Options

FEATURE  Forests under threat
IIASA researchers are exploring ways to protect and sustainably manage the world's dwindling forests

FEATURE  A people-centered approach to limiting global warming
Could a different take on global energy use help us stay below 1.5°C?

SPOTLIGHT  25 years of Ukraine membership

Nurturing cooperation, preservation, and prosperity in the Arctic
Balancing environmental protection, economic opportunity, and societal wellbeing in the far North
Welcome to the new-look Options. Thank you to all our readers who completed our readership survey and shared their thoughts and suggestions on the magazine – we have incorporated much of the feedback that we received. In addition to introducing a new design, we have created an IIASA corner featuring institute news and articles about IIASA people.

Also in this issue, we highlight research done under the Arctic Futures Initiative, where scientists have been collaborating on projects covering a variety of issues affecting the northern reaches of our planet to find solutions that balance environmental protection, economic prosperity, and societal wellbeing (pages 12-15). We also take a closer look at the institute’s extensive work around ensuring the sustainable management and protection of the world’s dwindling forests (pages 10-11). These, and many other interesting articles in this issue of Options, illustrate the value of different nationalities and disciplines working together to find solutions to the global problems that society faces today. If you would like to share your comments or ideas for future issues, you are welcome to contact us via email.

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ABOUT OPTIONS
Options magazine features recent IIASA research and activities.

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SIX TRANSFORMATIONS NEEDED TO ACHIEVE THE SDGS: MAJOR REPORT LAUNCHED

The World in 2050 initiative launched a report at the UN High-level Political Forum, Transitions to Achieve the Sustainable Development Goals, setting out six transformations that will enable humanity to meet the Sustainable Development Goals (SDGs). They encompass demography, consumption and production, decarbonization and energy, food, biosphere and water, cities, and the digital revolution.

www.iiasa.ac.at/news/TWI2050-18

INDIA NOT ON TRACK FOR 2030 CHILD MORTALITY TARGETS

Almost half of the districts in India are not on track to reduce the mortality rates of newborns and meet the target set out under Sustainable Development Goal 3 for 2030, while a third will not meet the target for under-five mortality rates, according to IIASA research. India still has the world’s highest number of child deaths, and states must do more.

www.iiasa.ac.at/news/child-mortality-18

PARIS CLIMATE TARGETS COULD BE EXCEEDED SOONER THAN EXPECTED

A new study led by IIASA researcher Thomas Gasser has for the first time comprehensively accounted for permafrost carbon release when estimating emission budgets for climate targets. The results show that the world might be closer to exceeding the budget for the long-term target of the Paris climate agreement than previously thought.

www.iiasa.ac.at/news/Permafrost-18

Climate taxes on agriculture could lead to more food insecurity than climate change itself

Written by: Helen Tunnicliffe

New IIASA-led research has found that a single climate mitigation scheme applied to all sectors in the form of a global carbon tax could result in more widespread hunger and food insecurity than the direct impacts of climate change. Smarter, inclusive policies are necessary instead.

The researchers, led by Tomoko Hasegawa, a researcher at IIASA and Japan’s National Institute for Environment Studies, and Shinichiro Fujimori, an IIASA researcher and associate professor at Kyoto University, summarized outputs of eight global economic models, including GLOBIOM, to analyze various scenarios to 2050.

The models suggest that by 2050 climate change could be responsible for putting on average an extra 24 million people at risk of hunger. However, if agriculture were included in very stringent climate mitigation schemes, such as a global carbon tax or a comprehensive emissions trading system applying the same rules to all sectors, the increase in food prices would be such that an average of 78 million more people would be at risk of hunger. Some models put the figure as high as 170 million.

The researchers stress that their results should not be used to argue against vital emissions reduction efforts. Instead, the research shows the importance of “smart” targeted policy design, particularly in agriculture. Policymakers must scrutinize other factors more closely, rather than focusing only on the goal of reducing emissions.

The researchers suggest, among others, schemes encouraging more productive and resilient agricultural systems and complementary policies to counteract the impact of mitigation policies on vulnerable regions. For example, money raised from carbon taxes could be used for food aid programs.

Tomoko Hasegawa: hasegawa@iiasa.ac.at
China’s energy policies must balance air quality, emissions, and water scarcity goals

Written by: Helen Tunnicliffe

China, like many countries, is moving from coal to natural gas to address severe air pollution. Although such a switch generally has benefits for air quality, carbon mitigation, and water stress, a new study reveals that some options may actually increase emissions and water consumption.

A team of researchers from IIASA, Princeton University, and the University of Maryland are the first to analyze the interactions between air quality, carbon emissions, and water use in both energy production and consumption. The researchers combined life cycle analysis with an integrated environmental impact assessment. Compared to five other sources of national and imported gas, coal-based synthetic natural gas increases emissions and water consumption, particularly in China’s northwestern provinces, which already have high carbon emissions and water scarcity. The degree of improvement depends on the region and sector. Regions with high air pollution and regions with high water stress generally do not overlap, and sectors emitting high levels of pollutants are not the same as those with high water demand, so the trade-offs and benefits are different.

“Our findings show why it is critical to understand the underlying air-carbon-water synergies and trade-offs so that China and other developing countries can properly design clean energy transition pathways according to their local environmental priorities,” says Yue Qin, a Princeton researcher and alumna of the 2016 IIASA Young Scientists Summer Program.


Assessing the role of forestry in achieving climate commitments

Written by: Helen Tunnicliffe

IIASA researchers have led the development of guidance for EU member states estimating greenhouse gas emissions and removals from their forests. Member states agreed to include greenhouse gas emissions and removals from land use, land use change, and forestry (LULUCF) within the EU’s 2030 climate targets, as part of the Paris Agreement, so countries must now report them.

The document, written by a team led by IIASA researcher Nicklas Forsell, provides the first technical guidelines for EU member states. It will support decision makers in calculating their baseline projection of forestry greenhouse gas emissions and removals for the period 2021-2030, known as the Forest Reference Level (FRL), and reporting their National Forestry Accounting Plans, which explain the calculation of the FRL and the country’s long-term forest strategy. The FRL expressed in metric tons of CO₂ equivalent per year, will be used as a baseline to which future emissions and removals will be compared.

The FRL is based on a country’s historical forest management practices. The effects of new management policies such as conserving existing forests and increased production of wood-based products to replace carbon-intensive ones, will be compared with the FRL. The guidance document includes a variety of different, practical estimation and reporting methods to allow for different member states’ circumstances.

Novel framework to address uncertainty in water management

Written by Helen Tunnicliffe

IIASA researchers have developed a general decision-making framework to support policy decisions on the management of water resources, which for the first time, explicitly takes into account the associated uncertainties.

Reliable access to clean water is a key aspect of the Sustainable Development Goals. The researchers analyzed the wide range of possible future conditions likely to pose significant planning challenges for water management authorities in vulnerable regions and river basins.

“We identified changes in the uncertainty range of anticipated water scarcity conditions and based on this assessment, developed a general decision-making framework to support the design of policy options,” says Peter Greve, IIASA Water Program researcher and lead author of the study published in Nature Sustainability.

There are many options available to decision makers to address water scarcity, including investments in water storage and transfer infrastructure, desalination plants, and economic incentives. In addition, water sector challenges vary considerably between countries and regions. Due to the economic risks involved, decisions must be based on reliable projections or address large uncertainties through flexible planning.

Rather than being based on single models or multi-model averages, the new framework is based on 45 water scarcity projections representing different socioeconomic pathways, climate change conditions, and modeling approaches. It provides grid-scale guidelines, rather than commonly used country- or basin-scales.

The researchers say that the purpose of this new framework is not to substitute local assessments, but to contribute to overall planning and implementation processes. It is especially suitable for regional, national, and multinational water authorities, as well as socioeconomic stakeholders.


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**Halving systemic risk in financial markets without adverse economic effects**

Written by: Helen Tunnicliffe

Researchers at IIASA have developed a new method to reduce systemic risk in the European government bond market by half without disadvantaging involved institutions financially.

Systemic risk is the chance that a crisis at one company could lead to the collapse of a financial system. The new method focuses on the risk posed by common asset holdings by financial institutions, known as ‘contagion’, which occurs when investors have overlapping portfolios of assets. If an institution under financial stress sells a particular asset at a reduced cost – a fire sale – it will devalue it, thus devaluing the portfolios of other institutions.

The researchers first developed a model to quantify systemic risk within a financial market with overlapping portfolios, and then used the information to rearrange overlapping portfolios without changing any size or risk profiles.

The model showed that the systemic risk of the optimized market was reduced by a factor of 2.27. It is more densely interlinked and in the European government bond market example, every bank was invested in every asset.

**How to deal with critical risks from climate change beyond adaptation limits**

Written by: Helen Tunnicliffe

A new book edited by researchers at IIASA, the London School of Economics, and Deltares looks at the research, political debate, and policy options surrounding the impacts of climate change that may be irreversible and beyond physical and social adaptation limits, known as Loss and Damage.

*Loss and Damage from Climate Change: Concepts, Methods and Policy Options,* is the first publication from the Loss and Damage Network, a partnership of scientists and practitioners Reinhard Mechler, Risk and Resilience Program deputy director led the editorial team, which also included IIASA researcher Thomas Schinko and Risk and Resilience Program Director JoAnne Linnerooth-Bayer.

The book covers the political, legal, economic, and institutional dimensions of Loss and Damage, highlights the role of climate management, presents case studies, and identifies practical, evidence-based policy options. Five key propositions to policymakers include identifying the distinct policy space for Loss and Damage, the use of attribution science (the understanding of the mechanisms that lead to climate change) to better inform policy, and the development of a broad narrative highlighting mutual benefits of improved policies.

Mechler explains that the science supporting potential policies has been trailing the debate. The new book aims to address this, and the propositions could form a foundation for the development of widely acceptable policies.


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An IIASA-led project looking at economic ties between the EU and the Eurasian Economic Union (EAEU) has published three reports discussing prospects of enhancing cooperation despite ongoing political cool-down in three important areas: technical product standards, foreign direct investment, and transport corridors.

The "Challenges and Opportunities of Economic Integration within a Wider European and Eurasian Space" project includes the Eurasian Development Bank, the Vienna Institute for International Economic Studies, and the Centre for European Policy Studies.

There is much interest in creating stronger economic ties between the EU and the EAEU, but progress is hampered by serious political tensions between the EU and Russia.

“At present, the European Commission does not engage in any official contacts with the Eurasian Economic Commission (EEC) at the political level. This creates significant uncertainty for business. IIASA serves as a unique, depoliticized platform that allows experts, policymakers, and representatives of the business community to exchange views,” says Elena Rovenskaya, IIASA Advanced Systems Analysis Program director.

The report on Technical Product Standards and Regulations in the EU and EAEU – Comparisons and Scope for Convergence, revealed that the EAEU has adopted European and international standards for goods more fully than previously realized. This lays the groundwork for legal and technical cooperation, such as a mutual recognition agreement like that which exists between the EU and the United States, where the exporting country will certify to standards in the importing country.

The second document on Foreign Direct Investment between the EU and EAEU highlighted that investment flows between the EU and Russia are in steep decline due to mutual sanctions, with little chance of change in the near future. As a result, only short-term measures like protecting existing investments and simplifying administrative procedures can be suggested.

The third report, titled Trans-Eurasian Land Transport Corridors: Assessment of Prospects and Barriers, emphasized that economic cooperation between Europe and Asia will require increased land transport capacity and associated investment. Further development will require coordinated action, including a higher level of regulatory harmonization and the development of railway infrastructure and various border-crossing points. Chinese subsidies have improved the economics of land transport, and the stability of such subsidies will be a key issue.

The reports were presented at a high-level conference in Moscow in June 2018 – “Prospects for a deeper EU–EAEU economic cooperation and perspectives for business” – organized by IIASA, the EEC, the Russian Union for Entrepreneurs and Industrialists (RSPP) and Alexander Shokhin, President of the RSPP. The project was also presented at a number of high-level events, including those of the Organization for Security and Co-operation in Europe.

The researchers are planning the next phase of the project, aiming to provide scientific foresight into how EU-EAEU economic cooperation may develop in the future.

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Finding a balance between agriculture and nature

Written by: Ansa Heyl

Research shows that fully enforcing existing legislation in Brazil could bring about a compromise between agriculture and the environment.

In 1965, Brazil passed a set of laws to protect the country’s native vegetation and regulate land use. The “Forest Code” carried the promise of stopping illegal deforestation and continuing Brazil’s trajectory toward an ever-decreasing loss of forest areas. The legislation was, however, never fully enforced, with many saying that its regulations were too restrictive. In addition, despite a significant decrease in deforestation observed between 2004 and 2012, which is largely attributed to other factors, the legislation failed to curb illegal deforestation. This led to a revision of the law in 2012. In recent years, Brazil has nonetheless seen a sharp increase in the loss of forestland. This is ascribed to internal pressure for the loosening of environmental regulations due to economic and political turmoil in the country, an increased need for land, and a lack of incentives to encourage farmers to stop deforesting.

A team of researchers from several international institutions led by IIASA Ecosystems Services and Management Program researcher Aline Soterroni and Fernando Ramos from Brazil’s National Institute for Space Research, set out to understand the implications of fully enforcing the Forest Code on both the environment and the Brazilian agriculture sector to 2050. Their work is timely, as it could reassert the need for continuous efforts in the enforcement of the Forest Code, while showing that it will not prevent growth in the agricultural sector.

“Deforestation is responsible for a major share of Brazil’s greenhouse gas emissions and has historically been linked to cattle ranching and crop production. Between 1990 and 2016, the land use sector in Brazil emitted more than 50 billion tons of CO₂, which is equivalent to one year of global emissions. Understanding the nexus between agricultural expansion and land-use change is key for Brazil to meet its ambitious goals of emissions reduction set during the 2015 Paris climate talks,” explains Soterroni.

Although a paper on the team’s work was only published earlier this year, the research has been ongoing for some time and has already informed policy. Specifically, the results were applied in the land use, land-use change, and forestry component of the Brazilian Intended Nationally Determined Contributions (INDCs) presented in the Paris Agreement.

According to José Domingos Miguez, director of Brazil’s Department of Environmental Evaluation in the country’s Ministry of the Environment and a leading climate negotiator, land-use emissions are a central part of Brazil’s climate commitments.

“Being able to point to the scientific basis for our climate commitment helps build trust with other nations, and creates a transparent environment for climate negotiations in the future. The Brazilian Government has benefited from the cooperation between IIASA and other leading Brazilian public institutions. The results of the study were quite informative and have provided science-based evidence that has contributed to Brazil’s INDCs,” says Miguez.

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Energy transition in Jordan: Devising clumsy solutions for wicked problems

Written by: Ansa Heyl

Jordan is currently exploring a variety of options to satisfy its growing energy demand. These include the deployment of renewable energy technologies to utilize the country’s abundant wind and solar resources, as well as the possible introduction of new resources like shale oil and nuclear. Each of these options comes with its own set of risks and benefits, leaving policymakers with a ‘wicked problem’, in other words, one that is difficult to solve due to incomplete, contradictory, and changing requirements.

A four-year study by researchers from IIASA, Jordan, and Sweden examined the views and discourses of different stakeholder groups about social, environmental, and economic criteria in the context of risks, benefits, and costs associated with each of the technologies being considered. The extensive stakeholder engagement process included policymakers, members of the financing community, academia, NGOs, energy companies, and mayors of local communities. The data collected during the process were analyzed using several methods of participatory governance research, including multi-criteria decision analysis.

“Our work was a step towards developing compromise and ‘clumsy’ solutions – so called because they involve hearing and responding to all worldviews – in the policymaking process on energy transition in Jordan. It showed the whole range of choices and preferences on energy generation technologies not only to us but also to a variety of participating stakeholders. It has raised awareness among participants about differences in the views and risk perceptions of other groups, as well as about how choices within certain parameters translate into trade-offs on technologies,” explains Nadya Komendantova, a researcher with the Advanced Systems Analysis Program.

The team’s findings are currently being discussed in the context of the Jordanian energy-policy process.

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STRENGTHENING THE GLOBAL RESPONSE TO THE THREATPOSED BYCLIMATE CHANGE

Multiple IIASA researchers were involved in the production of the Intergovernmental Panel on Climate Change’s recently published Special Report on Global Warming of 1.5°C. In December, policymakers will meet at the 24th Conference of the Parties (COP24) in Poland to review the Paris Agreement, and the Special Report will provide important scientific input.

INFORMING POLICIES FOR A DIGITAL WORLD

Research involving IIASA researchers looked into why it is important for consumers, companies, and governments to pay attention to the digitalization of the global economy. Using Finland as a case study, the researchers proposed a number of government actions that can both support national economies and prepare countries for a future shaped by digitalization.

www.iiasa.ac.at/news/IPCC-1.5-18

A VALUABLE TOOL FOR DECISION MAKERS

The biannual European and Asian population data sheets produced by the IIASA World Population Program have been presenting summary information about demographic trends, current statistics, and projections since 2006. The 2018 edition provides information on changes in education composition and labor force, measuring economic dependency, and estimating healthy life years and fertility. The data sheets continue to be an invaluable resource for regional and national development practitioners and policymakers.
FORESTS UNDER THREAT

THE WORLD’S FORESTS ARE IN SERIOUS TROUBLE AND IIASA RESEARCHERS ARE EXPLORING APPROACHES FOR PROTECTING THE ENVIRONMENT AND ENSURING THE SUSTAINABLE MANAGEMENT OF THIS IMPORTANT RESOURCE

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climate change represents a significant threat to the world’s forests. Increased extremes, such as long and severe heat waves and water stress due to a lack of, or uneven distribution of rainfall, is leading to a decline in the resilience of forest ecosystems, and sometimes causes explosive surges in natural disturbances such as fire and pest outbreaks.

The past summer saw extreme heat waves throughout the northern hemisphere. With the dry air and vegetation came an unusually large number of wildfires in many countries. In Greece, dozens of people were killed in the worst wildfires in a decade, while in Sweden wildfires reached as far as the Arctic Circle, and in the United States, massive amounts of land burned down, particularly in the west of the country. Most of these fires were forest fires.

While there is no one factor responsible for the mega-fires, the warmer average temperatures and more extreme weather connected to climate change lengthen fire seasons and lead to an expansion of fire-prone areas. This in turn causes more frequent, extensive and severe fires. IIASA research shows that due to climate change the burned areas in Europe and boreal Eurasia could triple by 2090 compared to their mean value between 2000 and 2008 if no action is taken.

In densely populated areas, 90% of fires started because of human activity are extinguished almost “immediately” because good infrastructure is in place. In remote areas, where capacity to control fire outbreaks is low however, fires set by humans can lead to devastating disasters. In distant areas without human activity, fires are ignited by lightning and can burn for weeks or even months on end.

Once a fire has started, how big it gets, and for how long it burns, depends on many factors, for example, whether wind favors the spreading of flames, how much dry vegetation is available as fuel, and what resources are available to extinguish it. All of these factors are included in the Wildfire Climate Impacts and Adaptation Model (FLAM), developed in the IIASA Ecosystems Services and Management Program.

Recently, the researchers applied their model to Indonesia, which is extremely affected by long and severe wildfires, partly due to the common practice of using fire for land clearing. The model was able to capture burned areas very well, especially for large fires. “Finding the areas that are particularly prone to wildfires will help policymakers to implement strategies for fire prevention and provides important information for building a cheap and efficient fire response infrastructure,” explains IIASA researcher Andrey Krasovskii.

Public debate often focuses on the reduction of carbon emissions from the burning of fossil fuels, but in fact, Indonesia’s emissions due to burning of forests on large peat areas are comparable to the annual fossil fuel CO₂ emissions of countries such as Japan and India. This shows how crucial forests are for our climate, and that large fires can easily turn them from CO₂ sinks to emitters.

WE HAVE CAUSED A DIVERSE SET OF PROBLEMS CONNECTED TO THE FORESTS ON EARTH, BUT PAST AND ONGOING IIASA RESEARCH SHOWS THAT WE CAN ALSO BE PART OF THE SOLUTION.

The threats that forests face due to climate change go way beyond wildfires. Climate warming is most extreme in the circumpolar boreal belt – the northernmost regions of Alaska, Canada, Russia, and Scandinavia. These areas are home to the boreal forests, which make up the largest ecosystem in the world, apart from the oceans, and comprises one third of all forests globally. Consisting mostly of coniferous species, these forests are shaped by their adaptation to a cold climate and depend on it crucially, which makes them particularly vulnerable to climate change.

IIASA researchers have intensively studied boreal forests for the last three decades. In September, the institute in collaboration with the International Boreal Forest Research Association, the Pan-Eurasian Experiment, and the International Union of Forest Research Organizations hosted a conference called “Cool forests at risk?” to find sustainable solutions for preserving this important ecosystem.

This event was not just a conference, but also the start of a collective effort by scientists, forest managers, and other stakeholders to protect boreal and mountain forests and raise public and professional awareness for the danger they face. “We hope that the knowledge we generate with our research, diversity of topics, and depth of discussions at the conference will help countries with cool forests transition to an adaptive, risk-resilient sustainable forest management,” says conference chair and IIASA researcher Florian Kraxner.

Sustainable forest management however, does not just include the protection of forests against the effects of climate change, but also the regulation of deforestation, the most obvious danger that forests face due to human activity. The core of the problem is quite simple: Because we can make money by cutting down trees for lumber or paper products, we are exploiting forests faster than they can regenerate. Unfortunately, that does not make the problem easier to solve. This is why the Equitable Governance of Common Goods project combined the expertise of the IIASA Risk and Resilience and Evolution and Ecology Programs to find out which types of regulations work best to ensure fair sharing of resources and prevent the so-called “tragedy of the commons” – the collapse of a resource due to the self-interested behavior of individuals.

One approach to finding these solutions is to use experimental games, like the “Forest Game” that was developed at IIASA. In the game, a group of five to ten players is asked to make decisions, over several rounds, about the management of a forest. Analyzing the players’ decision-making process helps the researchers find out what role communication and personal values play in resource governance.

We have caused a diverse set of problems connected to the forests on earth, but past and ongoing IIASA research shows that we can also be part of the solution. This gives rise for hope that we will be able to preserve the forests we so heavily depend on for our climate, economy, and biodiversity.
Nurturing cooperation, preservation, and prosperity in the Arctic

The vast 15 million square kilometer territory surrounding the North Pole commonly referred to as “the Arctic” may seem to be remote and intangible, but what happens there affects us all.

The Arctic region is undergoing a massive and rapid transformation, and many of the changes have significant effects in the rest of the world. The most prominent of these include global warming, rising sea levels, and the more extreme weather events experienced across the world in recent years. In addition, industrial extraction, air pollution, globalization, migration, and food and water insecurity, along with widening socioeconomic gaps in the region, may amplify existing risks, complicating decision making and increasing uncertainty.

While all of this paints a bleak picture for the future of this highly vulnerable and important region, some of the changes taking place could also bring about new opportunities for Arctic states, provided they are planned for and managed responsibly and sustainably.

A holistic and collaborative approach

The IIASA Arctic Futures Initiative (AFI) aims to provide decision makers in the region with options that balance environmental protection, economic prosperity, and societal wellbeing, and cuts across the expertise of all IIASA programs.

The initiative’s objective is to provide a holistic assessment of the Arctic region that integrates research and policy, while taking into account the interests of both industry and society. Over the years, IIASA projects related to the Arctic have covered a wide variety of topics spanning boreal forests and sustainable fishing practices in Arctic waters, to the modeling of future demographic trends and the development of collective responses to reducing air pollution.

The initiative is also cooperating with the Arctic Circle, the largest open democratic platform and network of international dialogue and cooperation on the future of the Arctic, thus combining the expertise of IIASA with the convening power of the Arctic Circle.

The future of Arctic populations

The Arctic region encompasses the Arctic Ocean and parts of Canada, Finland, Greenland, Iceland, Norway, Russia, Sweden, and the USA, and even though it is home to a relatively small number of people, they are one of the driving forces in active Arctic transformation. Understanding the population dynamics associated with these changes will be crucial to finding solutions in the future.
A study by AFI and World Population Program researcher Anastasia Emelyanova examined recent population developments in the Arctic and modeled future demographic trends towards 2050. Her innovative work suggests that education as a factor of human capital may in future drive demographic shifts in the region. Several communities have already expressed interest in the results, which could provide valuable input for stakeholders on decisions concerning future developments.

The rapid and extensive changes in the region also include an increased focus on industrial development, which has led to the deployment of large infrastructure projects in Arctic countries. Although such projects can be seen as beneficial on a national level, the benefits are not always as immediately evident to local communities.

A study undertaken in Finland by AFI and Risk and Resilience Program researchers Mia Landauer and Nadejda Komendantova, looked at how local people can be more actively involved in the planning of large infrastructure projects that have impacts on traditional livelihoods such as reindeer husbandry. They investigated how stakeholders involved in Environmental Impact Assessments (EIAs) perceive the participation of reindeer herders in the planning and implementation of infrastructure projects, and how these differ from the perceptions of the affected herders.

“The results revealed that the herders’ level of participation in the EIAs and the benefits and challenges of participation are perceived differently. Furthermore, the regulatory framework does not adequately ensure that the developer carries social and environmental responsibilities throughout the infrastructure project’s lifecycle, and that regular communication with herders will also be maintained after the EIAs,” explains Landauer. “Ideally, a participatory approach to decision making can improve the means of social learning for all involved parties and aid in the collaborative development of sustainable solutions.”

**A model for better global cooperation**

The idea of collaborating to solve otherwise seemingly unsurmountable problems is by no means a new concept when it comes to governance issues in and between Arctic states.

According to Lassi Heininen, a researcher with the AFI and professor of Arctic politics at the University of Lapland, there has been constant cooperation on environmental protection, science, and sustainable development between the Arctic nations since shortly after the Cold War ended almost 30 years ago. Heininen explains that the high geopolitical stability is likely due to the common interests of the Arctic states to decrease military tension and increase political stability, which ultimately makes cooperation on environmental protection possible.

“The Arctic states have reconstructed their reality of post-Cold War geopolitics by going beyond traditional power (meaning force) and implementing discursive, soft power based on knowledge and dialogue between different stakeholders, as well as the interplay between science, politics, and business. It has been very successful, and could serve as an example, or even a model, for stability-building worldwide,” he says.

To this end, AFI researchers have started a systematic analysis and synthesis of existing policies, strategies, and agendas of Arctic states, the Arctic
The Arctic is more impacted by global warming than any other place on earth. One of the factors that significantly contributes to this is black carbon (or soot) emissions resulting from the incomplete combustion of biomass and fossil fuels. When black carbon particles are deposited on snow or ice, they absorb heat from the sun, which accelerates the melting of both terrestrial and sea ice. Although it is clear that reducing black carbon pollution holds some potential for climate change mitigation, especially in the Arctic, in order to take effective action we have to know where it is coming from.

Researchers from the Air Quality and Greenhouse Gases Program have been investigating the impacts of black carbon and developing better methods to trace its sources for almost a decade. They have been actively contributing to the “Action on Black Carbon” initiative – an EU project that contributes to the development of collective responses to reduce black carbon emissions in the region. Their work has informed and supported processes aimed at setting clear commitments and targets for reducing black carbon emissions and enhancing international cooperation on black carbon policy in the Arctic.

The accelerated rate of sea ice melt is also greatly altering Arctic terrestrial ecosystems and changing both the local landscape and water cycles. During the past summer, Merrit Harlan, a participant of the Young Scientists Summer Program at IIASA, worked with researchers from the Water Program to improve terrestrial modeling of the Arctic. Using a large-scale open-source hydrologic model, Harlan projected changes in the Arctic in terms of the flow of water in streams, rivers, other channels, and permafrost by comparing four general circulation model projections spanning both a historical and future period. The tentative results of her study confirm that the water cycle in the Arctic is intensifying at an unprecedented rate, particularly permafrost melt and the flow of freshwater into the Arctic Ocean. This could have an unpredictable effect on the climate and can contribute to further intensifying the melting of sea ice.

Although the rapidly retreating sea ice in the Arctic represents a significant threat, from a strictly economic point of view, it also represents some major opportunities for Arctic states.

The Arctic contains a wealth of untapped natural resources, which represent tempting short-term economic benefits. The warmer winters and melting sea ice are extending the periods of ice-free waters in the region. This is improving accessibility to Arctic ports, and reducing the costs of oil and mineral exploration and exploitation, while also opening up faster transport routes connecting the Atlantic and the Pacific.

While economic benefits of the opening up of Arctic routes to shipping and extracting the previously untapped resources under the melting ice are clear, there is however also a very real possibility that the environmental factors that caused these opportunities will be further exacerbated by utilizing them. IIASA scientists have identified a need for a comprehensive multi-dimensional assessment of possible futures of shipping in the Arctic, as well as its consequences for the global economy and environment. This was also one of the topics discussed and supported by the community of the Arctic Circle conference in 2018. Employing systems analysis and scientific advice will be vital in helping decision makers to gain better insight into the factors that will influence the decisions they now have to make, and of which the implications will likely be felt for decades.

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A people-centered approach to limiting global warming

IIASA’s Low Energy Demand scenario shows how to limit global warming to 1.5°C in a different way

Written by: Helen Tunnicliffe

All over the world, researchers are trying to understand how we can limit climate change. According to IIASA Transitions to New Technologies Program (TNT) Acting Director Arnulf Grubler, a different approach that goes beyond climate change alone provides new insights.

Together with more than twenty collaborators from the TNT, Energy (ENE), Ecosystems Services and Management (ESM), and Air Quality and Greenhouse Gases (AIR) programs at IIASA, Grubler led the development of the Low Energy Demand (LED) scenario. Rather than focusing solely on climate change, the LED scenario instead uses the Sustainable Development Goals (SDGs) as a framework.

The LED scenario meets the Paris Agreement target of limiting global warming to 1.5°C by 2100, and is the first to do so by shrinking the energy system rather than relying on unproven negative emissions technologies, such as bioenergy with carbon capture and storage (BECCS). In the scenario, global energy use is reduced by 40% compared to today.

IIASA hosts the database that the Intergovernmental Panel on Climate Change (IPCC) used to develop its Special Report on Global Warming of 1.5°C. It was while looking at this in 2017, that Grubler noticed that each of the 400 global scenarios that could meet the 1.5°C target relied on negative emissions technologies.

In an earlier study by Keywan Riahi and colleagues, the ENE Program’s MESSAGEix model was used to run numerous simulations assuming limited availability of some key energy supply technologies, known as “knock-off” scenarios. At high demands, only eight of the “knock-off” scenarios were still feasible. With lower energy demand, all were feasible. Reducing demand therefore became the focus in the LED study.

IIASA expertise

In developing a scenario like this, what you need is diversity of expertise – exactly what IIASA has.

Charlie Wilson from TNT developed applied narratives around the scenario, including a “day in the life” story, without using dry, technical language. This helps with communication to those outside the scientific community. The LED team then used these storylines to perform a bottom-up assessment of energy demand integrating recent literature.

ENE researchers, including David McCollum and Volker Krey, then quantified the upstream energy supply implications of LED’s demands for staying below the 1.5°C target using the MESSAGE model. Krey says that it was an eye-opening experience to realize how much more flexibility and accelerated transitions in energy supply systems become available under the LED scenario. McCollum highlighted that the LED scenario was the first to quantify the effects of organizational and behavioral changes.

The scenario also ensured that there is sufficient energy to support the eradication of poverty in the Global South. Here, Narasimha Rao’s work on the Decent Living Energy project, which quantifies the standards of decent living, was vital.

Researchers from ESM used models including GLOBIOM to look at implications for land use. Conventional scenarios for ambitious climate change mitigation can lead to a four-fold increase of biomass demand by 2050, with knock-on effects for food costs and biodiversity. Stefan Frank explains that in the LED scenario, these are largely avoided.

In the AIR program, researchers quantified the LED scenario’s effect on air quality and health.

“The LED scenario basically eliminates the inefficient use of solid fuels in the domestic sector, which has substantial implications on concentrations of fine particulates and associated premature mortality,” says Peter Rafaj. “It is more efficient than strategies focusing on regulated emission sources such as power plants or industry.”
Available technologies

The answer to rapidly reducing energy demand is a people-centered approach, encouraging the fast uptake of technologies and practices that can reduce energy demand.

“There are two famous pictures, one showing the Manhattan Easter Day Parade in 1900, and one showing the parade in 1913. In the first photograph, there are only horses, and in the second, there are only cars,” says Grubler. “This shows how fast behavioral change can happen.”

Large-scale infrastructure however, cannot change quickly. The LED scenario therefore relies on “granularity” – smaller-scale technologies and practices that do not rely on large investments or broad government policy change.

The focus on the small and the available means that options like carbon capture and storage, geoeengineering, or fusion energy, are out. In, are end-use options such as shared mobility, including on-demand and Uber-like vehicle sharing, which in one simulation for Lisbon, reduced vehicle numbers by 97%. Improving energy efficiency in buildings could reduce energy demand by 75% by 2050. Diet changes away from red meat for example, reduce emissions, water, and land demand from agriculture. Making use of the digital economy, multi-function smartphones, and younger generations’ preference for accessing services rather than owning goods (for instance streaming video) will also reduce the expected vast growth in energy demand to just 15% by 2050.

Broad use

The LED scenario was not only used in the preparation of the IPCC Special Report, but also in the development of Transformations to Achieve the Sustainable Development Goals, a major report by “The World in 2050” – an IIASA-led initiative aiming to provide a science-based, integrative approach to address all 17 SDGs. This report was launched at the UN High Level Political Forum in New York in July. The report set out six key transformations to enable the world to meet the SDGs in a manageable way.

The paper describing the LED scenario generated much media interest and was discussed in the most recent paper by Amory Lovins, a leading figure in energy research who first developed the concept of low-demand driven “soft energy” paths in the 1970s. There has also been interest from NGOs such as Greenpeace.

An interesting research question encourages collaboration

What is surprising is that the process to develop the LED scenario took just three months.

“The reason for this is that somehow it resonated. People wanted to contribute,” says Grubler. “What this highlights is that you can get things done quickly and informally if it is an interesting research question that attracts the interest of your colleagues, creating a good, collaborative spirit.”

Developing the LED scenario has been a people-centered endeavor in more than one way. People-centered in that the solutions focus on personal choices, and people-centered in the collaboration and common purpose of the researchers.
25 years of Ukraine membership at IIASA

Written by: Sandra Ortellado

In 1994, Ukraine was at a turning point: the government was undergoing rapid change after declaring independence from the Soviet Union, and the country elected a new president and parliament. In the same year, the National Academy of Sciences of Ukraine (NASU) joined IIASA as a National Member Organization (NMO). With a commitment to systems analysis research, Ukraine embraced its transition to sustainable social, economic, and environmental betterment.

Move forward to 2018, when NASU is also celebrating its 100th anniversary, and there have been 25 years of productive collaborations between IIASA and Ukrainian systems analysts. Much of the IIASA-Ukraine relationship is owed to Borys Yevhenovych Paton, NASU president and Victor Mikhailovich Glushkov, director of the Institute of Cybernetics, who facilitated the creation of the Committee of Systems Analysis at NASU. They and their colleagues were key to the systems analysis focus at NASU, as well as the decision to join IIASA as an NMO.

Building economic growth and sustainability, together

The partnership between IIASA and NASU has benefitted from the contributions of Ukraine’s most promising scientists. Over the past quarter of a century, Ukrainian and IIASA researchers have worked together to study energy, water, land-use, socioeconomic systems, the sustainable revival of the agricultural industry, and the country’s dwindling forests. Such collaborations center around the adaptation of the institute’s advanced methods in systems analysis to identify long-lasting solutions to challenges that affect multiple sectors in Ukraine.

A current research project with NASU, “Integrated modeling of food, energy, and water management for sustainable social, economic, and environmental development”, incorporates the country’s specific management policies and IIASA global resource models. This allows both interregional and international trends to be factored into decisions about how to jointly handle resources, industry, and society. The project is a partnership between IIASA and seven leading institutes of NASU, collaborating with networks of national and international organizations, universities, advisors, and policymakers.

Other collaborations have tackled energy and disaster risk management. As the Ukrainian government develops a policy to increase its share of renewable energy to over 13% by 2030, IIASA has been working with the academy to develop models for energy systems planning. A model for catastrophic hazards combines natural, agricultural, financial, and socioeconomic systems in the face of financial and natural disasters like the recession of the late 2000s and the disastrous floods that cost the country more than US$800 million in 2008.

Collaboration however, goes beyond modeling into broad implementation. The ClimaEast project, which ran from 2012 to 2016, resulted in actionable recommendations for an adaptive sustainable forest management strategy in Ukraine, as detailed in IIASA’s Policy Brief 18: “A Policy Brief for Policymakers: Likewise, the project “Reducing Greenhouse Gas (GHG) Emissions Uncertainties” that ran from 2010 to 2014, resulted in the first fully verified carbon account for Ukrainian forests from 1990 to 2010 and produced a 30-year forecast for use in decision-making on managing GHG emissions. Four Ukrainian researchers, who were former participants in the Young Scientists Summer Program (YSSP), received an award by decree of the Ukrainian president for achievements in science, for their book on the project. An extended analysis of the impacts of climate change on national forests was published by NASU and IIASA in 2018.

The people behind the research

Achievements like these, and scientific progress in general, are a collective effort, and the people responsible are equally worth celebrating alongside their projects.

Working with a team of IIASA and NASU collaborators including Paton...
Ukrainians, on average per year, are employed by IIASA since 2008

- Sustainable agriculture and food security
- Sustainable energy future
- Financial and natural disaster risk management
- Integrated management of food, energy, and water security

Areas of research collaboration

Ukrainians have completed the Young Scientists Summer Program since 2008

- 15 researchers, advisors, and diplomats from Ukraine have visited or attended an event at IIASA since 2008
- 218 Ukrainians have completed the Young Scientists Summer Program since 2008

Capacity building

and NASU Vice President Anatoly Zagorodny, IIASA researchers Yuriy Ermoliev and Tatiana Ermolieva aimed to promote self-sufficiency in their home country with their research on integrated management techniques. The Ermolievs know that in the wake of financial and natural disaster, self-sufficiency means everything for a country as vulnerable and resilient as Ukraine.

“The country is extremely rich in land and sufficient mineral resources to cover domestic demand,” explains Ermolieva. “However, it is suffering from inconsistent and disintegrated policies that make it fully dependent on international help.”

The legacy of collaborative research between IIASA and Ukraine connects researchers young and old as they become experts in their fields. In fact, some of Ukraine’s notable scientists and scientific leaders got their start in the YSSP program. This includes Oleksandra Borodina, who works at the Central Reform Office in Kiev, advising the Ministry of Regional Development, Construction, Housing and Communal Services, and Nikolay Royenko, who founded Miratech Company – a leading international IT company. Since 2008, 15 doctoral students from Ukraine have participated in the YSSP contributing to more than 200 publications.

IIASA’s latest Ukrainian YSSPer is Bohdana Dubrovets. Working in the Ecosystems Services and Management Program alongside previous Ukrainian YSSPers like Olha Danylo, Mykola Gusti, and Myroslava Lesiv, she assessed the ecosystem services of forests in Chernobyl for implementing sustainable forest management in radioactively contaminated territories. The support of friends and mentors brings Ukrainians at IIASA together in a tightly knit community.

“I wish every PhD student would experience this kind of mentorship,” says Danylo.

If science and education define a country, then Ukraine’s budding talent and strong scientific connections are a testament to its enormous potential as a country, even in the face of its challenges.

“More attention to science in Ukraine could unlock its economic potential,” says Anatoly Shvidenko, a forestry expert at IIASA. “The positive relationships between Ukrainian and European research institutions over the past decades will open many opportunities for science and education.”

Zagorodny, who is also the IIASA Council member for Ukraine and leads a major IIASA-NASU collaborative project, is making the most of abundant scientific opportunity.

“Building on longstanding collaborations, NASU is looking forward to furthering its relationship with IIASA to conduct truly integrated multidisciplinary research addressing problems of common interest for Ukraine, IIASA, and the world, that require robust solutions that cannot be solved by traditional approaches,” he says.

According to Yuriy Kostyuchenko, from the Centre for Aerospace Research of the Earth at NASU, and the NMO secretary, the horizontal links between interdisciplinary programs and projects are sometimes even stronger than the vertical links within individual institutions.

“The scientific community of Ukraine strongly believes in the necessity of cooperation with IIASA and this well-developed scientific cooperation will continue on a solidly constructed base,” he adds.

Further info: A list of references and further reading can be found online at: www.iiasa.ac.at/Options/Ukraine-18

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Young Scientists Summer Program participants

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Regional impacts

Overcoming challenges to sustainable renewable energy in South Africa

Written by: Jeremy Summers

Like much of the continent, South Africa is facing severe threats from climate change, economic inequality, poverty, and unemployment. These threats compelled the government to pass legislation aimed at promoting economic development and environmental protection. The program seeks to increase the nation’s share of renewable resources into the national energy mix, create jobs and economic empowerment for black communities, and drastically reduce carbon emissions.

Results from recent studies, however, show that this program is not achieving its goals and that although money from the program is flowing into local communities, in many cases it is failing to benefit them. IIASA researcher and former Southern African Young Scientists Summer Program participant, Elvis Nkoana, endeavored to understand what is preventing the program from being successful.

In his study, Nkoana showed that the program is highly fragmented. Local communities are often not engaged, which has led to powerful stakeholders taking advantage of at-risk communities. The study also revealed other key problems such as a lack of awareness of the program and a shortage of skilled workers.

“While the intentions of the program are admirable, the execution and approach is limiting its ability to succeed,” explains Nkoana. “Raising awareness and empowering local leaders is key to improvement in the short term. Beyond that, the government must create a framework that protects and prioritizes vulnerable communities.”


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Preserving the Zambezi Basin for future generations

Written by: Ansa Heyl

The management of shared water resources has been a continuing challenge for all of southern Africa, particularly in the Zambezi, the largest river basin in the region. Spread across 1.37 million square kilometers and eight countries, the area is home to around 40 million people who rely on the river for among other things, drinking water, fisheries, and irrigation. Rapid population growth, increasing climate variability, and the need to expand secure access to water, energy, and land, however, suggest that basin countries will face serious challenges in achieving the UN Sustainable Development Goals.

Researchers from the IIASA Integrated Solutions for Water, Energy, and Land (ISWEL) project, have been engaging with stakeholders in the Zambezi Basin to develop tools and capacities around the management of the water-energy-land nexus. To date, the ISWEL team have co-organized two workshops with the Zambezi Watercourse Commission, and participated in a number of meetings with experts and stakeholders from the eight riparian countries to discuss desirable futures and pathways for the basin with regard to water, energy, and land security.

“The workshops have led to an enhanced and shared understanding of the main challenges, and the implications of different investments in the Zambezi basin,” says Barbara Willaarts, a researcher with the IIASA Water Program. “We have received overwhelmingly positive feedback and participants have emphasized the importance of cooperation between countries as key to achieving their goals.”

Further info: www.iiasa.ac.at/events/ISWEL-18

Barbara Willaarts: willaart@iiasa.ac.at
Regional Impacts

Among all the ramifications of climate change, perhaps none is more significant than the impact it has on agriculture. In the United States, agriculture, food, and related industries contribute almost a trillion dollars to the economy each year.

Numerous studies have evaluated the adverse impacts of climate change on agriculture, but most of them only explored its impact on a single country or region without accounting for impacts on the rest of the world. Consequently, many studies produce biased results.

A new study, however, explicitly quantifies the importance of accounting for global climate change when conducting regional assessments. The results show that indirect impacts of climate change from other regions of the world can be more important than the direct domestic impacts for markets connected by international trade.

“In regions that are deeply integrated in global markets, the most important effects of climate change on the agricultural sector may come through international trade from outside the region rather than directly from within,” explains Petr Havlik, an IIASA researcher and coauthor of the new study. “As our study shows, regional assessments of climate change impacts that ignore international trade and climate change in the rest of the world may get even the sign of the domestic impacts wrong.”

[pure.iiasa.ac.at/15342]
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Supporting the sustainable management of fisheries

Written by: Ansa Heyl

Overfishing of Atlantic cod around Newfoundland in eastern Canada led to a collapse in codfish stocks and the closing of cod fisheries in 1992. Researchers have observed that, before the collapse, the size at which cod matured and started to reproduce was gradually declining, and surmised that the phenomenon was likely an evolutionary response to heavy fishing.

Since the 1990s, the Evolution and Ecology Program at IIASA has been at the forefront of research on how fish populations react to pressures from fishing. The program has been working with numerous international partners on various projects, including a collaboration with the Department of Fisheries and Oceans Canada to monitor how cod populations have been developing in Canadian waters since their collapse. The team’s most recent work shows, for the first time, that fishing has caused male cod to invest more energy into current reproduction, leaving them with less energy for their subsequent growth, reproduction, and survival.

“One of the unanswered questions of our initial work was whether the life history of cod started to recover following the moratoria that were established around 1992. Despite initial signs of recovery, our more recent, and as yet unpublished research indicates that there has been none – only some minor fluctuations around a new mean. This underscores the importance of avoiding unwanted evolutionary changes,” says Mikko Heino, lead researcher for the project.

The team’s research has informed many practical applications, including Evolutionary Impact Assessments – a collection of tools that allow fisheries managers to evaluate the impact of fishing regimes on evolution.

Further info: ar17.iiasa.ac.at/evolutionary-fisheries
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Analyzing the impacts of climate change on US agriculture

Written by: Jeremy Summers

Among all the ramifications of climate change, perhaps none is more significant than the impact it has on agriculture. In the United States, agriculture, food, and related industries contribute almost a trillion dollars to the economy each year. Numerous studies have evaluated the adverse impacts of climate change on agriculture, but most of them only explored its impact on a single country or region without accounting for impacts on the rest of the world. Consequently, many studies produce biased results.

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Regional Impacts

**Feminizing the workforce in aging East Asia**

Written by: Melina Filzinger

In many countries, low fertility rates and continuous increases in life expectancy are leading to population aging. In Asia, the four advanced economies of Hong Kong, Japan, Singapore, and South Korea are aging particularly rapidly.

New IIASA research on the future workforce in these societies shows that expected negative economic consequences could be alleviated by including more highly educated women in the workforce. The adoption of progressive policies will play an important role in this process.

This becomes clear when comparing two scenarios: One in which labor participation rates are kept constant at their 2010 levels over the projected period until 2050, and one in which female participation rates similar to those of Sweden – a role model when it comes to the economic activity levels of women – are assumed. In this second scenario, male participation rates are assumed to reach current Japanese levels by 2050, which significantly increases participation rates of older males.

The differences in total labor supply between these two scenarios range from 9% in Japan to 28% in Korea. The majority of the potential gains in workforce are skilled female laborers. If their potential is properly utilized, highly skilled females could account for over 30% of the entire workforce in each society by 2050. This could keep the number of non-working people per working person constant (in Korea and Singapore), or keep the increase at a moderate level (in Hong Kong and Japan).

**Further info:** Loichinger E & Cheng YA (2018). Feminising the workforce in ageing East Asia? The potential of skilled female labour in four advanced economies. *Journal of Population Research* (pure.iiasa.ac.at/15278)
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**Making food and energy production in China compatible under limited water supply**

Written by: Melina Filzinger

In northwest China the coal industry and agriculture are competing for limited land and water resources. The traditional approach to planning the development of each sector independently is failing, as solutions that optimize the outcome within individual sectors do not necessarily yield an optimal outcome for the overall economy.

Researchers from IIASA and the China University of Mining and Technology have linked the agricultural and coal sectors in a new model to find the most cost efficient way of producing enough food and energy while taking constraints on the availability of land and water into account.

By capturing the spatial characteristics of sub-regions, the researchers determined how the production sites of coal and various crops could be reallocated to take advantage of different climates and geographies. They also found that implementing water saving technologies makes it feasible to enhance production without increasing water demand.

The model was applied to derive the optimal allocation of coal production and agriculture across the Shanxi province in China. The results show that the overall amount of crops and coal that can be produced depends critically on the availability of water. This demonstrates the need to take the variability of water supply into account to find solutions that work reasonably well under all availability scenarios.

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Regional Impacts

Biorefineries will have only minimal effects on wood products and feedstock markets

Written by: Helen Tunnicliffe

A new report by researchers from IIASA, Luleå University of Technology (LTU), and the Research Institutes of Sweden (RISE), has shown that more large-scale biorefineries will have only a small effect on the availability and pricing of wood products and feedstocks.

Funded by the Swedish Research Council for Environment, Agricultural Sciences, and Spatial Planning (FORMAS), the IIASA National Member Organization representing Sweden, the research focused on Sweden.

The results show that there is likely to be a much stronger demand on EU forests, although total production is not likely to increase. "Fringe feedstocks" – such as logging residue and bark – could also be used, although there may be technical and economic limitations.

The cost of forest feedstocks will rise, but large price spikes in the medium term are unlikely and the profitability of large-scale biorefineries will not be affected. Biorefineries should be integrated with existing forest industries, and conversion processes with high biomass-to-biofuel efficiency, while larger plants with the resulting economies of scale, are preferable.

IIASA researcher Sylvain Leduc says that the report should help policymakers set better biofuel targets and to understand the impacts on forestry markets.

The team used three interlinked models, the Global Biosphere Management Model (GLOBIOM), BeWhere, and the Spatial Price Determination Model (SpPDM).

Sylvain Leduc: leduc@iiasa.ac.at

Weight misperception in England likely influenced by socioeconomic factors

Written by: Sandra Ortellado

A new study reveals that overweight and obese adults in England are more likely to underestimate their weight status and less likely to try to lose weight, especially in lower-income, lower-education, and minority groups.

The study conducted by IIASA researcher Raya Muttarak, investigated how demographic factors are associated with perception of weight, particularly weight underassessment and attempts to lose weight.

In England, more than one in four adults aged 15 and older are considered clinically obese, yet Muttarak’s study shows that weight misperception has increased alongside obesity over time. This increase is possibly a result of the normalization of plus-sized bodies, which can undermine weight loss attempts. Although about one-fourth of male participants in the study were classified as overweight, the majority reported their weight status as normal.

Misperception significantly increased in lower education and income groups. Individuals in the bottom-income group were 1.3 times more likely to misperceive their weight and were consequently less likely to try to lose weight than overweight individuals with higher levels of income and education.

Muttarak believes that social inequalities may be contributing to the normalization of obesity and patterns in weight misperception.

"The price of healthier fresh foods is higher than processed and energy-dense foods in England," says Muttarak. "As a sociologist, I feel these inequalities should be addressed."

Raya Muttarak: muttarak@iiasa.ac.at
Q: What attracted you to IIASA?
A: IIASA has a tremendous reputation internationally for its groundbreaking work in systems analysis. I have spent large parts of my career using dynamic systems modeling and integrated modeling in conservation biology, so it is an area I personally think is important for solving many global problems. If I can make a small contribution to help IIASA deliver on the tremendous potential that it holds, I would be delighted.

Q: How do you feel about your appointment as the new director general of IIASA?
A: It is a huge privilege to be given this responsibility, but I am also very excited about it. I feel passionate about the role that IIASA can play in forging a sustainable future for humanity. I have a lot of learning to do about the organization itself and I am happy to dive into that.

Q: What do you think IIASA’s main strengths are?
A: IIASA’s main strength is its people. The people who work here are recognized throughout the world for the capabilities they have. Beyond that, one needs to recognize the institute’s strength in terms of its collaborators from around the world, who add value and bring additional strength to what we already have here.

Q: What particular experience do you bring to IIASA?
A: I think I have a good understanding of governance and the running of institutions like IIASA. I have experience that will allow me to make it a more efficient, effective organization, where our researchers will be able to do the best science that they can. I hope that during my tenure here people will get to know me as someone that is approachable and prepared to engage with staff, and somebody that will make sure that I do my utmost to make this organization truly take off.

Q: What is your vision for IIASA?
A: IIASA already has significant global prominence established over many years through excellent research under successive directors, particularly with the growth achieved under my predecessor. First, this growth phase needs to be consolidated. At the same time, we must make sure that IIASA expands its footprint into our member countries, adding value there so that IIASA is seen as the hub of collective systems analysis activities, and to develop those activities at a national level.

I will focus on the values, culture, and the climate of IIASA, to make it a destination of choice for staff, students, collaborators, and visiting scientists.

Q: What will be your first steps in your new role?
A: My first step will be to listen. I want to hear what people have to say about IIASA, both internally and externally. We have to develop a new strategic plan for 2021 and beyond, so the idea is that we take the learnings from the listening exercise and assimilate them into the new strategic plan.

Q: What are you looking forward to most?
A: I really enjoy it when the scientific enterprise makes a meaningful contribution to improving the quality of life for humanity and the quality of the environment. As humans, we may not be able to live in a pristine environment, but we can certainly live on a dignified earth. We must get this balance right to ensure that the future that emerges is both sustainable and dignified.
Ensuring a better future through global cooperation

Q&A with Heinz Faßmann, Minister for Education, Science, and Research of the Republic of Austria.

Q To what extent can scientists and organizations like IIASA contribute to ensuring that policies are informed by scientific evidence?
A Scientific advice is needed for a growing number of policy areas and evidence-based policymaking is becoming increasingly important. Politicians should indeed make use of scientific knowledge when making decisions on complex issues like migration, but scientists also have a responsibility to translate their findings into practice so it can contribute to solving global challenges.

The Austrian Government uses different advisory structures ranging from experts to advisory bodies of Ministries or the Government to inform its decisions, so I am optimistic that we are on the right track to extend our capacities here. In terms of translating science to inform policy, IIASA is a true success story and an excellent role model. With its transdisciplinary and international approach, it is ideally positioned to provide policymakers with knowledge and concrete scenarios for solving global challenges. I am proud that Austria has been hosting IIASA for the last 45 years.

Q How can we convince more countries to actively contribute to finding solutions to global problems like climate change and migration?
A Solutions to global problems can only be found through international cooperation and dialogue, and there are a number of structures in place to foster and support this. The UN Sustainable Development Goals and its targets, for instance, provide a political framework for putting national science, technology, and innovation agendas into a global context. The EU research framework program “Horizon 2020”, provides an important cornerstone for funding international collaboration activities, and its successor program “Horizon Europe”, promises to put an even stronger focus on international collaboration. In addition, there are many bilateral cooperation activities and programs on all levels, ranging from personal contacts and institutional partnerships to large bilateral cooperation programs.

Keeping dialogue alive in difficult times is of course also crucial. This is called science diplomacy, which was the original purpose for IIASA’s establishment during the Cold War. Although the institute has since expanded its mission, its original role of diplomacy for science is still central to its charter.

Q How can we ensure better cooperation and dialogue between science and policy?
A As we know, generating reliable research results takes time. In times of crisis however, policymakers are expected to act within very short timeframes. These differing timelines sometimes make collaboration much more difficult. In addition, when policymakers are faced with complex problems and turn to researchers to help them find a solution, they expect clear answers. Yet, different research designs can offer different insights to the same topic depending on which academic discipline undertakes the project and which research questions are formulated. While this is what academics refer to as “expanding the body of knowledge”, it sometimes leaves policymakers guessing or allow some to choose evidence that supports their political agenda.

Better cooperation and dialogue between science and policy can however be ensured by institutionalised settings like the Migration Commission or the Expert Council for Integration that provide a permanent platform for the exchange of ideas and knowledge.
On 1 October, IIASA welcomed a new director general at its helm as Albert van Jaarsveld commenced his five-year term as chief executive officer of the institute.

“We are delighted that Albert van Jaarsveld will become IIASA’s eleventh Director General,” said Michael Clegg, IIASA Council chair, on news of the appointment. “He brings wide-ranging experience in research management, administration, and scientific leadership to the institute.”

Since 2015, Van Jaarsveld served as Vice Chancellor and Principal of the University of KwaZulu-Natal – one of the foremost research-intensive universities in South Africa. From 2009 to 2015, he was chief executive officer of South Africa’s National Research Foundation, where he doubled the budget from ZAR2bn to ZAR4bn (EUR 253m) and led the research funder’s drive for excellence and transformation across the South African national research landscape.

“Leading IIASA into the next decade greatly motivates me,” explains Van Jaarsveld. “I am passionate about protecting the environment and using science as a force for positive change at the global level—both of which are central to IIASA’s work and mission. I look forward to working with IIASA staff, its National Member Organizations, and the institute’s large network of collaborators across the world for a better future.”

Pavel Kabat, director general since 2012, left IIASA at the end of August to take up a new appointment at the World Meteorological Organization as its first chief scientist and research director. Clegg commented, “We congratulate Pavel on his appointment. We are very grateful for his leadership of IIASA over the last six years during which he guided IIASA through a period of exceptional growth.”

www.iiasa.ac.at/news/Jaarsveld-18
Supporting women in science

Written by: Philippa Baumgartner

The Women in Science Club (WISC) at IIASA is a network that aims to amplify the scientific contributions of women at the institute. The club is comprised of over 60 members – not all women – who either work at or have a connection with IIASA. Since 2017, the club has organized training sessions, scientific lectures, and discussions at IIASA, and provided a platform and support network for tackling some of the challenges facing women in science.

“Through social media and our club discussions we frequently see the challenges that women of different academic backgrounds face, be it generational or cultural differences, when hiring, retaining, and promoting researchers. There are very few women at IIASA in management positions and very few in the late-stage of their careers, which makes it additionally challenging to highlight some of the obstacles women face,” says WISC President Amanda Palazzo.

The idea for a club came about after a visit from Tarja Halonen, a Finnish politician who served as President of Finland, who visited IIASA to talk about diversity and equality issues. Her talk confirmed to the club founders that the challenges faced by women working in science are not unique.

“The club aims to provide a positive, constructive, and supportive environment. It is open to all genders and all professional backgrounds and we have so far succeeded in creating a community where people can connect with each other,” explains Monika Bauer, WISC vice president.

During the past summer, the club announced a mentoring program for its members, and the WISC coordinators are now in the process of matching up suitable pairings. “The mentoring program will provide guidance and support to people who are looking to navigate their careers. Mentors will not provide scientific or professional supervision, but may offer advice on tackling challenges and support professional development,” says Palazzo.

For now, the scheme is a pilot program, but the organizers hope that after evaluation, it can be expanded in coming years.

Also to be launched in the fall, is a Women in Science Fund which aims to provide financial support to women at all career levels who are connected to science and IIASA, both now and in the future. Monies raised will be used to fund research fellowships at the institute, as well as a variety of professional development opportunities and the WISC mentoring program.

At the leaving party of outgoing IIASA Director General Pavel Kabat, he pledged, alongside his wife, Anneke Kabat-Geselschap, to donate 20,000 Euros to the Women in Science Fund. “I am so proud that this fund was conceptualized and grew using the grassroots nature of our club. The gift from Pavel and Anneke empowers us with resources to allow the Women in Science Club to continue to make a difference in the IIASA scientific community,” adds Palazzo.
Bridging the science to policy gap

Written by: Philippa Baumgartner

In September, IIASA hosted a summer school bringing together 75 researchers and policymakers from 40 EU member states and neighboring countries to learn together how to better use evidence for policymaking.

Along with keynote lectures and panel discussions, the three-day event consisted of a number of masterclasses where participants could learn skills and gain insights into how the other side – be it science or policy – operates. Masterclasses ranged from “strengthening dialogue for research impact” and “systems thinking for policymaking”, to “infographics and data visualization for evidence-driven decision making”.

Jointly organized by IIASA and the European Commission’s Joint Research Centre (JRC), the event was held under the auspices of the Austrian EU Presidency, with the support of the Austrian Ministry for Education, Science, and Research and the Austrian Ministry for Europe, Integration, and Foreign Affairs.

The theme of the summer school was migration and demography – specifically the role of population and migration for sustainable development in the European neighborhood. In 2016, IIASA and the JRC launched a new center of expertise on population and migration, in direct response to a need to strengthen demographic expertise within the European Commission, with a specific focus on migration.

Director-General of the JRC Vladimír Šucha, in his opening remarks explained how crucial it is for science and policy to work together for the benefit of society. He emphasized the importance of universities and other research institutions in providing policymakers with relevant and correct information in an era marked by an unprecedented amount of data, scientific controversies, and post fact politics that often make it difficult to know what the facts are.

Federal Minister for Education, Science and Research of the Republic of Austria, Heinz Faßmann, delivered a video address on population and migration as a policy challenge. Faßmann stressed that research and innovation play an increasingly important role in solving global challenges and that current policy challenges could create windows of opportunity for researchers and policymakers alike.
Eight years ago, Diana Ürge-Vorsatz was a researcher at IIASA. Today, she is a professor of environmental sciences and policy at the Central European University in Budapest, Hungary, where she previously directed the Center for Climate Change and Sustainable Energy Policy for ten years.

Reflecting on her long and successful career, Ürge-Vorsatz’s advice for today’s young scientists is to focus on making an impact instead of worrying about how those in their immediate environment appreciates their work. “Real impact and appreciation often comes later,” she says.

Originally from Budapest, Ürge-Vorsatz earned a PhD in environmental science and engineering at the University of California before becoming involved in the work of the Intergovernmental Panel on Climate Change (IPCC) in 2002. In 2007, the IPCC’s activities were recognized with a Nobel Peace Prize. Recognition of Ürge-Vorsatz’s achievements continued in the following years when she was awarded the Medium Cross of the Order of Merit of the Republic of Hungary for her scientific work in 2008, and received the “Role Model” award in 2009.

The mother of seven is an equally accomplished scientist and leader. Having published widely on energy efficiency and sustainable energy policy, she is now serving as the associate editor of the Springer journal *Energy Efficiency* and is a member of the editorial board of *Annual Reviews of Environment and Resources*.

Still, balancing a career and family life is no easy task says Ürge-Vorsatz, who admits that there are constant sacrifices as well as rewards in both areas. “I still feel the joys and rewards on both sides are much bigger than the sacrifices,” she says.

Most recently, Ürge-Vorsatz was selected as the European climate science expert for Al Gore’s Climate Reality Leadership Corps event in Berlin, the first such training event in Europe in five years. Afterwards, she returned to IIASA for a seminar on disruptive urban energy solutions and their interactions with other societal goals hosted by the IIASA Women in Science Club.

“I find it especially rewarding to work with talented women,” says Ürge-Vorsatz. “Women can be exceptionally self-motivated and dedicated, and I admire many of my colleagues who possess outstanding stamina and resilience combined with talent and commitment.”
IIASA corner

People profiles

Bringing the nexus approach to water decision making
Written by: Helen Tunnicliffe

ISWEL Project Officer Barbara Willaarts explains the importance of an integrated approach
Barbara Willaarts joined IIASA in January 2017, as project officer and research scholar on the Integrated Solutions for Water, Energy, and Land (ISWEL) project. Originally from the Netherlands, Willaarts grew up in Spain and has a background in environmental science.

“During my postdoc it became very obvious to me that if we aim to manage water sustainably it is vital to have a holistic, systems thinking approach, because water is a key resource and decisions taken in isolation ultimately have impacts on all sectors,” says Willaarts.

ISWEL is an ideal fit, looking at cost-effective solutions to meet future water, energy, and land demands under different climate change scenarios, both globally and focused on the Indus basin in Asia and the Zambezi basin in Africa.

Willaarts helps to coordinate the work of 25 IIASA researchers from multiple programs, while also doing her own research. She works to establish stakeholder contacts, including at government level and research organizations, to develop capacity and foster an integrated, nexus approach to river basin management.

At a recent conference in Zimbabwe, it became apparent that efforts are paying off. The Zambezi Watercourse Commission is increasingly focusing on the nexus approach and transboundary and cross-sector cooperation, by, for example, balancing an upstream country’s desire for hydropower with the irrigation needs of farmers in downstream countries.

“Our goal is that ISWEL delivers knowledge and tools that can be used and expanded beyond the lifetime of the project, so stakeholders in the basin can take ownership of these and spread it,” says Willaarts. “It is really rewarding.”

Barbara Willaarts: willaart@iiasa.ac.at

‘Science diplomacy is how we make knowledge workable’
Written by: Helen Tunnicliffe

Science Diplomacy Officer Sergey Sizov explains the vital importance of science diplomacy at IIASA and the different aspects of his role
“Simply put, science diplomacy is the ‘legs’ of any research study that allows it to find its way to relevant government authorities. Scientists create knowledge, and if we want this knowledge to be implemented, it should be communicated to policymakers who have the power to act for the benefit of people. Science diplomacy is how we make the knowledge workable for policymakers dealing with foreign affairs,” explains Sizov.

Sizov has a legal background and is originally from Moscow. Prior to joining IIASA in 2016, he had a successful ten-year career as a Russian diplomat. As part of his duties, he works closely with Jan Marco Müller, the head of directorate and science diplomacy coordinator, to facilitate the interaction of IIASA with the relevant ministries of focus countries, multiple intergovernmental organizations, and diplomatic corps.

Good connections with the latter, he explains, are very important, since the image of IIASA in world capitals is largely formed by the reports of ambassadors accredited in Vienna.

“Working with diplomatic and policy communities is a specific, but also exciting mission. You can invite people from all over the world to address topical scientific challenges. That is also the role of science diplomacy – to help build bridges and foster mutually beneficial cooperation between different nations. Not being constrained by any political bias, IIASA is the perfect partner and platform for such dialogue. You can be creative, you can explore any dimension, and help to implement the knowledge that IIASA generates,” says Sizov.

Sergey Sizov: sizov@iiasa.ac.at
Q You do a lot of research around mortality rates in India. What led you to this line of research?
A Fertility rates have been declining worldwide, but in parts of India, it remains high. Most Indian demographers focus on fertility in their research, but in my first research project on mortality analysis, I found it to be a powerful indicator of any kind of inequality. Examining life expectancy or under five mortality rate by population subgroups can, for example, give a solid idea of the level of development or any inequality among them. In my research, I have demonstrated wide regional and socioeconomic variation in India by examining various sets of mortality indicators.

Using mortality as an indicator also allows other factors such as gender to emerge. When you investigate gender discrimination, effects are often very difficult to measure, but population mortality gives a more objective result. A recent study for instance, dealt with gender discrimination after birth. We found that there is an average of 239,000 excess deaths per year of girls under the age of five in India due to gender bias. The results of this study were widely publicized, so awareness of this issue has been raised, which is a first step towards addressing the problems that led to this tragedy.

Q Did you have any mentors that influenced you to pursue a career in research?
A My parents were passionate about educating my sisters and I, and at school, my teachers were always encouraging me to continue my studies. While at university in Assam, the part of India where I am from, I had two professors who encouraged me to do a PhD once I had completed my studies there. This was not something that I had previously considered, but they convinced me to continue my studies at the International Institute for Population Sciences in Mumbai. The environment at the institute was very professional, and I was able to complete my MPhil and PhD degrees under the tutelage of some great teachers. Here at IIASA, I am also working with some truly inspirational people and that keeps me motivated to keep doing what I do.

Q What is next for you in your career?
A I teach and supervise MPhil and PhD scholars of Population Studies at the Centre for the Study of Regional Development at Jawaharlal Nehru University in Delhi, so after I finish my postdoc work at IIASA, I will return there. My main goal however to produce scientific evidence that can help reduce inequality and improve people’s health and wellbeing. Every time I come to Europe, I see how researchers are providing science-based information to policymakers. Evidence based policies are crucial for a large and diverse country like India and I hope that my work can contribute to better policymaking in my home country.
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