWAYS TO FUTURE COLLABORATION

In light of the realities of a changing climate, cooperation between scholars from all over the world is as crucial as ever. Having enjoyed many years of working together with Norway and other countries all over the world, IIASA endeavors to bring together the best specialists, as well as train a new generation of young scientists to work together to find solutions for the global challenges facing our world today.

Further info: <https://iiasa.ac.at/members/norway>
Barbara Kreissler kreissler@iiasa.ac.at

Setting IIASA on a new course for the future

As his term as IIASA Director General comes to an end, Albert van Jaarsveld looks back on his five-year tenure at the institute.



Albert van Jaarsveld
Director General

Since I joined IIASA as Director General in 2018, the institute has experienced an exciting period of growth, with around 450 employees and guest researchers spending time in Laxenburg during 2022. IIASA researchers produced almost 700 research papers and attracted nearly 980 policy citations of their research across 30 countries. The development of a new decadal strategy, research plan, and a revised program configuration, all acted as important launch pads for continued outputs in high profile journals and a growing policy impact.

A highlight for IIASA over this period was the celebration of the institute's 50th anniversary in 2022 with 18 targeted global events co-hosted with IIASA member organizations, stakeholders, and communities. More than 2,500 participants joined us to commemorate the achievements of IIASA and systems science in addressing the most challenging global and shared problems facing humanity.

The last five years also turned out to be an important reset period for the institute, following the 2017 external review of IIASA and the 2018 Task Force Report that called for the implementation of a range of significant governance and operational upgrades. In response, numerous institutional changes to align IIASA with modern best practices and legal requirements, and to create a competitive and dynamic career development environment for talented researchers, were implemented. Another significant development was the first major revision of the IIASA Charter led by the IIASA Council since the establishment of the institute in 1972.

The period between 2018 and 2023 was sadly disrupted by two important events. First, the COVID-19 pandemic had an impact on IIASA operations between 2020 and 2021. Thankfully normal operations, with some adjustments, resumed thereafter. IIASA researchers ensured that science productivity at IIASA was maintained and made telling contributions for society to understand, overcome, and bounce back after COVID-19. Secondly, the Russian invasion of Ukraine in February 2022 was troublesome as both the Russian and Ukrainian Academies of Sciences are members of IIASA. To date, IIASA has maintained its founding science diplomacy principles by retaining all critical linkages while ensuring adherence to prevailing sanction regimes. The retention of the IIASA DNA is considered paramount by the Council.

New IIASA memberships included the return of India and Slovakia, as well as an expanded sub-Saharan African regional membership comprising 17 countries. Regrettable membership losses include Indonesia, Malaysia, and Mexico, and we hope that their absence will be temporary. Looking forward, it is important for IIASA to work towards expanding its membership across the world. Expanding the global influence of IIASA was constrained during COVID-19 but should now be pursued with renewed vigor.

Upon my departure I would like to wish the incoming Director General, John Schellnhuber, the best for his tenure as Director General, and to thank the IIASA Council, employees, collaborators, and visitors I met while at IIASA, for the privilege and honor of serving this exceptional institution over the last five years. May the next 50 years continue to be a period of unparalleled success and excellence for IIASA.

The essential role of IIASA in the creation of global public goods



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Michael Clegg
IIASA Council Chair

Outgoing IIASA Council Chair, Michael Clegg, reflects on how the institute has contributed to creating public goods through its research since its inception half a century ago, and how it will continue to do so into the future.

The foundation of IIASA rested on two key ideas: First, that the creation of new knowledge about the systems that govern our environment (writ broadly to include our physical, biological, and social environment) can enable a better and more secure future for our descendants; and second, that international cooperation in the creation of new knowledge can act to reduce conflict among nation states by openly sharing knowledge about the management of common environmental threats. Put differently, the founding vision of IIASA was to create and apply the global public good of openly shared scientific research as a means to address tangible environmental threats while at the same time creating greater cooperation among nations, thereby reducing the threat of conflict. To achieve these twin goals, IIASA had to be international, it had to add to the store of public knowledge through the conduct of original scientific research and it had to gain the serious attention of governmental decision makers.

It was not easy to establish an international institute with these goals and it took more than four years between the Glassboro Summit of 1968, where the idea was first proposed, to the founding of the institute in Laxenburg, Austria in 1972. The early leaders of IIASA worked assiduously to implement the principles of creating knowledge as a public good and using scientific cooperation as an instrument for peace. The fact that IIASA celebrated its fiftieth anniversary last year is a testament to their wisdom and vision.

In a world of continuously emerging challenges and opportunities, IIASA had to shift from being an East-West institute to a global one in the early 90s. Unfortunately, this period also saw the loss of many founding members of IIASA and a gradual reduction in IIASA's influence. Despite these obstacles, IIASA succeeded in bringing important new members into the institute including Brazil, China, India, South Africa, and others. This period might be called the second phase of IIASA's history.

Today we are entering what appears to be IIASA's third phase. The consensus of the 90s has eroded and national conflicts are increasing. Although IIASA enjoys the tremendous asset of an outstanding research and support staff, the relative size of the institute has increased only marginally over fifty years, raising serious questions about the scalability of the concept. Today, environmental challenges are larger than in 1972 and appear to be accelerating. Threats to essential services like food production, for example, are more evident – we are just concluding a summer of unprecedented wildfires and mass migration is disrupting social arrangements. Owing to these accelerating threats, the public goods created by IIASA are more important now than ever and the foundational vision for IIASA is as relevant today as it was more than fifty years ago.



PURSUING THE URBAN UTOPIA

As cities draw in more and more people, the challenges and opportunities posed by urbanization are ever-increasing. How can we make sure that the cities of tomorrow will serve both people and the planet?

By Fanni Daniella Szakal

We live in an age where more than half of humanity calls cities their home, a figure expected to rise to over 70% by 2050. While cities offer promise and progress, increasing urbanization also has its perils—overcrowding, waste, air pollution, disease, and soaring temperatures.

Yet, things do not have to be this way, argued Michael Thompson, a researcher in the IIASA Population and Just Societies Program in a speech given at the Prada Frames Symposium on Waste in Milan this year. By re-engineering city infrastructure, we can lessen the massive ecological footprint of urban environments, “all the way to the point where our cities are walking on air,” as he puts it.

But how can we transform urban environments in a way that ensures the wellbeing of both people and the planet? Thompson highlights three main courses of action: turning away from fossil fuels towards renewables, dealing with waste in a creative and value-changing way, and practicing city-forestry and city-farming, thereby making our cities greener.

“Electricity from renewables is now much cheaper than from fossil fuels and it is waste-free. Once we have taken human waste out of the water cycle, and reconceived it as a valuable resource, we will be quids-in and able to swim in our rivers without having to ‘go through the motions,’” writes Thompson. “With our cities becoming ever more forested, carbon dioxide is removed from the atmosphere, and the cities themselves are made more biodiverse and more livable.”

Fostering urban resilience and building sustainable cities are the focus of numerous research projects at IIASA, working towards mitigating the immense footprint of the urban giants and smaller towns alike while safeguarding the health and wellbeing of their inhabitants.

A LIVING, BREATHING ORGANISM

Much like human beings, cities have a metabolism, consuming energy, water, and resources, and producing waste. The study of urban metabolism models these flows to get a better understanding of how the resources are used and ways to reduce the possible negative environmental impacts.

“MUCH LIKE HUMAN BEINGS, CITIES HAVE A METABOLISM, CONSUMING ENERGY, WATER, AND RESOURCES, AND PRODUCING WASTE”

The Resource Nexus for Transformation to Circular, Resilient, and Livable Cities in the Context of Climate

Change (RECREATE) project focused on assessing the energy and carbon flows in four pilot cities: Beijing, Malmö, Shanghai, and Vienna. With this network-based approach, the researchers were able to identify the sectors directly and indirectly responsible for the most carbon dioxide emissions (manufacturing, transportation, and electricity production), pinpointing where policy changes would have the largest effect.

The process of building livable cities needs to include the people who live there, which is why the project also involved stakeholders and policymakers through interviews and co-creation workshops in the cities of Vienna and Shanghai.

“BY IDENTIFYING THE VALUES OF PEOPLE ABOUT WHAT MAKES THEIR CITY LIVABLE, WE CAN CREATE ‘UNTOUCHABLES’ IN THE MODELS”

“By identifying the values of people about what makes their city livable, we can create ‘untouchables’ in the models,” says Brian Fath, a researcher in the IIASA Advancing Systems Analysis Program. “Why bother going in directions in modeling scenarios that are undesirable to the people?”

LITERAL HOTSPOTS

Cities are particularly vulnerable to climate change because of the Urban Heat Island effect. Buildings and other urban structures without vegetation trap heat, leading to higher temperatures in the city compared to the surrounding countryside. Heatwaves cause thousands of deaths every year, as the human body is not able to cope with prolonged extreme heat.

Funded by the Austrian Climate Research Fund, the Urban Climate Change Adaptation for Austrian Cities: Urban Heat Islands (ADAPT-UHI) project was developed to support urban planners in creating strategies and action plans for climate change adaptation and mitigation in Austria. The project focused on Klagenfurt, Mödling, and Salzburg, three small to medium-sized cities that often get overlooked in heat island studies, which have tended to focus on major cities. The researchers came up with a series of recommendations, a number of which have since been included in their city strategies, such as planting more trees, using green or white roofs, and greening surfaces, among others.

“One of the most interesting results was to see that while Mödling would benefit if it implemented our recommendations, the benefits would be even higher if



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the surrounding regions implemented them too,” says Linda See, a researcher in the IIASA Advancing Systems Analysis Program who led the project at IIASA. “We invited representatives from each of the regions to show them this result, and it was great to see people realizing that if they cooperated, their benefits would be even larger.”

A MASSIVE PILE OF GARBAGE

With so many people living in close proximity, working out what to do with the enormous amounts of waste generated in cities becomes a real challenge. Unmanaged waste is not just an aesthetic issue—without proper disposal, it can become a hazard for both humans and the environment.

While recent decades saw an increase in efforts towards recycling, globally only around 13% of waste is recycled and only 5.5% is composted. It is clear that we need to do better. IIASA researchers and colleagues from the University of Natural Resources and Applied Life Sciences in Vienna looked at future trends of global municipal waste generation and their impact on greenhouse gas emissions and air pollution if waste management systems stayed as they are now until 2050. Then, they assessed how implementing circular waste management systems where waste generation is minimized, materials are reused and recycled, and waste is collected and disposed of effectively could reduce waste and associated emissions.

“WASTE REDUCTION TOGETHER WITH THE ADOPTION OF CIRCULAR WASTE MANAGEMENT SYSTEMS WILL DELIVER A BROAD RANGE OF CO-BENEFITS INCLUDING REDUCTION OF GREENHOUSE GAS EMISSIONS, AIR, AND WATER POLLUTION”

“Waste reduction together with the adoption of circular waste management systems will deliver a broad range of co-benefits including reduction of greenhouse gas emissions, air, and water pollution,” says Adriana Gómez-Sanabria, a researcher in the IIASA Energy, Climate, and Environment Program. “All of this would contribute towards the realization of the Sustainable Development Goals.”

Following up on this research, Gómez-Sanabria and her colleagues are taking a closer look at preventing waste from leaking into waterways where the negative impacts on health and the environment are especially high. In an upcoming study, they identify the residential zones close to rivers, lakes, and coastal areas where the adoption of circular waste management systems should be prioritized.

CLOSING THE LOOP

Circularity isn't only important in waste management, but it is also a crucial step in delivering on almost every aspect of agreements like the Sustainable Development Goals and the Paris Agreement. IIASA has been coordinating CircEUlar, a Horizon Europe project aiming to develop circular pathways for a low-carbon transition in the European Union, involving several research institutions across Europe.

The project combines stakeholder engagement, empirical analysis, and integrated modeling approaches with the goal of developing new methodological approaches for the modeling of circularity in the context of climate mitigation pathways, while considering the role of digitalization, mobility, buildings, and household services in detail.

"The demand-side focus of the research with emphasis on exploring the implications of new business models and changing consumer practices makes this a really exciting project to work on," says Volker Krey, a researcher in the IIASA Energy, Climate, and Environment Program and the principal investigator on the project.

BY CITIZENS, FOR CITIZENS

Urbanization in Europe has an even more striking tendency than global estimates: by 2050 almost 85% of Europeans will live in cities. In an effort to make the transition more inclusive, an IIASA-led Horizon Europe project called Urban ReLeaf, aims to leverage the power of citizen science to co-create livable cities for the future, increasing the participatory aspect of city planning.

"We are collaborating with local communities and more specifically vulnerable groups to design inclusive urban greening strategies," says Inian Moorthy, a researcher in the IIASA Advancing Systems Analysis Program and a co-coordinator of the project.

The project focuses on climate change adaptation, green infrastructure, and urban design planning in six cities across Europe. As many cities lack the necessary data for robust green planning decisions, citizen science can help close these gaps. Some of the initiatives include creating a tree registry in some of the cities, distributing temperature, humidity, and air pollution sensors to citizens, as well as directly collecting citizens' perceptions.

"WHAT IS UNIQUE ABOUT THIS PROJECT IS THAT WE ARE DIRECTLY PARTNERING WITH CITY ADMINISTRATIONS"

"What is unique about this project is that we are directly partnering with city administrations," says Gerid Hager, a researcher in the IIASA Advancing Systems Analysis Program who co-coordinates the project with Moorthy. "Hopefully this will increase their commitment to work on these topics and to try to accelerate the uptake of citizen observations in their governance processes."

While there is a lot of data available to help policymakers discern the best strategy for governing urban environments, as Thompson writes, "everything hinges on governance: on getting all that re-engineering of city infrastructure to actually happen." Collaborating with city officials and citizens themselves is a crucial step to make the move from science towards real action; towards creating the green, sustainable, and inclusive cities of tomorrow.

Further info:

www.iiasa.ac.at/circeular
www.iiasa.ac.at/recreate
www.iiasa.ac.at/urban-releaf
<https://urbanreleaf.eu/>
pure.iiasa.ac.at/17284
pure.iiasa.ac.at/11653

Brian Fath fath@iiasa.ac.at

Adriana Gómez-Sanabria gomezsa@iiasa.ac.at

Gerid Hager hager@iiasa.ac.at

Volker Krey krey@iiasa.ac.at

Inian Moorthy moorthy@iiasa.ac.at

Linda See see@iiasa.ac.at

Michael Thompson thompson@iiasa.ac.at



REGIONAL IMPACTS

By *Jeremy Summers*

Explaining the impacts of climate change on migration

There has been much debate around the impact of climate change on migration. The international discourses around this topic, however, have often been more politically charged and less backed by science.

In a recent IIASA Working Paper, Roman Hoffmann, who leads the Migration and Sustainable Development Research Group of the IIASA Population and Just Societies Program and his coauthors, used a novel internal migration dataset built on 107,916 migration flows between subnational region pairs over time to analyze climatic impacts on internal migration worldwide. The researchers then combined this migration data with data on drought and aridity in the subnational regions to estimate whether changes in climatic conditions have affected migration.

Their results show that drought and aridity have a considerable impact on internal migration. The strongest migration impacts were observed in hyper-arid and arid areas of Southern Europe, the Middle East and North Africa, Southern Asia, and South America. Additionally, the results show that within individual countries, it is the relatively poorer regions where populations respond strongest to environmental stress.

“Drought and aridity are found to increase internal migration worldwide with considerable heterogeneity across regions as well as age and education groups,” explains Hoffmann. “Our study provides new comparative evidence on the impacts of climatic factors on internal migration using novel longitudinal census migration data for 72 countries. The findings highlight the importance of differential mobility patterns across population subgroups in different contexts.”

Further info: pure.iiasa.ac.at/18922

Roman Hoffmann hoffmannr@iiasa.ac.at



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Adapting water needs for agriculture in South Africa

In many parts of the world, access to freshwater is becoming increasingly scarce. Nowhere is this truer than in South Africa, which experienced a significant drought from 2015 to 2018. The example of South Africa highlights the complex dynamics of the different parties that are vying for water supply for both urban and agricultural uses.

Former IIASA Young Scientists Summer Program participant Simone Theron, along with her coauthors, including IIASA researchers Stefan Hochrainer-Stigler and Silvia Tramberend, employed a mixed-methods approach by combining a sustainable livelihoods framework with semi-structured interviews to measure the impacts of the drought on irrigated apple production in the region.

Their results show a progressive weakening of natural and physical capital between 2015 and 2018. However, their findings also show that human intervention greatly mitigated the impact of the drought on apple production. This indicated the importance of developing policies that focus on local vulnerabilities, especially regarding climate change adaptation planning.

“This research shows that there are important interlinkages between sectors and the decisions of risk bearers during disaster events,” explains Hochrainer-Stigler, a senior researcher in the IIASA Advancing Systems Analysis Program. “The wrong decision, or the right decision that takes too long, can exacerbate an already stressful situation, and make matters much worse. A systemic perspective focusing on the connection between actors and decisions can assist in determining ways forward. This perspective can not only help to decrease negative feedback loops within the system, but also jointly adapt to current and future risks.”

Further info: pure.iiasa.ac.at/18921

Stefan Hochrainer-Stigler hochrain@iiasa.ac.at

Sylvia Tramberend trambers@iiasa.ac.at



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Addressing sustainable housing needs for low-and middle-income countries

It is expected that the coming decades will see unprecedented levels of residential building construction, particularly in low- and middle-income (LMI) countries. In fact, LMI countries represent roughly 80% of the world's current population and 99% of expected population growth over the next 10 years.

However, less than 50% of studies measuring residential building life-cycle assessment (LCA) include LMI countries. As a result, current commendations fail to address the very real needs of LMI countries in the design and construction of residential buildings.

In a new study published in the journal *Environmental Science and Technology*, researchers analyzed residential building LCA studies from the 135 LMI countries and created a classification system for diverse building types that can be used to inform future research.

Their results show that it is critical to not only streamline and organize residential building LCAs for LMI countries, but also for the representation of buildings from these countries in global studies.

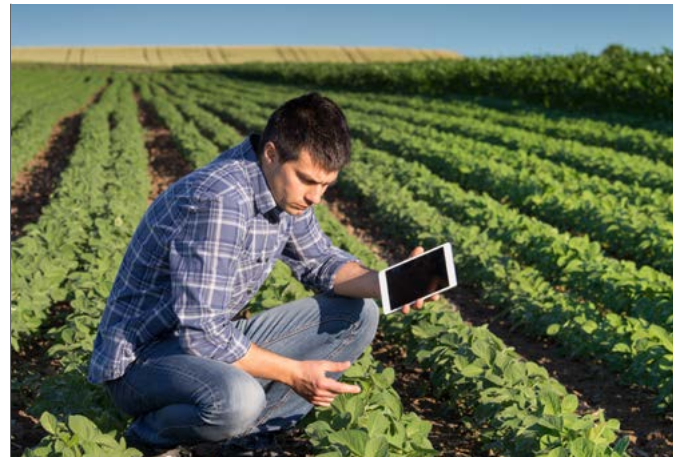
“This study is the first to examine the heterogeneity of building types in low and middle-income countries,” explains study author Narasimha Rao, a senior researcher in the IIASA Energy, Climate, and Environment Program. “Understanding their impact on thermal stress will improve our ability to protect against greenhouse gas emissions from buildings in the Global South and better design mitigation solutions. Our objective is to incorporate these new building archetypes into IIASA's energy models and refine scenarios of future emissions pathways that entail decent living standards for all.”

Further info: pure.iiasa.ac.at/18860

Narasimha Rao nrao@iiasa.ac.at



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Adopting new strategies for fighting soybean failures in the Americas

Soybeans are one of the most vital crops across the globe. Most of its production, however, occurs in just Argentina, Brazil, and the US, making the global supply vulnerable to potential regional disruptions.

Such a disruption may come from weather disturbances, which are posing serious risks to crops globally. In 2012, poor growing conditions in all three countries caused very low soybean yields, driving the price of the crop to record highs. This event should be seen as both a warning sign and a call to action to step up the fight against ongoing threats from climate change.

In their study published in the journal *Earth's Future*, Christian Folberth, a researcher in the IIASA Biodiversity and Natural Resources Program, and his colleagues, combined process-based models and data-driven modeling to derive more robust climate impact estimates on crop production. The study used a storylines approach, which relates potential future impacts to past events, a novel new way for properly communicating the impact of climate change to a wider audience.

“The study highlights adaptation as key to ensuring the security of supply for soybean under high emission and global warming pathways,” explains Folberth. “While the study assumed a scenario of continuous adaptation to gradually changing climate, which is a common process in farming in the long run, a greatly accelerated pace of climate change expected for coming decades will require substantial efforts to avoid increasingly frequent soybean failures in the three source countries.”

Further info: pure.iiasa.ac.at/18707

Christian Folberth folberth@iiasa.ac.at



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Considering the private sector in post-pandemic biodiversity policymaking

When it comes to sustainable development, few things are as important as biodiversity. However, the past decade has seen multiple disruptions to biodiversity conservation, including insufficient financial provisions and the effects of COVID-19.

IIASA researchers and colleagues analyzed numerous policy frameworks and found that they focus largely on public sector interventions. Focusing on East and Southeast Asia, the researchers suggest that mobilizing the private sector in this effort will have a more significant impact for sustainability. In fact, according to the study, the recent global pandemic can be seen as an opportunity to transform mankind's approach to sustainability.

"Myopic visions and a lack of systems thinking have consistently delayed the implementation of conservation strategies," explains study author Ali Kharrazi, a senior researcher in the IIASA Advancing Systems Analysis Program. "While the COVID-19 pandemic has been a tragedy for humankind, it has also highlighted the risks and vulnerabilities of ignoring nature in economic and development policies. To this end, the world should not rely solely on government-led approaches, which are inherently slow and inflexible. Instead, society should promote a more active role for the private sector and businesses that understand the value of impacts on natural capital. In this manuscript, we highlighted the opportunities that can mobilize the private sector towards the reforms needed for sustainable development. COVID-19 has offered an opportunity to deliberate and decide on direction-setting ambitious targets that can trigger and facilitate such transformations towards nature conservation."

Further info: pure.iiasa.ac.at/19096
Ali Kharrazi kharrazi@iiasa.ac.at



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Analyzing how working mothers impact the workforce in China

Women's participation in the labor force in China has been high compared to the rest of the world, but that rate is falling, creating a new gender gap in the Chinese workforce.

IIASA Population and Just Societies Program researcher, Guillaume Marois and his student, Shuomei Liu, used logistic regression models to explore the impact of having children on the labor force among married women in China.

Their results show that having children, especially more than one, significantly reduces married women's labor force participation in China. Similarly, they found that having a younger child has a much more significant negative impact on workforce participation.

Additionally, the researchers discovered that the negative effect of having children on women's labor force participation is stronger for highly educated women. Results also suggest that public childcare services and supportive family policies are needed to mitigate these childbearing effects and promote gender equality.

"A potential increase in fertility resulting from the end of the one-child policy could create a double burden for workers in the short term as higher fertility decreases women's workforce participation," explains Marois. "This shrinks the pool of potential workers who will have to pay for both a higher number of children and a growing number of elderly people, thus exacerbating population aging challenges. This underlines the importance of reducing the barriers that prevent mothers from reconciling their family and professional life."

Further info: pure.iiasa.ac.at/18696
Guillaume Marois marois@iiasa.ac.at



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Consistent vs. increasing levels of population decline in Spanish municipalities

Population decline is a key demographic challenge facing modern society. While previous studies have examined population decline, less is known about the different contemporary trajectories of depopulation in small areas and their demographic and contextual factors.

A recent study published in the journal *Geographical Analyses* shows that while Spain recorded an overall 17.2% population growth between 2000 and 2020, 63% of municipalities experienced depopulation. Their findings demonstrate that population decline is more prevalent in rural areas (71% of rural municipalities), but also occurs in 18.9% of core cities, 6.8% of suburbs, and 15.1% of towns.

The study identifies six distinctive trajectories of population decline and reveals that populations and a birth deficit characterize trajectories with consistent and high levels of decline, while trajectories with transitions to decline are underpinned by a drop in immigration since the global financial crisis of 2008.

“With Europe at the epicenter of population decline, the EU is promoting policy measures to mitigate depopulation,” explains lead author Miguel González-Leonardo, a researcher in IIASA’s Population and Just Societies Program. “However, effective policy design requires a good understanding of different trajectories of population decline and underpinning demographic and contextual factors. Policy measures are unlikely to mitigate depopulation in rural areas experiencing trajectories of consistent and high levels of decline. Rural municipalities and small- and medium-size cities undergoing temporary and lower levels of depopulation, however, have the potential to do so, especially declining cities.”

Further info: pure.iiasa.ac.at/185793

Miguel González-Leonardo gonzalezm@iiasa.ac.at

Addressing landscape justice in Atlantic salmon fishing in Finland

Atlantic salmon fishing in Northern Fennoscandia is more than just a local source of food or means of outdoor recreation and nature-based tourism. It is a time-honored tradition for Arctic residents, whose ancestors have fished Northern Finland’s rivers for countless generations.

But in the modern world, there are many different questions—from ecological and sociocultural to legal and political—surrounding who has the right to fish salmon in these ancient rivers.

In a new study published in the journal *Land*, researchers explored these questions as perceived by stakeholders culturally, economically, or administratively attached to these rivers. Their findings demonstrate that the way salmon fishing is currently governed (from the top down) causes landscape injustice. This manifests as an unfair distribution of risks and benefits regarding fishing governance and its difficulties.

Results of the study also indicate the need for recognition and systemic evaluation of sociocultural and local economic aspects of salmon fishing, which are mostly ignored in favor of solely analyzing the overall ecological status of salmon populations.

“Atlantic salmon is connected to a variety of landscapes’ sociocultural, economic, and environmental values,” explains lead author Mia Landauer, a guest researcher in the IIASA Advancing Systems Analysis Program. “The study’s findings show that to advance towards more equitable environmental governance of Atlantic salmon, national and international policy decisions need to take into account the local socio-cultural and economic components of Atlantic salmon fishing as well.”

This project, JUSTNORTH, was funded by the European Union’s Horizon 2020 research and innovation programme (grant agreement no.: 869327).

Further info: pure.iiasa.ac.at/18837

Mia Landauer landauem@iiasa.ac.at



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FROM OUR NETWORK



Connect

IIASA Connect: Building impactful regional communities

By *Tyseer Aboulnasr*

As IIASA Connect brings together the global systems analysis community, it also acts as a hub for regional communities to connect and engage. Tyseer Aboulnasr, Chair of the IIASA Committee for Egypt, shares how the recently established North Africa Applied Systems Analysis Center (NAASAC) has benefited from including their community of diploma participants on this versatile platform.

Egypt has been an IIASA member for over 15 years and recognizes the value this membership provides to its professional community interested in evidence-based decision making. We recently established NAASAC in collaboration with IIASA to spread and strengthen this culture of decision making based on evidence-based systems thinking. Our goal is to create a community of professionals in the field; a community that shares experiences nationally and is well connected, both regionally and internationally, to enable impactful policymaking.

As a starting point, we established a graduate diploma targeting mid-level government officials. IIASA Connect

provides a home for this “community seed” allowing our graduates and experts to come together and utilize this space as an interactive hub to showcase our work, connect to other networks, and share and receive relevant updates.

Being a member of IIASA Connect and hosting an IIASA Connect Feature has, for example, allowed us to share our experience with other IIASA member organizations interested in establishing regional systems analysis centers, while also providing valuable input to fine tune our own strategy.

In addition, one of our graduates, Mai Awad, published a blog about her experiences in NAASAC’s Diploma Program through this platform and participated as a speaker in the IIASA Connect Coffee Talk on Science Communication – Science to Policy. This was a great opportunity for her to connect internationally with people in the same field.

We understand that it takes time to build a national community deeply rooted in an international setting, and we are confident that IIASA Connect can help us achieve this.

CONVERSATIONS WITHIN OUR GLOBAL SYSTEMS ANALYSIS NETWORK ARE TAKING PLACE IN IIASA CONNECT!

IIASA Connect Coffee Talks bring together members of IIASA staff, alumni, and National/Regional Member Organizations for dialogues on issues that add value to the community.

IIASA Connect Features promote relevant opportunities and achievements available to our network.

Interested in hosting or speaking at our events? Join the network today! : connect@iiasa.ac.at

The **IIASA Connect App** is available on Google Play and the App Store.



WHERE ARE THEY NOW

Esperanza González Mahecha

By **Monika Bauer**

As a Climate Change Specialist at the Inter-American Development Bank (IDB), IIASA Young Scientists Summer Program (YSSP) alumna, Esperanza González Mahecha, is supporting countries in Latin America and the Caribbean to include climate change considerations in all aspects of planning, from infrastructure works and financing schemes, to policies that foster sustainable and inclusive development to improve lives.

“I am glad to have the opportunity to work with governments using my scientific background to help them advance the agenda to fight climate change,” she notes.

González Mahecha supports initiatives like IDB CLIMA, which is a first-of-its-kind among multilateral banks to offer a financing tool that rewards investments that create the capacities and systems required to access higher concessional financing and mobilize financial flows at scale. This innovative pilot program aims to test a results-based approach for improving biodiversity and climate policy, providing the borrower country with a discount when the nature and climate objectives of selected projects are met.

When remembering her time at IIASA, she says: “The YSSP was an unforgettable experience. I am so grateful to have participated and for the friends I made along the way. I learned so much from my peers and the terrific scientific



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community. Meeting and sharing thoughts with many people worldwide working on energy and climate change challenges was inspiring. I learned that collaboration and transdisciplinarity are relevant to addressing humanity’s problems.”

According to González Mahecha, her YSSP experience also reinforced her vision that climate change is not just an environmental problem, but also a social and economic one. She feels that the knowledge acquired during the program has been invaluable for the different roles she has filled since in the fields of energy, climate change, and biodiversity.

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IIASA PEOPLE

Understanding biodiversity as a nexus issue

IIASA researcher Martin Jung is a rising star in the field of conservation research with a passion for exploring how biodiversity and conservation issues can truly be embedded in complex systems.

By *Langit Rinesti*

Jung has always been interested in biodiversity, ecology, and conservation both in terms of exploring our natural world and understanding and quantifying how biodiversity will be affected in response to global change. This led him to pursue his studies in Biodiversity and Environmental Sciences, culminating in a PhD from the University of Sussex in the UK focusing on broad-scale biodiversity impacts.

At IIASA, Jung is involved in a range of projects related to ecological modeling and integrated planning for conservation and nexus issues, all of which broadly try to identify cost-efficient future conservation and restoration priorities for biodiversity, while minimizing impacts on the bioeconomy.

“Biodiversity is at the heart of so many elements of a wider system. With its decline, we can expect entire systems to be affected,” he notes.

One of his research interests is to explore how biodiversity and conservation issues can be truly embedded in complex systems. So far current quantitative approaches allow few feedbacks between biodiversity and other sectoral issues.

“Conservation issues can be quite complex and require extensive collaboration across disciplines, which is what makes working in an interdisciplinary environment such as IIASA so important,” he explains.

In the future, Jung wants to play a bigger role in supporting other biodiversity conservation scientists and practitioners by making new data and quantitative tools openly available.

Martin Jung jung@iiasa.ac.at



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Communicating research into climate mitigation policies

Zuelclady Araujo Gutierrez’s research supports governments to have better data and tools for their long-term climate change mitigation planning, tailored to the realities of their countries.

By *Stephanie Okeyo*

Climate change is a global challenge, but Araujo Gutierrez has always been interested in how it manifests differently, depending on the region, the country, or local community, as these require having a global vision while considering specific strategies.

She joined IIASA in 2022 after working as a consultant for various multilateral organizations and governments in Latin America and in her home country, Mexico. Along the way, she realized that there would never be a one-size-fits-all solution. So, she started asking, “How does one translate scientific information in a way that is relevant, relatable, and useful in different contexts for various stakeholders?”

At IIASA, she explores how governments can use the Global Biosphere Management Model (GLOBIOM) to analyze land-use demand and implement national policies that will achieve net-zero emission targets by 2050. Her analyses aim to create specialized, tailored approaches that can be used to inform decision-making processes.

“It is vital to be sensitive and flexible when working at the science-policy interface,” she says. “Even if the science is clear, stakeholders have different points of view, resources, needs, and priority areas that ultimately influence their decisions. By listening and addressing local needs and incorporating those into our modeling, we stand a better chance of seeing good policy put into action.”

Araujo Gutierrez hopes to create sustainable support systems for governments to use GLOBIOM to inform national climate policies, especially within Latin America.

Zuelclady Araujo Gutierrez zmfaraújo@iiasa.ac.at



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Nurturing the next generation of systems scientists

Every year, a select group of talented young scientists are offered the opportunity to embark on a transformative, career-shaping journey in the picturesque town of Laxenburg, Austria when they participate in the IIASA Young Scientists Summer Program (YSSP).

By *Ansa Heyl*

At its inception, IIASA faced a scarcity of researchers versed in the art of systems analysis. This multidisciplinary, international, and applied approach was a novel endeavor, and IIASA needed to bridge the gap by recruiting experienced scientists and forming them into interdisciplinary teams. However, the challenge lay in the difficulty for seasoned researchers to adapt to new methodologies.

The solution? The creation of the YSSP—a platform where early-career researchers converge to learn, collaborate, and innovate under the mentorship of IIASA experts. The program aims to provide the most comprehensive systems analysis training possible, preparing the next generation of scientists to address the intricate web of global issues.

Each year, talented PhD students from around the world participate in the YSSP. The program kicks off with an immersive week in June, where fellows gain insights into ongoing research at IIASA and present their projects on a topic related to the IIASA research agenda. Guided by mentors, these young scientists spend the summer refining their research and producing a paper as a first step towards a publishable journal article.

Beyond research, the YSSP emphasizes collaboration and community building. This year, a guided hike through the Austrian countryside provided a backdrop for shared experiences and discussions—a blend of work and leisure that enhances the overall YSSP experience.

Since its establishment in 1977, the YSSP has hosted approximately 2600 fellows. The impact of the program is tangible, as evidenced by the diverse projects and the subsequent achievements of YSSP alumni.

To name just a few, 1994 YSSP alumnus Adil Najam is president of the World Wide Fund for Nature (WWF), and inaugural Peter de Jánosi Visiting Fellow at IIASA; 2006 YSSP Katherine Calvin is currently NASA's Chief Scientist and Senior Climate Advisor; 2010 YSSP participant Arame Tall is a Senior Adaptation and Resilience Specialist in the Climate Change Group of the World Bank; and 2017 alumna Esperanza González Mahecha works as a Climate Change Specialist at the Inter-American Development Bank (IDB).

“Our hope is that the participants not only gain valuable research experience but also carry the spirit of the IIASA approach into their future endeavors. For us, success is not just measured in publications, but in the creation of an intellectual and emotional anchor that lasts a lifetime,” says IIASA Capacity Development and Training Dean, Fabian Wagner.

As the YSSP continues to evolve, it stands as a testament to IIASA's commitment to fostering a community of scientists equipped to navigate the complex landscape of global challenges. Enriched by the YSSP experience, YSSPers are poised to become not just researchers but ambassadors of a more sustainable world—an embodiment of the systems approach that IIASA values and believes is crucial for addressing the challenges that lie ahead.

Applications for the 2024 YSSP are open until 12 January 2024 – [click here for more information](#).

Further information: www.iiasa.ac.at/yssp

Fabian Wagner wagnerf@iiasa.ac.at

IIASA TRAILBLAZERS: CELEBRATING EXCELLENCE IN 2023

IIASA has a long history of being home to some of the most exceptional systems thinkers of our time. In the last year, several IIASA researchers were again honored with various awards and appointments.

By Ansa Heyl



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IIASA Interim Deputy Director General for Science, Wolfgang Lutz, is an internationally recognized social scientist and demographer known for his work on international population trends with a special focus on population forecasting, population-development-environment interactions, and introducing education as a standard demographic dimension in addition to age and sex. In recognition of the scientific-political relevance and high topicality of his research throughout his career, Lutz was awarded the Austrian Research Association (OeFG)'s Science Prize in 2023.

Earlier this year, Lutz was also appointed as Special Adviser to Dubravka Šuica, the European Commission Vice President for Democracy and Demography. In this role, he will provide tailored advice, representation, and support to Vice President Šuica, ensuring that demographic considerations are mainstreamed into the evaluation, preparation, and implementation of policy initiatives, legislation, and budgeting.



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IIASA Population and Just Societies Program researcher Sergei Scherbov has received an honor of his own in being elected to the prestigious Academia Europaea in recognition of his groundbreaking contributions to demographic modeling, population projections, and innovative analyses of aging. His inclusion in the Human Mobility, Governance, Environment, and Space category further underscores the far-reaching impact of his work.

In the realm of conservation science, IIASA researcher Martin Jung was awarded the Society for Conservation Biology's 2023 European Early Career Conservation Award. His research, focused on the interconnectedness of land use, food production, and biodiversity indicators, has earned him acclaim for its role in shaping impactful spatial planning and impact assessment of conservation policies.

IIASA Cooperation and Transformative Governance Research Group Leader, Nadejda Komendantova, was appointed as an independent expert on the United Nations Environment Programme's (UNEP) Foresight Expert Panel established in cooperation with the International Science Council (ISC) to help identify and evaluate emerging issues and signals of change.

Energy, Climate, and Environment Program researcher, Nebojsa Nakicenovic was also appointed as a Fellow of the World Academy of Art and Science (WAAS) in acknowledgment of his dedication to advancing global civilization, human welfare, and sustainable development through transdisciplinary studies and operational projects throughout his career.

The year's recognition continued with IIASA's impressive representation in the 2023 Research.com Top Scientists ranking, where 32 researchers and alumni affiliated with IIASA were acknowledged for their outstanding contributions. The rankings, determined through meticulous evaluation of profiles on Google Scholar and Microsoft Academic Graph, highlight the institute's commitment to excellence in research across diverse fields.

Lastly, six eminent researchers were honored with the title of IIASA Distinguished Emeritus Research Scholar. Günther Fischer, Arnulf Grübler, JoAnne Linnerooth-Bayer, Nebojsa Nakicenovic, Sergei Scherbov, and Anatoly Shvidenko were all lauded for their significant contributions to systems analysis and their lifelong dedication to IIASA. Their impactful work spans fields such as world food systems, energy and technology, risk management, demography, and forest and vegetation carbon science.

Further information: www.iiasa.ac.at/awards

Wolfgang Lutz lutz@iiasa.ac.at



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Q&A

Q&A

EMPOWERMENT
THROUGH SCIENCE

IIASA Transformative Institutional and Social Solutions Research Group Leader, **Shonali Pachauri**, explores policy pathways for achieving universal access to basic services and technologies. She was a lead author of the Working Group III contribution to the Intergovernmental Panel on Climate Change (IPCC)'s Sixth Assessment Report (AR6), and a member of the Extended Writing Team for the Synthesis Report.

By **Bettina Greenwell**

Q What role do the IPCC and Working Groups play in increasing ambition and action on climate change?

A The IPCC provides the most comprehensive and authoritative assessment of available knowledge on the risks, causes, and consequences of climate change, as well as the potential response strategies to address it.

The latest IPCC Synthesis Report highlighted just how far off-track the world is and underscored the urgency of taking more ambitious action. It serves as a critical input to the first global stock take of the United Nations Framework Convention on Climate Change (UNFCCC).

Q Do you have any suggestions on how society could apply the knowledge gained from the report to enable a quick transition to carbon neutrality?

A The exact strategies for a transition to carbon neutrality will vary by context, but the AR6 provides a clear assessment of available options in every sector that can at least halve emissions by 2030. For the first time, it includes an entire chapter on “Demand, Services, and Social Aspects of Mitigation”. A key message is that changes to our lifestyles and behavior can reduce our carbon footprint and improve our health and wellbeing. To be effective, such lifestyle changes need to be supported by systemic changes across every aspect of society – including transport, buildings, industry, and land use.

On an individual level, the biggest contribution can be achieved by switching to walking and cycling and using

electrified transport. Other effective options include reducing air travel and adapting our houses. Shifting towards balanced, plant-based diets can help lower our individual carbon footprints and is good for our health too.

Q What do you hope to accomplish with your work at IIASA?

A I hope that through my work I can expand knowledge of how to achieve a decent life for all with access to energy services, infrastructure, and other essential resources, while simultaneously protecting our planet. I am particularly interested in applying the research I do with my IIASA colleagues to improve the lives of people that are deprived of the basic services that are important to living a decent life.

Q You have published multiple papers in high-profile journals, and you are on the editorial advisory boards of several journals. What advice can you give early-career researchers?

A Work on issues that you are passionate about and committed to. There will be times when your work will feel like sheer hard graft, but it's important to build persistence, patience, and resilience to power through. If you embrace your challenges, they can become opportunities for growth and learning. Most importantly, surround yourself with people you enjoy working with. We spend so much of our waking life working, it is important to have fun at work too.

Shonali Pachauri pachauri@iiasa.ac.at

INSTITUTE NEWS

By *Bettina Greenwell*

The IIASA Biodiversity Club: Discovering local flora and fauna

The Biodiversity Club aims to connect IIASA staff members to nature by organizing excursions in and around Laxenburg.

“We offer support to get to know the biodiversity surrounding the institute through citizen science campaigns,” says Martin Jung, a researcher in the IIASA Biodiversity and Natural Resources Program and president of the Biodiversity Club. “For example, we are currently running an IIASA iNaturalist project. iNaturalist is a citizen science platform where users can upload pictures of wild plants and animals.”

So far, the club has collected presence records for over 800 species living in the park surrounding the institute. Recent observations included the European stag beetle, the Armenian blackberry, a plant native to Armenia and Northern Iran, and the woodland grayling, a type of butterfly listed as near threatened.

The regularly scheduled lunchtime “Biodiversity Walks” are popular among IIASA staff.

“Not only are these walks a break from your desk, but they also bring colleagues together to learn and share knowledge about plants and animals encountered during the walk,” says IIASA External Relations Officer Jodey Peyton, who co-organizes the walks.

Club members have also arranged a trip to Lake Neusiedl, a UNESCO World Heritage Site spanning the border of Austria and Hungary, to participate in a bird watching tour. The reed bed of Lake Neusiedl is an important resting place for migratory birds on their way to and from Africa.



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Eco-theater: Science and art to support the sustainability transformation

What happens when you combine art and science? Often thought of as completely different fields, IIASA alumna Gloria Benedikt breaks through the divide and thrives at their dynamic intersection. The researcher and performer has directed multiple multimedia performances at theatres, universities, festivals, and conferences across Europe and the US.

In October 2023, at the MuTh Vienna concert hall, a double bill of eco-theater put together by Benedikt explored the potentially existential threat to human existence through the metaphors of breathing and eating while seeking a way forward. Eco-theater strives to create science-based work in the context of our new climate reality toward a goal of environmental justice.

The evening opened with *Four Drifting Seasons* by Dutch composer Merlijn Twaalfhoven. Based on NASA data from 1880 to present, an opera singer sang the temperature rise.

This was followed by *Breath* – a multimedia dance piece by Benedikt and a team of scientists from IIASA and Harvard University. The piece depicts a journey through time, starting from cyanobacteria that accidentally produced oxygen two and half billion years ago, enabling life on planet Earth, to the present day, where the human species is slowly but consistently depriving itself of air to breathe and then perhaps, albeit belatedly, changing course.

The evening’s program concluded with the premiere of the theater play *Piece of Cake*. It was developed in 2019 as part of the IIASA Science and Art project by Lanxing Fu, co-director of the Brooklyn-based Superhero Clubhouse, and Fabian Wagner, IIASA principal researcher and Capacity Development and Academic Training Unit dean.

IIASA ranked among the most active participants of Horizon Europe in Austria

By **Vladimir Tarakanov**

The Austrian Research Promotion Agency (FFG) is the national funding agency for industrial research and development run by the federal government of Austria. Due to the Agency's scope of work, the FFG has access to information on the performance of different institutions within the country with regard to different research projects and collaborations, as well as technological trends at the European level.

According to the FFG EU-Performance Monitor data from February 2023, IIASA ranked fifth in terms of Horizon Europe Programme participation among all Austrian organizations, including both university and non-university research organizations. The FFG also identified IIASA as the most active participant from all Austrian non-university research organizations. Other organizations sharing the top positions include the University of Vienna, the Austrian Institute of Technology (AIT), the Vienna University of Technology (TU Wien), and the University of Natural Resources and Life Sciences (BOKU).

“These achievements reflect the extensive international scientific network of IIASA and the fact that we are addressing some of the most timely and policy-relevant topics,” says IIASA Interim Deputy Director General for Science, Wolfgang Lutz. “We strive for constant improvement and scientific excellence in line with the institute's vision for 2021 to 2030 — to be the primary destination for integrated systems solutions and policy insights to current, emerging, and novel global sustainability challenges, threats, and opportunities.”

Horizon Europe is a scientific program of the EU, which provides funding for research and innovation projects. It facilitates collaboration and provides additional capacity for research and innovation to develop, support, and implement EU policies. Its primary objective is to support the creation and distribution of knowledge and technologies to help achieve the Sustainable Development Goals and tackle global challenges. Horizon Europe provided vital funding for a broad multiplicity of IIASA research projects, focusing on sustainability, climate neutrality, biodiversity preservation, air pollution, demography, and other fundamental global issues.

In 2022 alone, Horizon Europe provided over EUR 15 million of funding for IIASA projects. Some of the projects coordinated by IIASA and funded by Horizon Europe include:

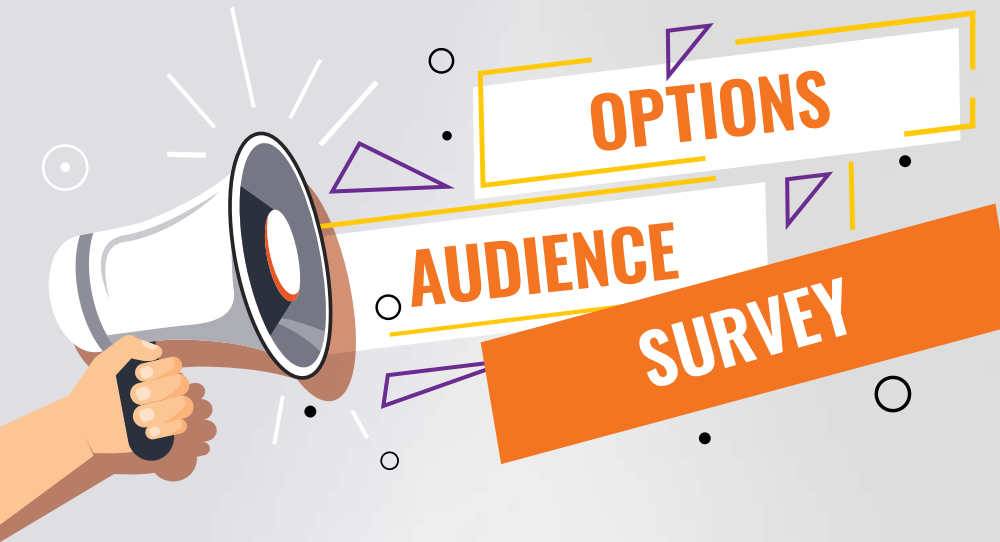
CircEular — a new four-year project aiming to develop circular pathways for a low-carbon transition in the European Union.

LAMASUS — a project aiming to produce tools and design processes allowing EU policymakers to assess the impacts of future climate change and land use policies ahead of their implementation.

ForestNavigator — a project helping to assess the climate mitigation potential of European forests and forest-based sectors and inform the public authorities on the most suitable approach to forest policy and bioeconomy.

Wolfgang Lutz lutz@iiasa.ac.at





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The International Institute for Applied Systems Analysis (IIASA) is an independent, international research institute with National- and Regional Member Organizations in Africa, the Americas, Asia, and Europe. Through its research programs and initiatives, the institute conducts policy-oriented research into issues that are too large or complex to be solved by a single country or academic discipline. This includes pressing concerns that affect the future of all of humanity, such as climate change, energy security, population aging, and sustainable development. The results of IIASA research and the expertise of its researchers are made available to policymakers in countries around the world to help them produce effective, science-based policies that will enable them to face these challenges.

National Member Organizations:

- AUSTRIA** The Austrian Academy of Sciences
- BRAZIL** (Observer) The Brazilian Federal Agency for Support and Evaluation of Graduate Education (CAPES)
- CHINA** The National Natural Science Foundation of China (NSFC)
- EGYPT** Academy of Scientific Research and Technology (ASRT)
- FINLAND** The Finnish Committee for IIASA
- GERMANY** Association for the Advancement of IIASA
- INDIA** The Technology Information, Forecasting and Assessment Council (TIFAC)
- INDONESIA** (Observer) Indonesia National Committee for Applied Systems Analysis (INCASA)
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