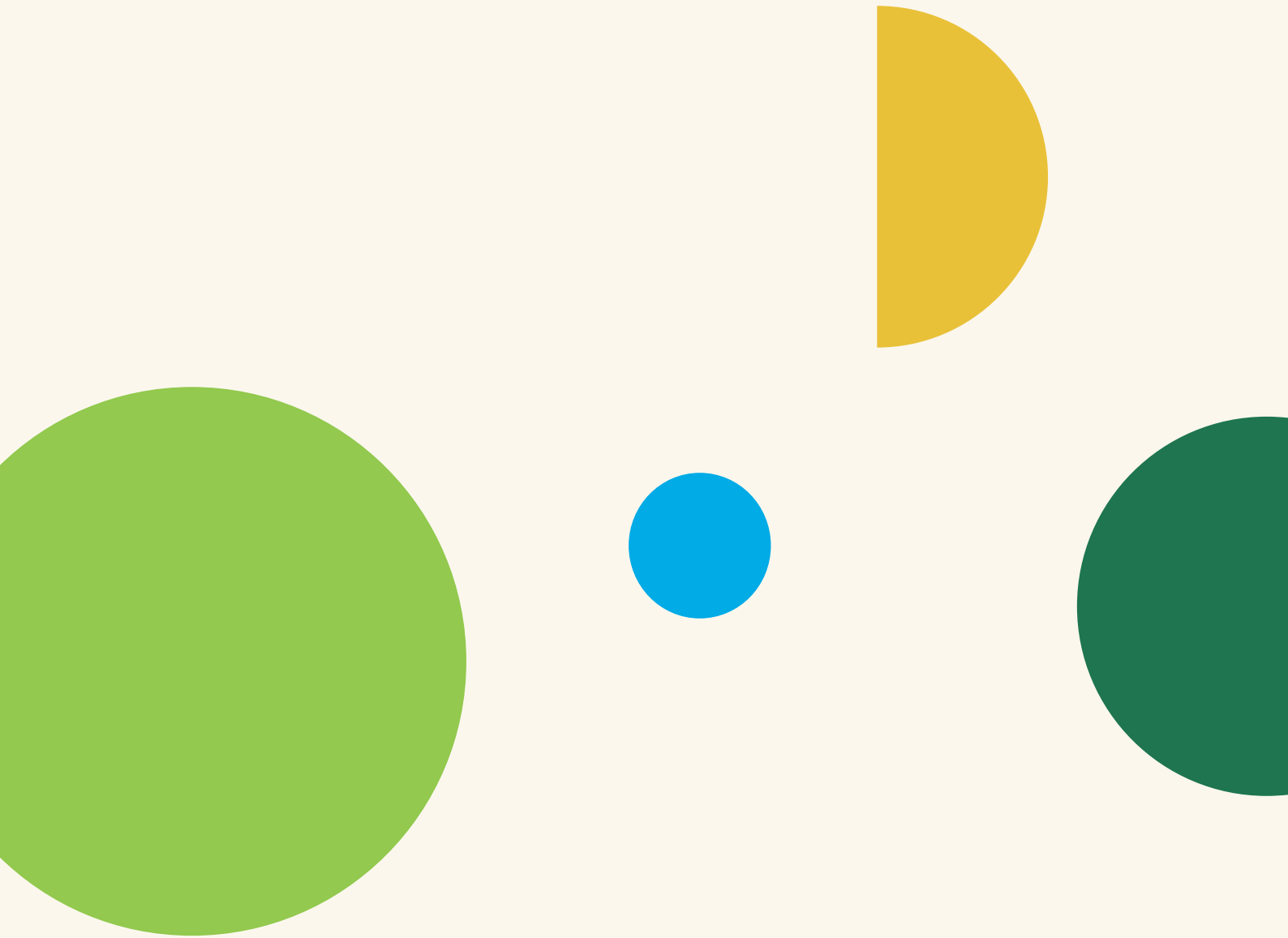


Sweden's engagement with the International Institute for Applied Systems Analysis



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Förord

I en tid när samhällets lösningar på stora utmaningar kräver kunskap och insikter som spänner över många olika fält, kan forskning och innovation inom systemanalys bidra till nya lösningar och möjligheter att hantera komplexa problem. När de geopolitiska spänningarna ökar blir internationellt samarbete inom forskning och utveckling allt viktigare. För att möta dessa multipla globala kriser är det avgörande att bygga global kapacitet. Detta kräver inkludering av ett brett spektrum av länder, där varje nation utifrån sina specifika förutsättningar måste ställa om och anpassa sina samhällen för att hantera klimatkrisen och andra globala utmaningar. Sveriges medverkan i det internationella forskningsinstitutet International Institute for Applied Systems Analysis, IIASA, har under lång tid varit ett viktigt verktyg för att främja forskning som tacklar dessa utmaningar genom gemensam internationell expertis och kapacitet.

Den här utredningen, genomförd av Faugert/Technopolis, är en grundlig genomgång av Formas stöd till tillämpad systemanalys med särskild fokus på det svenska medlemskapet i IIASA. Utredningen följer upp och analyserar Formas stöd till svensk forskning inom internationell systemanalys. Målet med utredningen är att utvärdera Formas organisation av den svenska noden genom kommittén för tillämpad systemanalys, KTSA, och att skapa ett beslutsunderlag för att ta ställning till hur arbetet bäst ska organiseras i framtiden. Utredningen belyser värdet av Formas insatser för att stärka förutsättningar för svenska ansatser inom internationell systemanalys. Utredningen lämnar även rekommendationer om riktning och ambitionsnivå för det svenska medlemskapet i IIASA.

Rapporten kommer att vara ett viktigt underlag när Formas bereder ett beslut om omfattning och inriktning för Formas fortsatta arbete inom tillämpad systemanalys och stödet till IIASA. Den kommer också att användas i vårt fortsatta lärande och utvecklingsarbete. Analysen och rekommendationerna är rapportförfattarnas egna. Jag vill rikta ett tack till dem för en grundlig och väl genomförd analys.

Stockholm september 2024

John Tumpane
Avdelningschef för avdelningen för miljö, Formas



September 2024

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Tomas Åström, Erik Arnold och Catharina Palm



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Summary

The Swedish Research Council for Sustainable Development (Formas) assigned Faugert & Co Utvärdering/Technopolis Group to analyse the Council's support to international systems analysis and in particular Sweden's membership of the International Institute for Applied Systems Analysis (IIASA). Data collection consisted of document studies, registry analyses, interviews and web surveys. The assignment was conducted from April to September 2024.

Background

IIASA was established in 1972 to build trust between parties on opposite sides in the Cold War. The Institute focused on building capacity and doing research in civil applications of the new discipline of systems analysis, which could be used to help tackle global sustainability problems that were important to all sides. IIASA quickly became established as the global centre of excellence in systems analysis in areas such as environment, resource use, health and climate change. While the quality of IIASA's work was not questioned, the governance and organisation have been criticised in recent years, and this has triggered substantial reform and modernisation.

IIASA's core funding comes from member countries which pay an annual membership fee. One of its key contributions is to enlarge and enrich global networks of researchers through capacity-building and joint research, thus creating value not only from research results but also through supporting absorptive capacity at national and international levels. The research results and tools that IIASA produces are available to all – members and non-members alike – meaning they are 'public goods'. This works because members are prepared to collectively fund public knowledge goods at the international level, but is unstable because only a few members need to leave to make the Institute unviable. This makes membership a 'moral' obligation.

Sweden's collaboration with IIASA

Sweden's collaboration with IIASA in terms of researchers affiliated to the Institute, participating in the Young Scientists Summer Program (YSSP), participating in joint projects and visiting IIASA or hosting IIASA visitors, is rather modest. In contrast, the extent of Sweden's combined output in terms of access to networks, access to IIASA's resources, income from joint projects and co-authored papers, is considerable. Formas' Directors General have participated actively in IIASA governance but, other than that, the Council has in recent years assigned only marginal resources to make use of the opportunities the membership provides.

For individual researchers, the benefits of the Swedish membership are quite significant. YSSP participants unanimously agree that their research careers have benefitted to a remarkable extent, which is evidenced by four in five being active at universities or research institutes. Moreover, all YSSP participants but one remain active in Sweden. There is evidence of Swedish capacity building in systems analysis and there appears to be coherent research groups collaborating with IIASA at several Swedish universities, research institutes and government agencies.

Researchers believe that Sweden has benefitted from increased awareness among policymakers of opportunities to tackle environmental and societal challenges, which has led to more informed policymaking. This is demonstrated by a notable number of Swedish policy



papers citing IIASA research, mainly on climate change and greenhouse gas emissions, and transportation-related air pollution. The Swedish organisations most commonly citing IIASA research are universities, research institutes and government agencies.

It is challenging to conclude whether the participation modes, outputs and benefits mentioned above are adequate. However, a simple comparison of Sweden's membership fee with the income to Swedish participants in joint projects with IIASA in 2020-2023 yields a leverage close to seven to one. We cannot assess how much of this that is additional, but it does not take much to equal the membership fee. As in other countries, the weight of opinion is that the returns to IIASA membership depend in part on the amount of effort and resource devoted by the NMO to ensuring that national researchers make active use of it.

Recommendations

The political and diplomatic aspects of whether Sweden should continue its membership of IIASA are beyond the scope of this assignment, so our recommendations are based solely on the research policy dimension:

- Sweden should continue its membership of IIASA
- Formas should continue to be Sweden's National Member Organization
- Formas needs to become more active in order to capture the benefits of IIASA membership
- Formas should work together with other National Member Organizations to ensure the reform process at IIASA continues, because the needed modernisation is still incomplete



1 Introduction

The Swedish Research Council for Sustainable Development (Formas) assigned Faugert & Co Utvärdering/Technopolis Group to analyse the Council's support to international systems analysis and in particular Sweden's membership of the International Institute for Applied Systems Analysis (IIASA).

1.1 Assignment

The objectives of the assignment were to:

- Assess Formas' organisation of the Swedish National Member Organization (NMO) through the Committee for Applied Systems Analysis (KTSA)
- Highlight the importance of the Swedish IIASA membership for Swedish preconditions and efforts in applied systems analysis
- Submit recommendations for orientation and ambition level for the Swedish IIASA membership
- Provide a basis for Formas to decide on scope, focus and organisation of the Council's continued efforts in applied systems analysis

The assignment was to answer the following questions:

1. What is the added value of the Swedish IIASA membership?
2. What are the advantages and disadvantages of the Swedish IIASA membership and Formas' way of organising and administering it?
3. Should Formas continue to be Sweden's NMO? If not, what are the alternatives?
4. How could the Swedish IIASA membership be organised in an efficient and cost-effective manner?
5. What can be learned from other countries' NMOs?
6. To what extent do Swedish efforts in systems analysis benefit from IIASA's resources? To what extent are there unused resources at IIASA?
7. What is the scope of the overall Swedish collaboration with and engagement in IIASA?
8. Which Swedish organisations and research groups collaborate with IIASA and benefit from the Institute's resources?
9. To what extent has the Swedish collaboration with and engagement in IIASA contributed to results and impacts? To what extent have results been useful in Swedish research, government work and policy processes?

The assignment was mainly to focus on the 2020–2023 period.

Considering Sweden's future membership of IIASA also raises political and policy questions. IIASA was established in a very different global context from today, so the foreign policy, diplomatic and science diplomacy aspects and implications of staying or leaving need to be considered. In general, it is difficult to withdraw from international agreements, though this has nonetheless been done by several member states during IIASA's history. These dimensions are important in a final decision about membership, but are outside the scope of this report.



1.2 Methods

Document analyses

The team analysed a range of documents on IIASA, including the Institute's strategy, annual reports, Flagship Report, Institutional Review and Governance Review, as well as qualitative information on Swedish organisations' collaboration with IIASA, kindly provided by IIASA. The team also analysed documents provided by Formas, including three previous assessments of the Swedish membership, invited comments on the most recent assessment, and documents on KTSA's remit and accomplishments.

Registry analyses

The team analysed quantitative information on Swedish IIASA collaboration (also kindly provided by IIASA), including visitors to and from IIASA, participants in IIASA's Young Scientists Summer Program (YSSP), IIASA staff with Swedish citizenship, co-publications, joint projects, Swedish policy papers citing IIASA research, and more.

Interviews

The team interviewed 29 researchers, research stakeholders, former KTSA members and individuals representing IIASA, Formas and other countries' NMOs. The interviewees are listed in Appendix A.

Web surveys

The team conducted two web surveys, one of researchers with Swedish affiliation that collaborated with IIASA in the timespan 2020–2023, and one of YSSP participants from Swedish organisations in 2014–2023. The survey of researchers resulted in 62 responses, representing a 47 percent response rate, and the survey of YSSP participants in 16 responses, representing a 73 percent response rate. Appendix B provides further details.

1.3 Implementation

The assignment was conducted from April to September 2024 by Tomas Åström (project manager), Erik Arnold and Catharina Palm.

1.4 Report contents

Following on this brief introductory chapter, **Chapter 2** summarises IIASA's history and KTSA's accomplishments. **Chapter 3** analyses Swedish collaboration with IIASA, and **Chapter 4** the results and impacts for Swedish researchers, YSSP participants and society, while **Chapter 5** analyses the value of the membership. **Chapter 6** summarises the report's main findings and formulates its recommendations.

Appendix A lists the assignment's interviewees while **Appendix B** provides details on the web surveys. **Appendix C** summarises the abbreviations used in the report.



2 Background

This chapter provides a short summary of IIASA history relevant to the current assessment, and summarises the Institute's strategy at the outset, at the end of the Cold War and today. It describes recent reforms triggered by complaints from several NMOs in 2016, including their effects on the structure of the organisation and on the evolution of IIASA's mission. The final section describes the activities of the Committee for Applied Systems Analysis set up in Sweden in 2019 to replace the previous Swedish IIASA Committee and to support the further development of systems analysis in Swedish research and policy.

2.1 History¹

After six years of discussion and diplomacy initiated by President Lyndon Johnson and Premier Alexey Kosygin, IIASA was established in 1972 as a way to build trust between the Soviet and Western blocs during the Cold War. IIASA started work in Vienna in 1973, moving to Laxenburg Castle – a former Habsburg palace made available by the Austrian government – once renovations were complete.

The USA and the USSR brought a total of ten allied countries with them. Others joined in subsequent years, with Sweden joining in 1976. The normal way to set up such an organisation would have been via an international treaty signed by the member governments. However, since Federal (West) Germany and its allies did not formally recognise the DDR (East Germany), IIASA was established as a Non-Government Organisation (NGO) in the form of a not-for-profit company. Member countries are therefore represented in the Council of IIASA not by government ministries but by national scientific organisations such as research councils and academies of science. In practice, this has given IIASA a great deal of independence from the NMOs.

The choice of a research theme on which to cooperate was a secondary, if nonetheless very important, matter. Systems analysis had characteristics that were very useful in the historical and political context. The Second World War had seen big leaps in planning, logistics, systems analysis and the beginnings of the application of computers, which continued in the post-War years, for example in the Strategic Planning movement of the 1960s – a decade of great technological optimism combined with a strong desire to use 'value-neutral' quantitative methods to avoid political bias in decision-making.

The focus on systems analysis has a background in the growing post-War interest in computing and cybernetics² and complexity, and in developing general systems theories applicable to social as well as technical systems³. IBM started delivering its 360 mainframe computers in 1965, making general-purpose computing available in the West at unprecedented scale on machines that were (more or less) mass produced, expanding the computing power available to businesses and researchers alike. The Club of Rome published *The Limits to Growth* in 1972, putting both resource limits and systems dynamics on the

¹ IIASA's history is long, convoluted and fascinating. Here we restrict ourselves to setting out a few key strands of importance to its role and the way that it has changed over time. The main sources for this section are documents on the IIASA web site, plus the literature cited.

² N. Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*, Herrmann & Cie, MIT Press, 1948.

³ L. von Bertalanffy, *General System Theory Foundations, Development, Applications*, George Brazillier, 1968.



political agenda.⁴ So, systems analysis was highly topical that year. It was also capable of being almost whatever the user wanted it to be:⁵

[T]he nature of systems analysis has remained intriguingly opaque. Its proponents did not produce any stable definition, not of basic concepts, such as rationality, nor of the concrete methods and techniques required for doing [systems analysis]. Moreover, it seems that this opacity – or rather the openness it engendered – partly explains why, after its invention at the RAND Corporation in the 1940s and 1950s, [systems analysis] has travelled to several other contexts, from government to social policy to industry and management and from the USA to other countries and international organizations. It is unsurprising that each of these transfers confronted systems analysts with different types of problem to which they sought different solutions.

The USA made a well-judged and topical offer to the USSR through IIASA, which was in effect to repurpose systems analysis from military to civil goals – from single-purpose optimisations to multi-player, multi-objective problems. RAND was at the time the foremost practitioner of military systems analysis. IIASA would build others' capacity in civil systems analysis, in the process boosting the Soviets' capacity in cybernetics, though without transferring computing technology, in which the USSR was lagging. Thus, the systems analysis agenda could address global peacetime problems of interest to all the members of IIASA. Building on RAND's capabilities ensured that IIASA was the civil centre of excellence in the field.

IIASA today has 20 members, with some original members having departed (a few of which have since returned), while IIASA has attracted new members from the global South. IIASA's membership has evolved from being an East-West coalition to having more of a North-South orientation – implicitly increasing the need for capacity building once more and bringing new research problems and new contexts in which to solve systemic problems.

In 2023, the Institute had 85 research staff. It produced 727 publications (431 in peer-reviewed journals) in collaboration with 159 organisations in 91 countries. Its income was EUR25.9m⁶, of which 40 percent came as membership fees from NMOs⁷, and the balance from joint projects, mostly in the EU Framework Programme. The members in the aggregate benefit from a good degree of funding leverage; each member Euro triggers almost EUR1.5 in additional income.

2.2 Strategy

IIASA has been confronted with a need to consider its strategy at least three times in its history: at the start; at the end of the Cold War, when its political purpose largely disappeared; and from 2017, when an Institutional Review concluded that IIASA was unclear about what it was for, and that it had become in important respects outdated.⁸ These specific challenges

⁴ D. H. Meadows, D. L. Meadows, J. Randers and W. W. Behrens III, *The Limits to Growth: A report for the Club of Rome's project on the predicament of mankind*, Universe Books, 1972.

⁵ M. Duller, 'Internationalisation of Cold War systems analysis: RAND, IIASA and the institutional reasons for methodological change', *History of the Human Sciences*, 172–190, 2016.

⁶ The accounts do not show the value of Austria's gift of the use of Laxenburg Castle, so both the costs and the contributions to IIASA are under-reported.

⁷ IIASA also has Regional Member Organisations (RMOs); throughout this report 'NMOs' also includes RMOs.

⁸ 'International Institute for Applied Systems Analysis (IIASA), Institutional review report', June 2017.

notwithstanding, IIASA’s successive strategies have tended to be sufficiently open to give IIASA room for manoeuvre and to allow a bottom-up approach to prioritising projects. There does not appear to be any explicit mechanism to exert pressure on the Institute to address specific sociotechnical problems identified by the member states.

IIASA’s first three years are described as a period of experimentation that resulted in a two-part strategy. The first part was to build scientific expertise in each of the four columns of Figure 1. The second part was to overlay a series of cross-cutting global issues across them – initially Global Energy Systems and Universal Regional Development, but over time others were expected to emerge.

Figure 1 IIASA strategy and organisation, 1976.

	RESOURCES & ENVIRONMENT	HUMAN SETTLEMENTS & SERVICES	MANAGEMENT & TECHNOLOGY	SYSTEM & DECISION SCIENCES
GLOBAL ENERGY SYSTEMS				
UNIVERSAL REGIONAL DEVELOPMENT				

Source: R.E. Levien, ‘Applying Systems Analysis in an International Setting’, pp. 29–48, IIASA Conference ’76, IIASA, 1976.

After the end of the Cold War, IIASA revised its strategy, aiming to be relevant in the new geopolitical context by focusing on three themes: global environmental change; global economic and technological transitions; and systems methods for analysis of global issues.⁹

The current (2021–2030) strategy, developed after the extremely critical Institutional Review of the Institute by an external panel in 2017, states that ‘Over the next decade, IIASA research will focus on transformational changes towards sustainable social-economic-environmental systems’. As before, this is to be realised in a matrix, with IIASA’s organisational structure providing the elements shown on the left of Table 1, and the cross-cutting research themes listed on the right. Science diplomacy, strengthening partnerships with NMOs and others, and building capacity will support impact.

⁹ J. F. Ahearne and A. McDonald, ‘Report of the Committee for the International Institute for Applied Systems Analysis’, *Records of the Academy (American Academy of Arts and Sciences)*, pp. 22-25, 1994/1995.



Table 1 Research programmes and cross-cutting themes in IIASA's strategy for 2021–2030.

Research programmes/research groups	Cross-cutting research themes
<ul style="list-style-type: none">• Advancing systems analysis (ASA)• Biodiversity and natural resources (BNR)• Energy, climate and environment (ECE)• Population and just societies (POPJUST)• Economic frontiers (EF)• Strategic initiatives (SI)	<ul style="list-style-type: none">• Governance and institutions• Technology and innovation• Economy and society• Population and behaviour• Equity and resilience• Production and consumption• Biodiversity and ecosystem services

Source: IIASA Research Plan, 2021–2024.

2.3 Governance and management

IIASA has reformed aspects of its governance and management in recent years. Complaints from a number of NMOs about intransparency, over-centralisation, recruitment processes for top managers, and lax financial management in 2015–16 led the Council to refuse to renew the contract of the Director General for a third term and to commission external reviews of the Institute. Hence, in addition to the aforementioned Institutional Review there was also a Governance Review in 2017,¹⁰ performed by a governance specialist from the South African National Research Foundation, which is detailed and technical and produced very similar conclusions to the Institutional Review. Given the degree of overlap between the two reports and the broader scope of the Institutional Review, we focus on the latter below.

The Institutional Review was extremely critical. It called for significant modernisation of the organisation and its governance, identifying weaknesses not only in IIASA itself but also in its relationship with the NMOs and the countries they represent. The panel argued that IIASA's structure and processes were no longer fit for purpose. 'IIASA currently has multiple narratives to explain and make sense of what it does, which tends to suggest a lack of focus and clarity about the scope of its mandate. IIASA should identify its main goals and objectives [and] ... given the institute's current membership' (i.e. given the shift from an East-West to a North-South constellation). The Institute was over-centralised, with too much power concentrated in the hands of the Director General and Chief Executive Officer, and its decision-making was intransparent. The panel argued that IIASA was spread too thinly. Unlike in its early years, it could no longer be the best at everything and needed to specialise more. It needed to rebalance its portfolio of activities in a way that better served the needs of its members. An institute-wide research strategy was needed to increase transparency, with starting and stopping rules for each activity. Overall, 'Three overarching issues need to be integrated into the institutional renewal process (i) the value proposition for member countries, (ii) substantial focus on governance and leadership reform and (iii) investment in the modernization of IIASA'.

The panel saw a proactive supply strategy as a precondition for balancing IIASA's perspectives, strength and interests on the one hand with NMOs' needs on the other. IIASA also needed to scale up direct engagement in activities to benefit member countries if some NMOs were to see true value for their membership. This needed engagement included research engagement, capacity building, and empowerment to benefit from IIASA's research results.

¹⁰ 'IIASA Governance Review', February 2017.



According to the panel, there were problems not only internal to IIASA but also on the side of the NMOs. The IIASA Council needed to be more engaged in the research substance and more mechanisms were needed to link IIASA programmes and activities to the national level and articulate national needs.

The Panel ... believes that membership engagement is also about identifying members' responsibilities – including towards supporting international science as a global public good. In other words, the issue of benefits for NMOs should not only be about the 'what's in it for us' question, but be balanced by 'what we contribute'. IIASA and its NMOs need to work together collaboratively and take joint responsibility for realizing the Institute's vision.

However, this would require not only internal reform but also a consensus among the NMOs about IIASA's purpose.

IIASA's response to the Institutional Review was to hire a new Director General in 2018, who focused strongly for a while on bringing management and administration up to date. Ultimately, the review also resulted in a revised Charter in 2022 (implemented 2023). This involved modernising IIASA's operational framework and processes, as well as introducing a new organisational scheme.

Another effect of the Institutional Review and its criticism of IIASA's communication with NMOs and others at national level has been a substantial increase in such activities.¹¹

Figure 2 shows IIASA's current governance and organisation. According to its Charter, IIASA comprises the Council and its Executive. The Council is the governing body of the Institute that:

- Sets the strategic directions for the institute
- Provides guidance and support to the IIASA Executive in taking and implementing decisions fundamental for the functioning of the Institute
- Oversees the activities of the Institute in establishing relations with governments and national bodies
- Facilitates and oversees the dissemination of the results of the Institute's research

The Council, on which NMO representatives sit, is advised by three specialised sub-committees. It appoints the Director General and the two other members of the Executive, who in turn appoint the staff.

This form of organisation supports a strong *de facto* separation between research governance and overall institutional governance, so that in practice research objectives and priorities are determined by the Executive and approved by the Council. Since 2002, IIASA has had a Science Advice and Review Board¹² intended to 'ensure that IIASA work continues to meet the highest standards in both scientific and policy relevant communities'.¹³ This Board comprises academics and does not represent the national level but the scientific community as a whole. It is intended to meet annually and reports directly to the IIASA Executive and indirectly to the Council Research and Engagement Committee. It is thus not a go-between

¹¹ 'Increasing the visibility and impact of IIASA in the scientific community in member countries', IIASA Council meeting, 1415, November 2023.

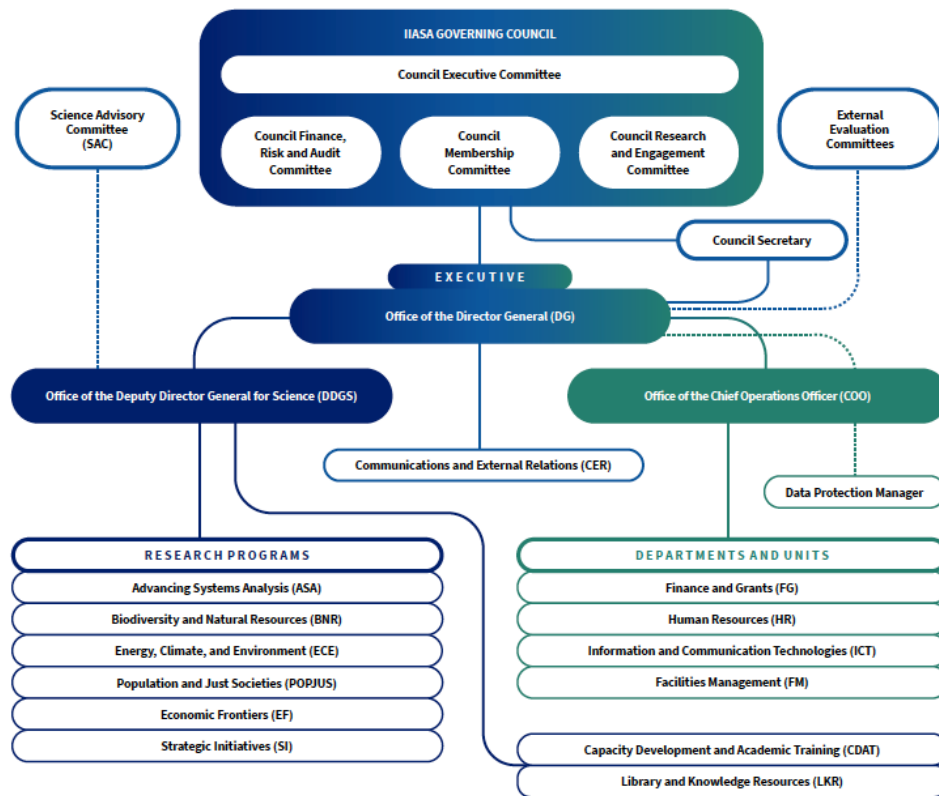
¹² Until 2024 called the Science Advisory Committee.

¹³ IIASA web site.



linking IIASA to needs in the member states, but a way for IIASA to consult the scientific community. Neither the Institutional nor the Governance Review refers to the Board, suggesting it is not seen as part of institutional governance.

Figure 2 IIASA governance and organisation structure.



Source: IIASA Annual Report, 2023 / IIASA Web site, August 2024.

It appears to us that the structure of IIASA's governance serves either to support the Institute's autonomy or to isolate it from member state needs and policymaking, depending on how one chooses to describe the situation. The NMOs are research funders and academies, but their role as Council members is oversight and involves little or no scientific content. (Unsurprisingly, our interviewees said that many NMO representatives – especially the academics – were little interested in the Council proceedings.) The primary policymaking users of IIASA research results, such as environment authorities, research organisations, regulators, and so on, have no formal role in IIASA governance. Even if they succeed in communicating their needs to the NMOs at the national level, there is no channel for communicating these needs to IIASA.

The three top members of the Executive have all been appointed since the Institutional Review. The current Director General (appointed 2023) is in charge of operations, delegating on the one hand to a Deputy Director General (appointed 2024) in charge of IIASA's research activities and on the other to a Chief Operating Officer (appointed 2020), who manages the administration and other 'overhead' activities. With a new organisation and executive, IIASA has the opportunity to set a new course, though some staffing and organisational barriers to change persist.



2.4 Evolution of the mission

IIASA's original mission was strongly research focused:¹⁴

[T]o build bridges across the Cold War divide and confront growing global and international problems through scientific cooperation. The institute was tasked with supporting research addressing problems of modern societies arising from scientific and technological development, and to undertake its own studies into both methodological and applied research in the related fields of systems analysis, cybernetics, operations research, and management techniques. [In the meantime ...] the institute's perspective has evolved from a focus on systems analysis to a broader systems science approach to build bridges between countries and stakeholders in the pursuit of sustainable development.

The Institutional Review saw IIASA's vision and mission as extending from research to addressing policy problems:

- *IIASA Vision:* IIASA will be the world leader in systems analysis to find solutions to global problems for the benefit of humankind
- *IIASA Mission:* To provide insights and guidance to policymakers worldwide by finding solutions to global and universal problems through applied systems analysis to improve human and social wellbeing and to protect the environment

However, despite the attention given in the Institutional Review to the need to connect better with the problems and needs of the NMOs and their governments, the current Vision set out in the strategy for 2021–2030 is focused on the Institute itself:

To be the primary destination for integrated systems solutions and policy insights to current, emerging, and novel global sustainability challenges, threats, and opportunities.

The closest the strategy comes to articulating the mission for 2021–2030 is to say IIASA should deliver impact through:

- **Advanced cutting-edge systems knowledge and scientific innovation** in an increasingly complex and interconnected world faced with enormous and growing uncertainties
- **Improved policy options for transformations towards sustainability** by injecting science and state-of-the-art systems-based analysis into decision-making processes
- **Inter- and transdisciplinary collaborations, capacity building, and partnerships** that respond flexibly to emerging challenges and serve as a trusted neutral platform for science, policy, and societal exchange

Thus, neither the new organisation nor the 2021–2030 strategy clarifies how the Institute is to relate to national and societal needs. While our interviewees with NMO representatives emphasised the importance of making such a connection for IIASA and for their own decisions about remaining as members of IIASA, the new organisation and strategy appear to be barriers to such a change.

¹⁴ 2021–2030 strategy.



2.5 Committee for Applied Systems Analysis

Following the 2017 Institutional and Governance Reviews of IIASA and the 2018 assessment of the Swedish IIASA membership, including 25 invited responses on the latter from Swedish stakeholders, Formas' Director General decided to appoint the Committee for Applied Systems Analysis (*Kommittén för tillämpad systemanalys*, KTSA) on 12 March 2019. The Committee was given a mandate until end of 2021.¹⁵ On 28 June 2022 the mandate was extended until end of 2023.¹⁶ The KTSA members represented the Swedish Environmental Protection Agency (SEPA), the Swedish Energy Agency (SEA), the Swedish Meteorological and Hydrological Institute (SMHI), the Swedish International Development Cooperation Agency (Sida), the Swedish Agency for Marine and Water Management (HaV), Formas, the Royal Academy of Sciences (KVA), the Royal Swedish Academy of Engineering Sciences (IVA) and the Young Academy of Sweden (SUA). The Committee's mission was to:¹⁷

- Promote development of systems analysis methods and competence development, both nationally and in relation to IIASA and other international programmes
- Promote application of systems analysis perspectives in society
- Promote public authorities' use of systems analysis methods and research in decision-making
- Actively collaborate with Swedish stakeholders and, as far as possible, identify institutional preconditions required for this to be realised
- Disseminate knowledge on development and implementation of systems analysis, as well as increase interest in systems analysis and IIASA's activities through other means
- Engage Swedish universities, university colleges and research institutes in research and competence development in both research and society at large
- Engage industry and organisations to increase societal benefit of system analyses

According to a summary provided by Formas, KTSA continuously provided Formas with advice on IIASA's strategy and research plans, activities, and proposed nominations for experts and the like. In addition, KTSA engaged in the following activities:¹⁸

2020

- Authored a debate article on how to tackle important societal challenges

2021

- Organised a roundtable discussion and a seminar on applied systems analysis in decision-making
- Advised the Swedish Agenda 2030 coordinator on how systems analysis may improve decision-making

¹⁵ 'Inrättande av en svensk kommitté för tillämpad Systemanalys', Beslut, Formas, 12 March 2019.

¹⁶ 'Ledamöter i Kommittén för tillämpad systemanalys', Beslut, Formas, 28 June, 2022.

¹⁷ 'Inrättande av en svensk kommitté för tillämpad Systemanalys', Direktiv, Formas, 12 March 2019. Authors' translation.

¹⁸ 'Kommittén för tillämpad systemanalys, KTSA. Genomförda aktiviteter', Formas, n.d. Authors' translation.



2022

- Gave a keynote address on mathematical models and modelling as foundation for political decision-making to the Riksdag's (Swedish Parliament) Environment and Agriculture Committee
- Met with the Government's Committee for Technological Innovation and Ethics (Komet)
- Participated in a seminar on preparing for tomorrow's climate arranged by Rifo (a forum to facilitate exchange between members of the Riksdag and researchers), KVA and Future Earth

2023

- Organised, in collaboration with the Riksdag's Evaluation and Research Secretariat (RUFES), a seminar on decision-making in cross-sectoral and complex societal challenges during the Riksdag's research day
- Formulated input to the research bill for use by the public authorities and organisations represented in KTSA

3 Swedish collaboration with IIASA

This chapter analyses Swedish collaboration with IIASA in the years 2020–2023, except for YSSP participation where the period is 2014–2023 to allow time for the development of participants’ careers (and to access a larger dataset).

3.1 Extent of collaboration

In the period 2020–2023, 14 Swedish citizens were affiliated to IIASA via three categories used by the Institute. Table 2 shows that in total there were eight employees, seven guest researchers and one associated researcher, totalling 16 affiliations. The apparent discrepancy is explained by the associated researcher becoming guest researcher and one guest researcher becoming employee. (IIASA stopped using the associated affiliation category in the beginning of 2023.) By the end of 2023, there were seven Swedish employees at IIASA, including five researchers, and six Swedish guest researchers. The 11 Swedish researchers amount to 2.1 percent of the 533 researchers affiliated to IIASA in 2023.

Table 2 Swedish IIASA staff 2020–2023.

Employment type	Title	2020-Q1	2020-Q2	2020-Q3	2020-Q4	2021-Q1	2021-Q2	2021-Q3	2021-Q4	2022-Q1	2022-Q2	2022-Q3	2022-Q4	2023-Q1	2023-Q2	2023-Q3	2023-Q4
Employee	Senior Research Scholar																
Employee	Senior Research Scholar																
Employee	Senior Research Scholar																
Employee	Senior Research Scholar																
Employee	Senior Research Scholar																
Employee	Researcher																
Employee	Office Assistant																
Employee	Cleaning Staff																
Guest	Guest Senior Research Scholar																
Guest	Guest Senior Research Scholar																
Guest	Guest Senior Research Scholar																
Guest	Guest Senior Research Scholar																
Guest	Guest Research Scholar																
Guest	Guest Senior Research Scholar																
Guest	Guest Research Assistant																
Associate	Senior Research Scholar																

Source: Data supplied by IIASA.

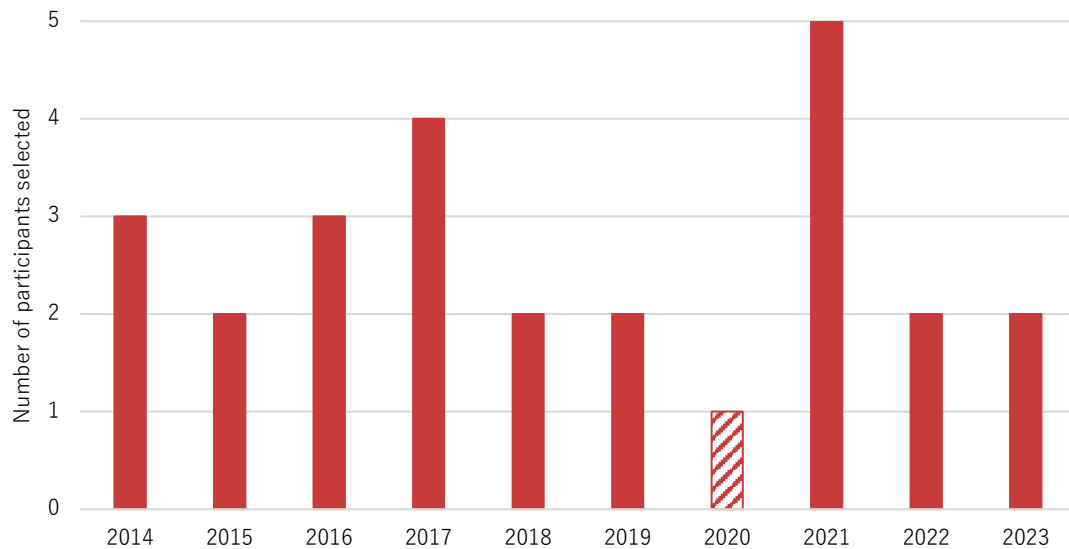
According to its Communications and External Relations Department, IIASA recruits employees through open processes, solely based on abilities and qualifications and using predetermined criteria for the relevant position. However, since IIASA aims for gender diversity, the Institute gives preference to members of underrepresented groups when there are equally qualified candidates. Preference is also given to candidates from member countries. Guest researcher affiliations enable researchers from other organisations to make use of IIASA’s facilities. Such affiliations are initiated by IIASA’s research programmes.

In addition to employment, IIASA offers postdoc positions and YSSP participation. However, of the 16 postdocs that IIASA on average hosts each year, none came from Sweden in 2020–2023. In contrast, 26 YSSP participants from Sweden were selected by IIASA in 2014–2023, see Figure 3, resulting in an average of 2.6 participants per year, or 5.3 percent of the 49 YSSP



participants that IIASA (on average) selects each year. However, due to the Covid-19 pandemic, participation was virtual for the five participants in 2021, while the candidate selected in 2020 chose not to participate (hashed bar in Figure). Eleven of the 26 participants selected were Swedish citizens (42%). Among the non-Swedes two each were citizens of Bolivia and China, and one each of Czechia, Egypt, France, Germany, Greece, India, Indonesia, Iran, Italy, Norway and UK. In Chapter 4, we further explore the careers of the YSSP participants.

Figure 3 YSSP participants selected from Sweden 2014–2023.¹⁹



Source: Data supplied by IIASA enhanced by googling.

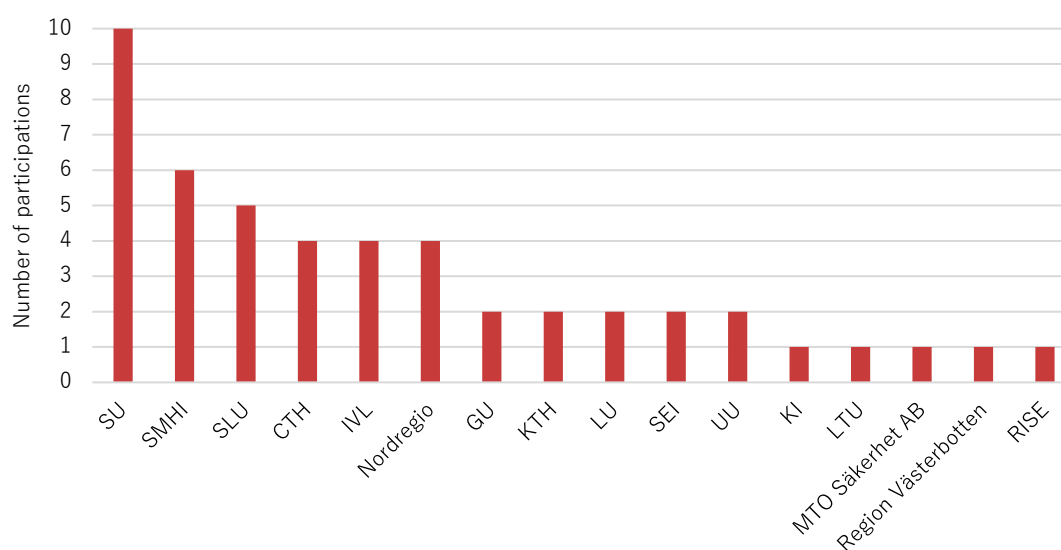
In 2020–2023, there were 48 participations by 16 Swedish organisations in 39 projects together with IIASA, see Figure 4; 21 of the projects are still ongoing when this report is submitted. 31 of the 39 projects were (or are) funded by the European Commission, three by the (private, Swedish) Knut and Alice Wallenberg Foundation, and two by participants' 'respective national funding agencies' (which for one of the two projects explicitly is Formas). The most common Swedish partners are Stockholm University (SU), SMHI, Swedish University of Agricultural Sciences (SLU), Chalmers University of Technology (CTH), IVL Swedish Environmental Research Institute (IVL) and Nordregio, which together account for more than two thirds (69%) of participations.

According to IIASA data, the 39 projects have a total budget of EUR200m, with income for IIASA of EUR22m and EUR19m for Swedish participants (data for Swedish participants is missing for nine projects). Of the EUR19m for Swedish participants, EUR15m come from the European Commission, more likely than not related to the EU Framework Programme, where it is well known that the key to participating in projects is to be a partner in proposals from strong and relevant research networks. We cannot know how important IIASA membership is in this, but it is likely to be an important factor, while withdrawing from IIASA is likely to reduce the extent of Swedish participation in such networks over time. It would be unlikely that a Swedish partner would invite IIASA to participate unless this increased their chances

¹⁹ By chance, we stumbled upon two YSSP participants from Sweden who were missing in the data supplied by IIASA; they are included in the Figure.

of getting a grant. On a similar logic, membership of IIASA and the network relationship between the Swedish partner and IIASA will underlie the invitation. We can therefore view the project funding the Swedish partners get via these joint projects as one part of the national return on the IIASA membership fee. It is logically impossible to say how much of the project income is attributable to the membership of IIASA and its networks, because this will normally be a necessary but not sufficient condition for winning that income. While it is implausible that all the EUR19m in Swedish income is attributable to the EUR2.4m Sweden paid in membership fees during the four years in question (which would imply a leverage of about 7:1), it seems equally implausible that there is no leverage or that it is as low as 1:1. It is therefore reasonable to assume that the leverage is somewhere in between 1:1 and 7:1, and that this monetary benefit comes in addition to the various other benefits that would be problematic to quantify in monetary terms.

Figure 4 Swedish participations in joint IIASA–Sweden projects 2020–2023.²⁰



Source: Data supplied by IIASA.

IIASA keeps track of visits to and from the Institute. These visits have a wide range of purposes, including conferences, symposia, workshops, project meetings and more. The most frequent contacts with IIASA in 2020–2023 were with SU, SLU, the Royal Institute of Technology (KTH) and IVL, which together accounted for over half of all visits, see Figure 5. (The dataset for visitors to IIASA also include 35 visits by Formas' Directors General, mostly related to management and governance, for which reason these are not included in the figure. We return to management and governance in Section 3.4).

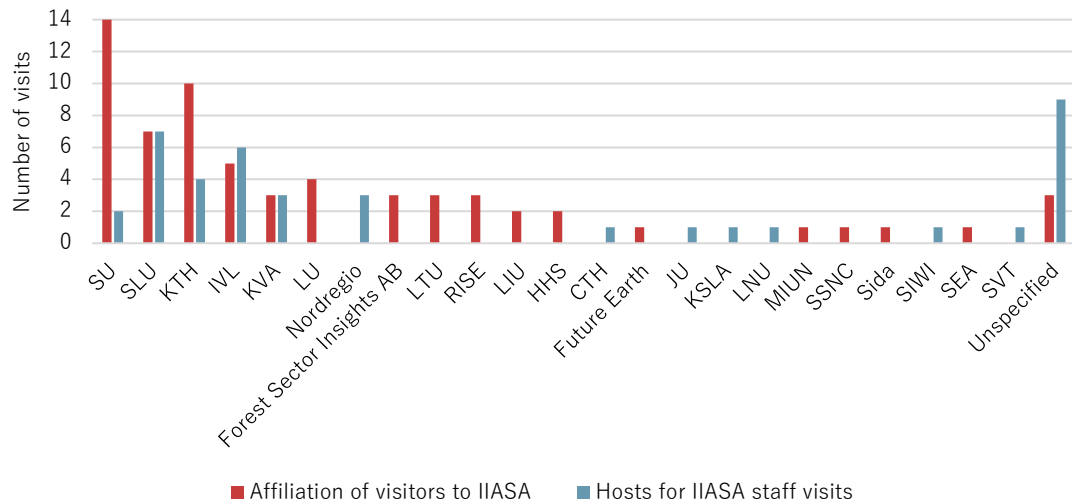
According to Scopus data provided by IIASA, 222 papers with at least one author from IIASA and one from a Swedish organisation were published in 2020–2023. In total, 37 Swedish organisations were represented among the 648 co-authorships (as judged by the first Swedish affiliation for authors with multiple affiliations). Figure 6 shows the number of co-authorships per organisation for co-authors with more than one paper (there are 15 additional organisations with only one paper); again, the analysis is based on first Swedish affiliation.

²⁰ The abbreviations used in the report are summarised in Appendix C.



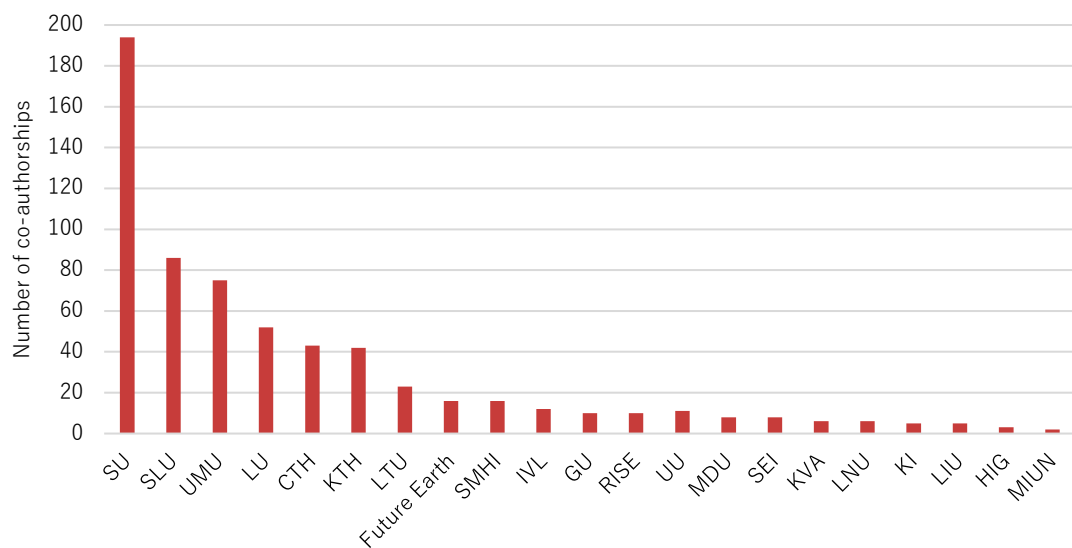
The top six organisations – SU, SLU, Umeå University (UMU), Lund University (LU), CTH and KTH – accounted for more than three-quarters (76%) of co-authorships.

Figure 5 Visitors to and from IIASA 2020–2023.



Source: Data supplied by IIASA.

Figure 6 Affiliations of co-authors in joint IIASA–Sweden papers 2020–2023.



Source: Scopus data supplied by IIASA.

To determine whether there are groups of researchers that dominate collaboration with IIASA, we analysed the mailing list for the survey of researchers (see Appendix B for details on how the list was constructed). We arbitrarily chose to consider three researchers from the same unit (for universities) or the same organisation (for other types of organisations) as a group; this resulted in Table 3, which includes almost two thirds of all researchers on the list. There do indeed seem to be coherent research groups at least at SU, KTH, LU, IVL, Luleå University of Technology (LTU) and SMHI, but where to draw the line depends on how many researchers



that should be considered to constitute a ‘group’. If one considers entire universities, SU clearly dominated (17% of researchers), followed by SLU (11%).

Table 3 Apparent research groups.

Organisation	Unit	Share of researchers
SU	Stockholm Resilience Centre	10%
KTH	Energy Technology	8%
LU	Physical Geography and Ecosystem Science	5%
IVL		5%
LTU	Energy Engineering	5%
SMHI		5%
SU	Computer and Systems Sciences	4%
SLU	Forest Resource Management	4%
SU	Physical Geography	3%
Future Earth		3%
UMU	Public Health and Clinical Medicine	3%
SLU	Forest Ecology and Management	3%
SLU	Swedish Species Information Centre	3%
CTH	Space, Earth and Environment	2%
SLU	Southern Swedish Forest Research Centre	2%
Sum		63%

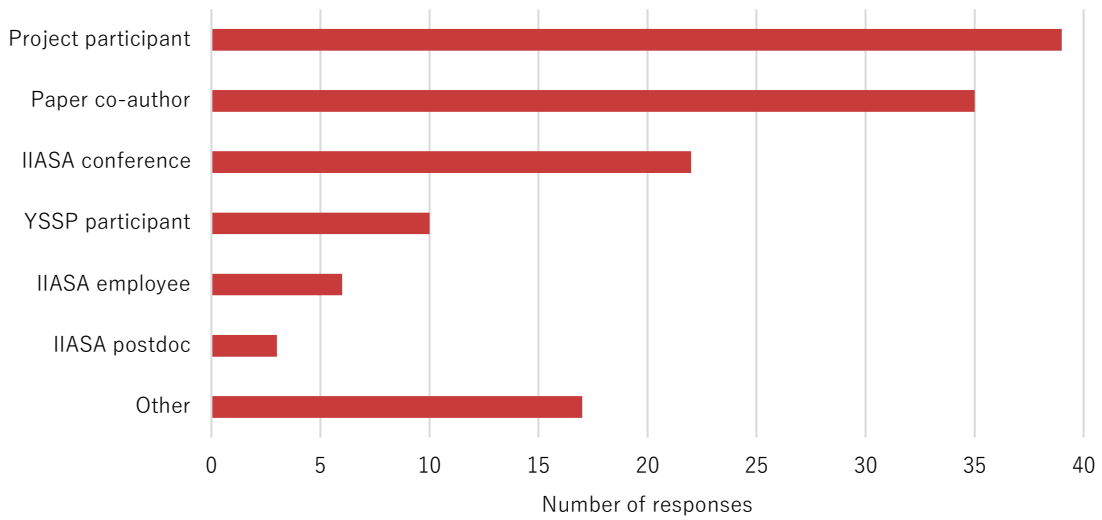
Source: Data supplied by IIASA.

3.2 Rationale for collaboration

As already mentioned, we conducted a web survey of researchers with a Swedish affiliation that collaborated with IIASA in 2020–2023 and one of YSSP participants from Swedish organisations in 2014–2023. Figure 7 shows the nature of the IIASA collaboration for the researchers.

The Figure shows that participation in joint projects, co-authored papers and participation in IIASA conferences clearly dominated. (Since multiple answers were permitted there are twice as many responses as respondents.) Among researcher respondents there were six IIASA employees (mostly former), three former postdocs and ten YSSP participants; two of the postdocs previously had been YSSP participants. It should be noted that these ten YSSP participants all participated prior to 2014, since we deliberately excluded any YSSP participant in 2014–2023 from the researcher survey mailing list (and instead invited them to respond to the YSSP survey).

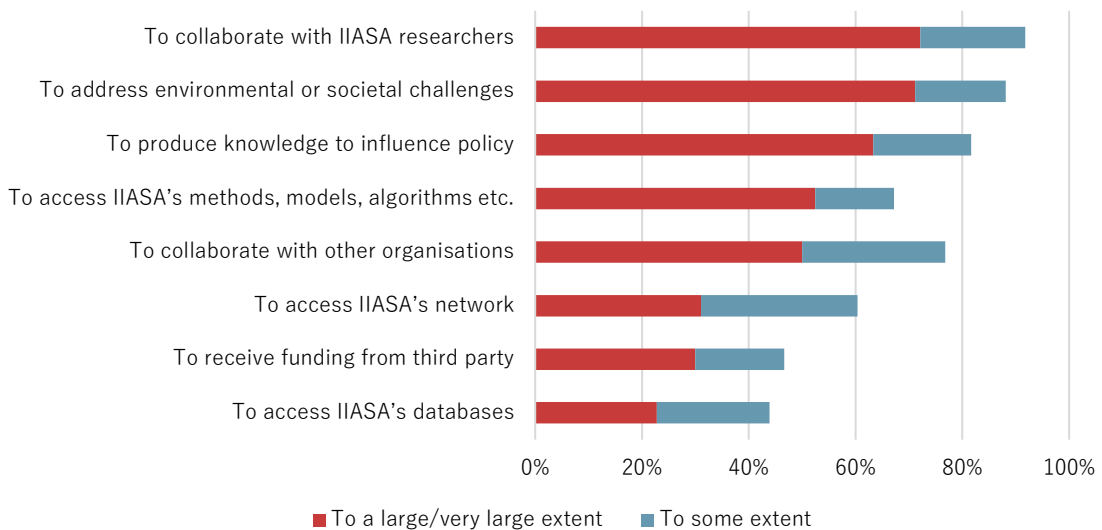
Figure 7 Nature of researcher respondents' collaboration with IIASA (n=60).



Source: Researcher web survey.

Figure 8 shows that researchers' most important motives for collaborating with IIASA were to collaborate with specific IIASA researchers, to address specific environmental or societal challenges, and to produce knowledge to influence policy related to specific environmental or societal challenges. Access to IIASA's methods, models, algorithms, software etc. were also considered important. (Survey questions and alternatives are shown unabridged in Appendix B.)

Figure 8 Researchers' motives for collaborating with IIASA (n=62).



Source: Researcher web survey.

In interviews, researchers emphasise the need for international collaboration as an important motive, since many environmental and societal challenges cannot be solved at national level. Several researchers also point to the increasing importance of systems analysis in addressing

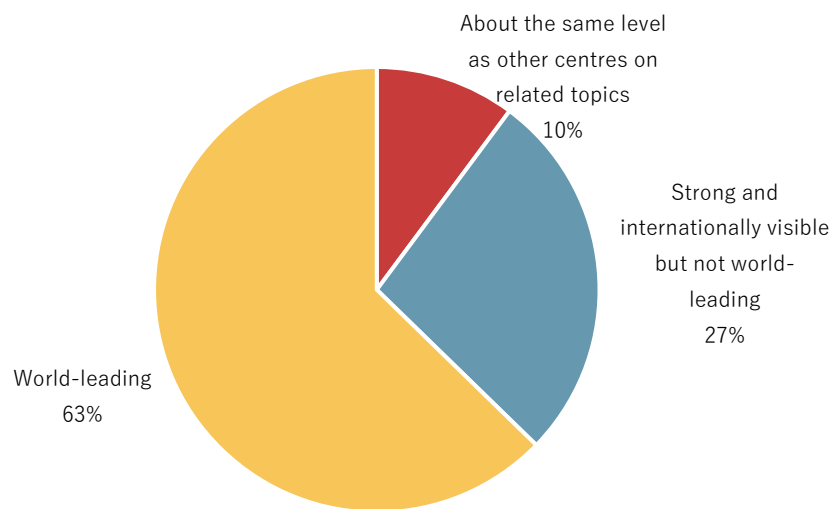


complex environmental and societal challenges. Some researchers explain that collaborating with IIASA on global and transnational issues in an international context broadens ones' perspectives.

Two interviewees mention the opportunity to collaborate with IIASA in research projects funded by the European Commission. One researcher argues that IIASA has resources and competence to lead such projects, which is challenging for many Swedish research institutions. Another interviewee mentions that IIASA has such close links to the European Commission that it can react swiftly to calls for proposals.

Almost two-thirds (63%) of researchers regard IIASA as world-leading and another quarter (27%) consider the Institute as strong and internationally visible but not world-leading, see Figure 9.

Figure 9 Researchers' view on IIASA as a centre of research excellence in systems analysis (n=59).



Source: Researcher web survey.

Of the 41 respondents who replied to the follow-on question on which the best two or three international centres of research excellence in systems analysis are, 25 answered IIASA, 11 the Stockholm Resilience Centre (SRC), 11 the Potsdam Institute for Climate Impact Research (PIK), six the (US) Santa Fe Institute and four the Dutch research institute on the environment and spatial planning (PBL). One survey respondent summarises what several others also mention, namely that there are few, if any, other centres with as wide a scope as IIASA:

IIASA is the key institute for gathering different disciplines that all in some way apply systems analysis. Beside IIASA there are single disciplines applying systems analysis.

Several respondents argue that IIASA has unique expertise in specific fields:

IIASA is the only neutral place where researchers from different nations can work together on global sustainability challenges. In the current geopolitical situation, it is needed more than ever.



The scenarios produced at IIASA are instrumental in all work related to studies on future climate change. This is especially important for Sweden where competence to build and produce such scenarios is either lacking or not coordinated.

In the field of air pollution IIASA and the GAINS-modelling team has unique expertise and experience on policy-relevant research as well as excellent contacts with national and EU policymakers.

Former KTSA members interviewed generally agree that IIASA is a centre of excellence in some, but not all, fields. Many researchers interviewed argue that although there are other centres of excellence in systems analysis, IIASA is unique as an international and unaffiliated institute active at a global scale in several fields. One interviewee explains:

There are of course other strong actors, but none that employ an equally international, borderless approach. On international issues and challenges it is very important with the kind of platform that IIASA provides.

Several researchers argue that IIASA is in line with or even ahead of other actors in many fields. One of them explains:

IIASA has a long history of quickly and successfully integrating new knowledge into its tools and resources meaning that they are continuously evolving. I would not underestimate this ability, and I do not think that there are others with a similar ability at this level.

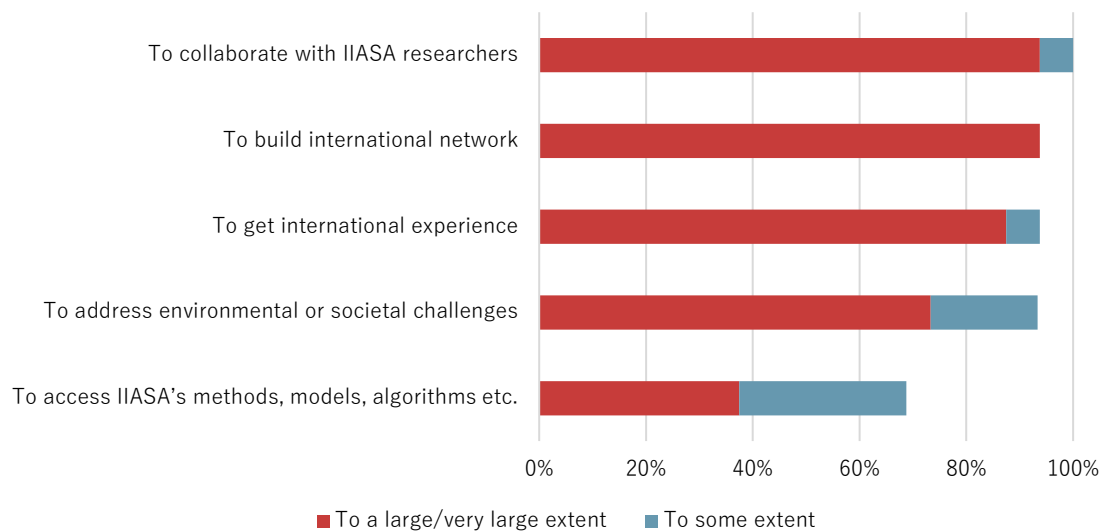
However, one survey respondent argues that systems analysis has become commonplace in research on sustainability issues:

I think by now systems analysis is central to the majority of excellent research in systems analysis. I don't think it has a home at institutes anymore but is present in all university departments that deal with sustainability issues (including Swedish universities).

Like Figure 8, Figure 10 shows that getting the opportunity to collaborate with IIASA researchers and to address environmental or societal challenges were also among YSSP participants' main motives for applying to YSSP, but network building and getting international experiences were also strong motives.



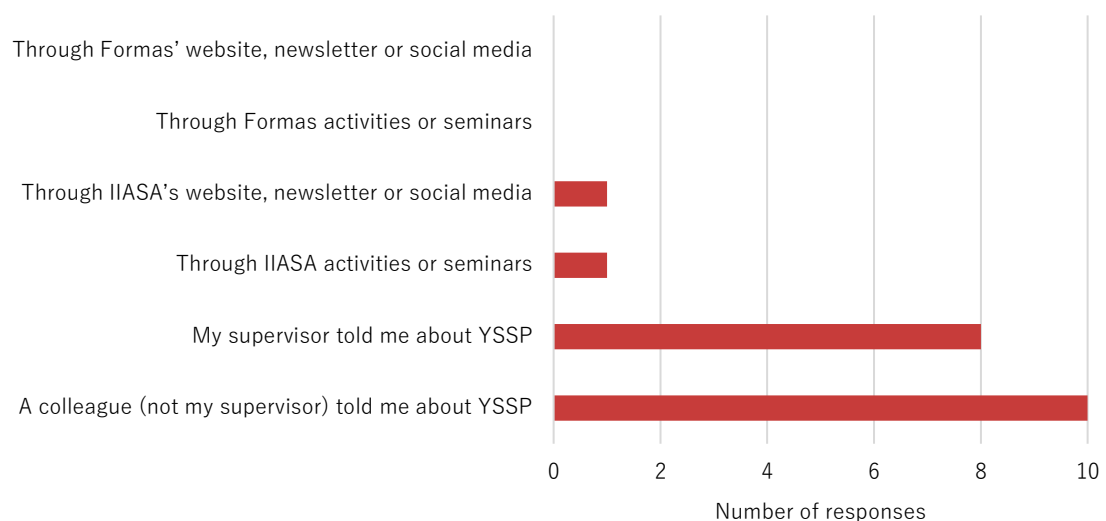
Figure 10 YSSP participants' motives for applying to YSSP (n=16).



Source: YSSP participant web survey.

Figure 11 reveals that word-of-mouth is by far the most common way to learn about the YSSP opportunity, not through IIASA or Formas, thus suggesting that there is room for more effective communication on YSSP – and presumably also on postdoc – opportunities at both organisations.

Figure 11 How YSSP participants found out about the YSSP opportunity (n=16).



Source: YSSP participant web survey.

3.3 Swedish use of IIASA resources

IIASA was asked to describe the IIASA resources that Swedish (meaning Sweden-based) researchers utilise and which of its resources that are un- or underutilised. The following sections summarise the information for each of IIASA's six research programmes/groups,



including the Swedish research groups that IIASA states utilise the resources (where specified).

Advancing Systems Analysis (ASA)

Swedish utilisation of the ASA research group's resources include:

- Development of methodologies for decision making under uncertainty, e.g. applied to health, energy, disaster risk reduction and climate change adaptation policies (SU (Computer and Systems Sciences))
- Combination of citizen and data science with Earth observation data to monitor progress towards the SDGs (SLU (Forest Resource Management; Forest Ecology and Management))
- Modelling of sustainable land-use and food systems (SU (SRC), LU (Centre for Environmental and Climate Science))
- Study of human-induced drivers of climate change, including ocean chemistry (GU, SU, SMHI)

Biodiversity and Natural Resources (BNR)

Swedish utilisation of the BNR research group's resources include:

- Models of greenhouse gas emissions from agriculture and forestry activities (SLU (Swedish Species Information Centre; Forest Ecology and Management), CTH (Space, Earth and Environment), LTU (Social Sciences, Technology and Arts), SEPA, Swedish Forest Agency)
- Models to identify optimal location, size, and technology of renewable energy systems (KTH (Energy Technology), LTU (Energy Engineering), CTH (Energy and Environment), RISE)

There is little or no Swedish use of the following BNR resources:

- Models of impact of future climate and socio-economic change scenarios on water resources
- Models of integrated species distribution
- Models of eco-evolutionary vegetation

Economic Frontiers (EF)

There is little Swedish use of the EF research group's resources:

- Models of decision-rules under regime-switching disruptions, including eco-system destruction, climate tipping and technological breakthroughs
- Models of household response to environmental, technological, economic and social transitions
- Models of households facing environmental or economic risks

Energy, Climate, and Environment (ECE)

The main resources of the ECE research group are:

- Climate change scenario databases:
 - AR6 Scenario Explorer and Database (Sixth Assessment Report of Working Group III by the Intergovernmental Panel on Climate Change (IPCC))
 - NGFS Phase 4 Scenario Explorer (Network for Greening the Financial System)



- SSP Scenario Explorer (Shared Socioeconomic Pathways)
- The MESSAGEix modeling framework for strategic energy planning and integrated assessment of energy-engineering-economy-environment systems
- The Greenhouse gas – Air pollution Interactions and Synergies (GAINS) model

Swedish users include SU (SRC, Environmental Science; Meteorology; Geological Sciences), Uppsala University (UU) (Earth Sciences), KTH (Energy Systems), Malmö University (MAU) (Urban Studies), LU (Environmental and Energy Systems Studies), CTH, LIU, GU, UMU, Karolinska Institutet (KI), IVL, SMHI, SEPA.

Population and Just Societies (POPJUS)

The main resources of the POPJUS research group are:

- Global population projections
- Migration models
- Understanding inequalities across countries, regions, time and sub-populations in the context of ageing and climate change
- Developing the justice framework in sustainability research
- Reacting to emerging challenges

Swedish users include Nordregio, KI and LU.

Strategic Initiatives (SI)

There is little Swedish use of the SI research group's resources, but UMU (Mathematics and Mathematical Statistics) collaborates with the group on one project.

In interviews, researchers argue that Swedish efforts in systems analysis benefit from IIASA's resources by widening research perspectives from national to global or transnational level. One interviewee illustrates this by describing how the use of IIASA's resources enabled the group to analyse the effects of measures taken in Sweden on other parts of the world. Another interviewee explains that some of the group's research would not be possible without access to IIASA's resources. Other interviewees mention in more general terms how collaboration with IIASA has prompted them to increase collaboration with others, also in other disciplines, which has benefited their research in systems analysis.

A couple of researchers suggest that some of IIASA's resources may be underutilised due to limited knowledge of IIASA and its resources among many Swedish researchers. One interviewee elaborates:

I do not think Swedish researchers utilise IIASA's resources to the extent that they could because they do not know about the opportunities that IIASA provides. There is a lack of knowledge about IIASA's expertise and what the Institute can offer. I do not think many Swedish researchers know about IIASA at all.

3.4 Swedish participation in IIASA management and governance

Our interviews with NMOs in other countries were very helpful for this report, but it was hard to explore much of the history with them. Fortunately, in Sweden present and past Directors General and staff members were able to present a picture of key events in the last decade or so.



The two Formas Directors General between them participated in both biannual Governing Council meetings in the 2020–2023 period (except in 2023 when only one meeting was attended), as well as in two Council Finance, Risk and Audit Committee meetings per year. The previous Director General also participated in 11 Council Executive Committee meetings during her period in office, translating into more than four such meetings per year, and also chaired the IIASA Finance Committee (of which the current Director General is a member).

The Institutional review discussed in Section 2.3 was triggered by dissatisfaction, especially among the Nordic NMOs, with the governance and management of IIASA. The organisation was seen as archaic, over-centralised, and dominated by an established network of old white men, often out of touch with current cultural and human resource management norms. The NMOs were also concerned at the apparent lax financial control of management costs and expenses. The Council subsequently blocked the reappointment of the Director General and triggered the Institutional Review. After the review panel presented its finding in 2017, the Council required IIASA to set up an internal task force to reform the Institute. This meant the timing of the 2018 assessment of Sweden's membership of IIASA was unfortunate. As several of the invited responses on the assessment said, the time to decide should be after, not during, the period when IIASA worked to tackle its governance and management challenges.

The view from Formas (and foreign NMOs) was that the next Director General, who took over in 2023, focused on management and process changes, such as updating human research policies and improving IIASA's outward communications. However, the changes met with increasing opposition from senior people in the IIASA hierarchy. Our interviewees felt that the new structure was much improved but was nonetheless felt to suffer important limitations, especially that it still failed to connect adequately to members states' individual and collective research needs, and that the end-users of IIASA's research remain disconnected from the Institute (as is reflected in our discussion of the institute's structure in Section 2.3).

An important consideration from Formas' perspective is that the events leading up to the Institutional Review and the subsequent reforms imposed a heavy burden on Formas' top management in addressing a potentially important but nonetheless very small part of its responsibilities.

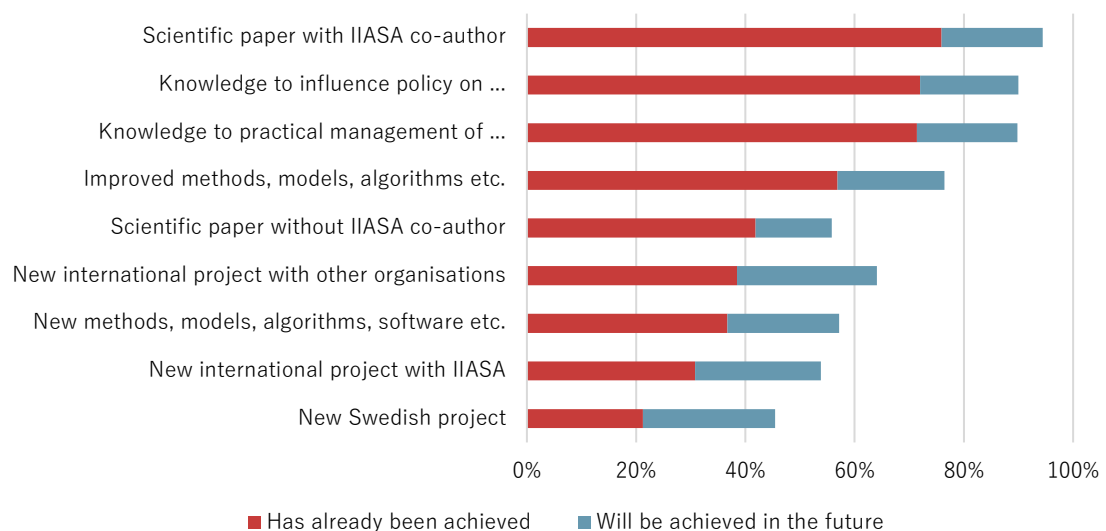
4 Results and impacts

In this chapter we consider the results and impacts of IIASA collaboration for Swedish researchers, YSSP participants and society.

4.1 Benefits to researchers

According to researchers, the most common personal outcomes to date are co-publications with IIASA, knowledge to influence policy related to environmental or societal challenges, knowledge to contribute to practical management of such challenges, and improved methods, models, algorithms, software etc. for systems analysis, see Figure 12. New projects have resulted for many respondents, but only for less than a third of respondents were these new projects together with IIASA. (Recall that 39 projects together with IIASA have brought Swedish participants EUR19m in income, cf. Section 3.1.) On average, one in five respondents expects further outcomes in the future. (The share of respondents that answered ‘Don’t know’ was quite high (30% on average) for the new projects and papers without IIASA co-author alternatives, so these results should be interpreted with caution.)

Figure 12 Outcomes of IIASA collaboration for researchers (n=58).²¹

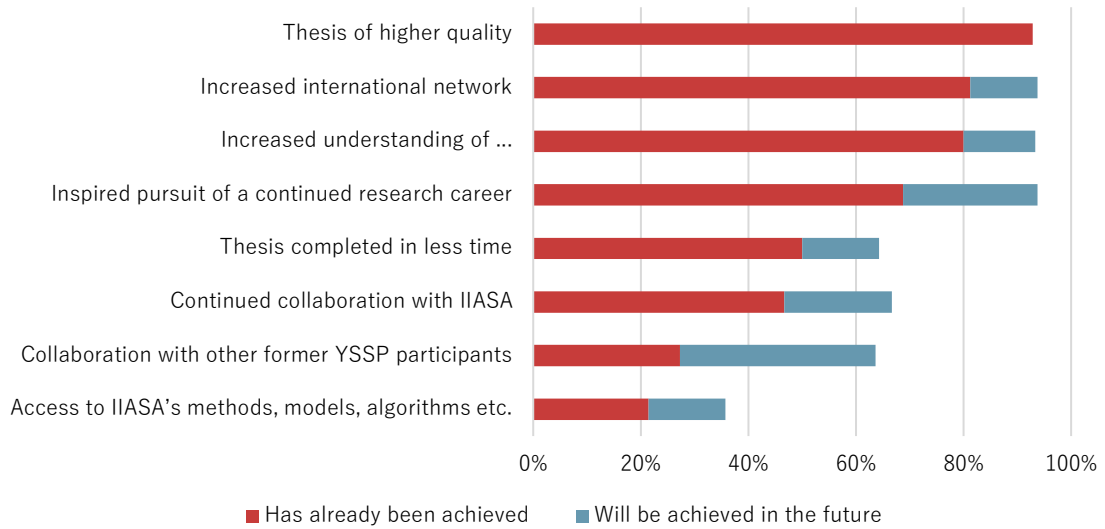


Source: Researcher web survey.

YSSP participants believe that the summer at IIASA brought them substantial benefits, most notably in terms of higher-quality PhD theses, increased international networks, and increased understanding of environmental or societal challenges, inspiring them to pursue continued research careers after defending their theses, see Figure 13. Half the respondents also believe that the YSSP experience meant that they completed their theses more quickly than they otherwise would have done.

²¹ Truncated alternatives end with ‘... environmental or societal challenges’.

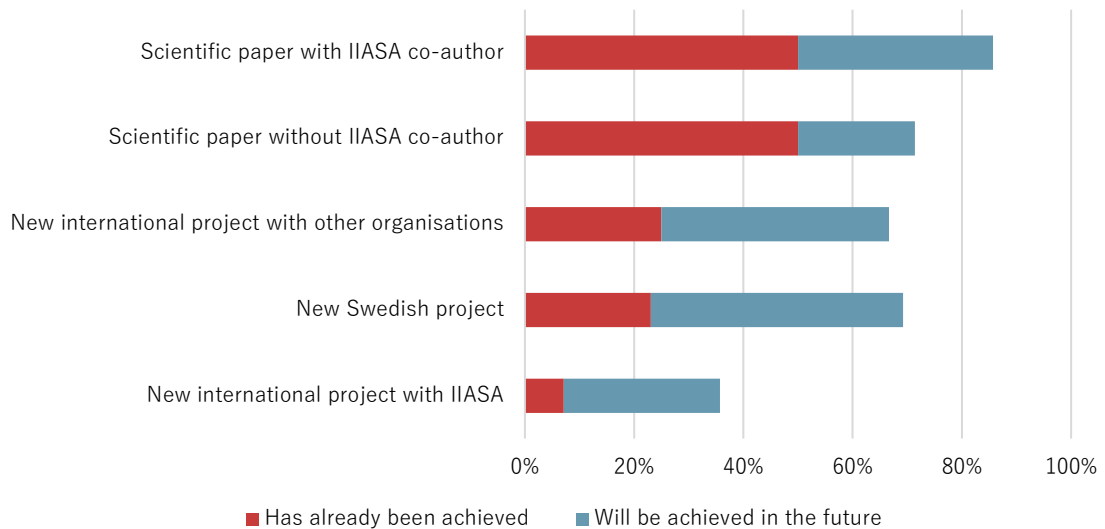
Figure 13 Outcomes of IIASA collaboration for YSSP participants (n=16).²²



Source: YSSP participant web survey.

Figure 14 shows that half of YSSP respondents have written papers both with and without co-authors from IIASA and that some already have seen new projects. The respondents' expectations of additional results are high overall.

Figure 14 Results of IIASA collaboration for YSSP participants (n=16).



Source: YSSP participant web survey.

All 16 respondents agree that their YSSP participation was beneficial to their careers so far and three-quarters of them agree to a large or very large extent. Some free-text responses are worth noting:

²² Truncated alternative ends with '... environmental or societal challenges'.



My collaboration with [name of IIASA researcher] has shaped my entire subsequent professional career.

My YSSP participation has been the single most impactful decision for my career development. Not only did it help me finish a better thesis in less time but also made me a renowned expert in my field and made me realize the huge potential of systems analysis in any professional endeavour since then.

The experience was not only good from an academic point of view, but also for social and personal development. Living together with people from different countries and backgrounds made the experience unique.

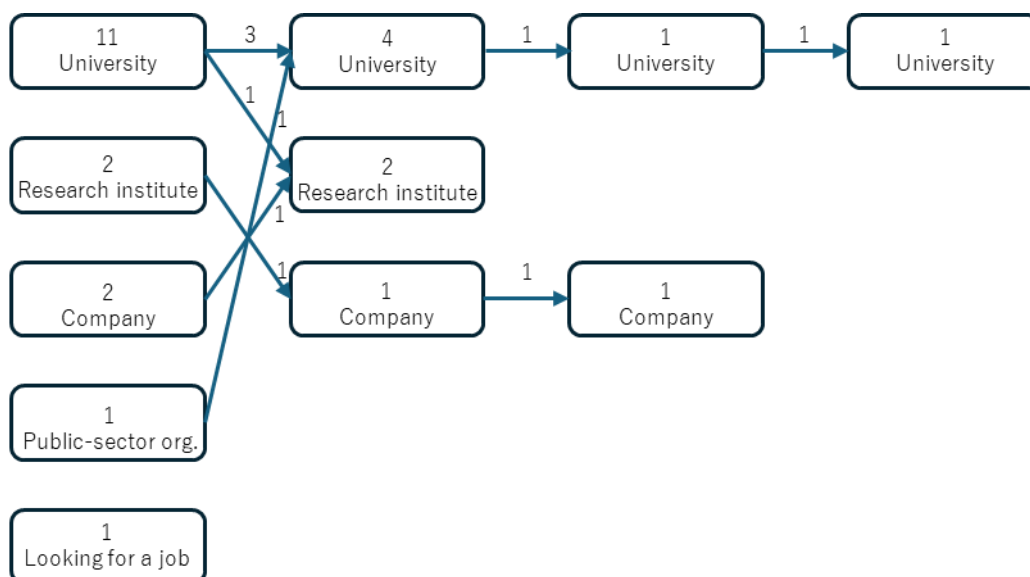
The YSSP offers robust support for doctoral students, inspiring creativity and providing a strong methodological foundation within an interdisciplinary setting.

Researchers who had participated in YSSP *before* 2014 agree that the programme had been most beneficial to their careers. One interviewee recounts:

Participating in YSSP has been instrumental to my career. I don't think I would be at this level had I not been affiliated to IIASA.

So, what do the YSSP participants' careers look like after completion of their PhD degree? Based on survey responses, we may map careers by actor type, see Figure 15. Nine of the 17 respondents remain at their first employer after completion of their PhD degree, which in most cases is the university where they defended their theses. Seven individuals have subsequently changed employers once, two have done so twice and one three times. (The respondent who is looking for a job responded to the survey at the time of her defence.)

Figure 15 Career development for YSSP participants (n=17). Numbers denote individuals.



Source: YSSP participant web survey.



Looking at their e-mail addresses, we may chart the present whereabouts of 24 of the 25 individuals who actually participated in YSSP, see Table 4. Three of the university-affiliated individuals work at Karlstad University (KAU) and LU, respectively, two each at KTH, SLU and SU, and one each at CTH, University of Gothenburg (GU), Linköping University (LIU), LTU and Mälardalen University (MDU). The three individuals at research institutes work at Research Institute of Sweden (RISE), Stockholm Environment Institute (SEI) and Research Institute of Industrial Economics (IFN), while the ones at Swedish companies are at Ramboll, Mellanskog and NE Nationalencyklopedin. One individual works for the US company Environmental Incentives. In summary, only one of the 24 YSSP participants that we have located has left Sweden (regardless of citizenship; the one working in the US is Swedish, according to IIASA data). Four in five work for universities or research institutes (cf. Figure 13; nearly seven in ten respondents stated that the YSSP experience inspired pursuit of a continued research career).

Table 4 Present employers of YSSP participants.²³

Actor type	Number	Share
University	17	68%
Research institute	3	12%
Company	3	12%
Foreign company	1	4%
Unknown	1	4%
Sum	25	100%

Source: Data supplied by IIASA enhanced by googling.

4.2 Societal benefits

Around three in five researchers judge that awareness among policymakers of opportunities to tackle environmental or societal challenges has increased and that it has led to more informed global/international policymaking on such challenges, see Figure 16. Responses indicate that the impact in terms of more informed policymaking may be slower at European and Swedish levels. Three in five respondents believe that public awareness also has increased. Four in five respondents expect impacts in all respects sooner or later. (On average, one in five respondents answered 'Don't know' suggesting that assessing such broad societal impacts is challenging.)

In addition, one researcher interviewed argues that collaboration with IIASA contributes to capacity building in Sweden:

Many researchers in Sweden that are influential in systems analysis have had some kind of connection to IIASA. For research related to systems analysis, you should not underestimate the capacity building that comes through people who have been at IIASA.

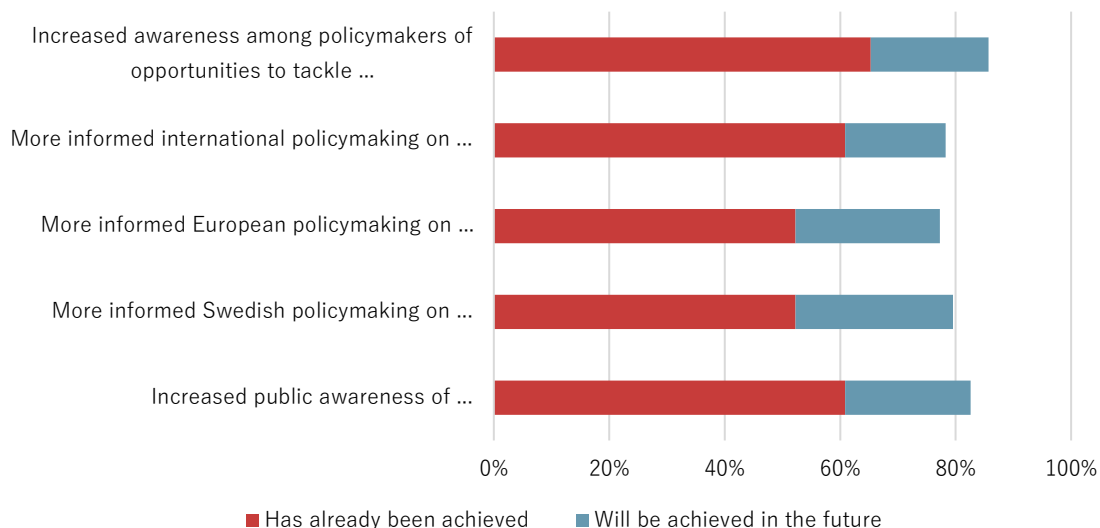
Another interviewee explains that collaboration with IIASA has improved his understanding of systems analysis and the accompanying methods and models. The same researcher argues

²³ We have failed to locate one of the former YSSP participants listed in the data from IIASA (too common name and no apparent LinkedIn presence). Additionally, we have by chance stumbled upon two additional YSSP participants from Sweden (in the given time period) who were missing in the YSSP participation data supplied by IIASA; they are included in the Table but were discovered too late to be invited to respond to the survey.



that collaboration with IIASA has improved the citation index of his published research, and thus increased its impact.

Figure 16 Societal impacts of IIASA collaboration according to researchers (n=57).²⁴



Source: Researcher web survey.

Overton is a service that collects policy documents and links them to the research, people and other policy documents that cite them. Table 5 shows the 38 Swedish organisations whose policy papers cite IIASA research during the years 2020–2023, based on an Overton dataset provided by IIASA. The organisations most commonly citing IIASA research are institutes and government agencies.

Each reference is associated with three topics in Overton’s database. The 159 references in Table 5 are associated with no less than 253 topics (but 182 topics appear only once); Table 6 lists the 19 topics that amount to more than 1 percent of all topics (effectively meaning at least five occurrences), which together constitute over a third of all topic references. The Table illustrates that climate change and greenhouse gas emissions dominate in the policy documents, followed by transportation-related air pollution (most references to air pollution and biofuels are linked to transportation). These observations seem to correlate with the top citing organisations in Table 5.

In the survey, we asked researchers who they consider as the main users, or beneficiaries, of their research. Half of them answered the government or certain named government agencies, with SEPA by far being the most mentioned, followed by the Swedish Forest Agency, SEA, the Swedish Board of Agriculture, HaV and the Swedish Transport Administration. All but SEA also appear in Table 5.

²⁴ Truncated alternatives end with ‘... environmental or societal challenges’.



Table 5 Swedish organisations whose policy papers cite IIASA research 2020–2023.

Citing organisations	Number of references
SEI	25
SEPA	17
IVL	15
Swedish National Road and Transport Research Institute	15
SIPRI	9
SMHI	7
Government Offices	6
RISE	6
Sida	5
Institute for Futures Studies	4
Swedish Forest Agency	4
County administrative boards	3
Formas	3
Global Water Partnership	3
SIWI	3
Swedish Transport Administration	3
City of Stockholm	2
HaV	2
Ratio Institute	2
Statens Medicinsk-etiska råd	2
Swedish Agency for Economic and Regional Growth	2
Swedish Board of Agriculture	2
Swedish Climate Policy Council	2
Swedish Defence Research Agency	2
Swedish Geotechnical Institute	2
City of Gothenburg	1
Forestry Research Institute	1
Geological Survey of Sweden	1
IFN	1
Public Health Agency of Sweden	1
Sveriges Riksdag	1
Swedish Agency for Work Environment Expertise	1
Swedish Competition Authority	1
Swedish Food Agency	1
Swedish Gender Equality Agency	1
Swedish Research Council	1
Forte	1
Transport Analysis	1
Total	159

Source: Overton data supplied by IIASA.

Table 6 Most common topics of Swedish policy papers citing IIASA research 2020–2023.

Topics	Number of occurrences	Share of all topics
Climate change	23	4,9%
Air pollution	15	3,2%
Climate change adaptation	11	2,3%
Sustainability	11	2,3%
Greenhouse gas emissions	10	2,1%
Sustainable Development Goals	10	2,1%
Biodiversity	9	1,9%
Agriculture	8	1,7%
European Union	7	1,5%
Intergovernmental Panel on Climate Change	7	1,5%
Sweden	7	1,5%
Transport	7	1,5%
Biofuel	6	1,3%
Earth sciences	6	1,3%
Paris Agreement	6	1,3%
Life-cycle assessment	5	1,1%
Natural environment	5	1,1%
Nature	5	1,1%
Renewable energy	5	1,1%
Sum		34.4%

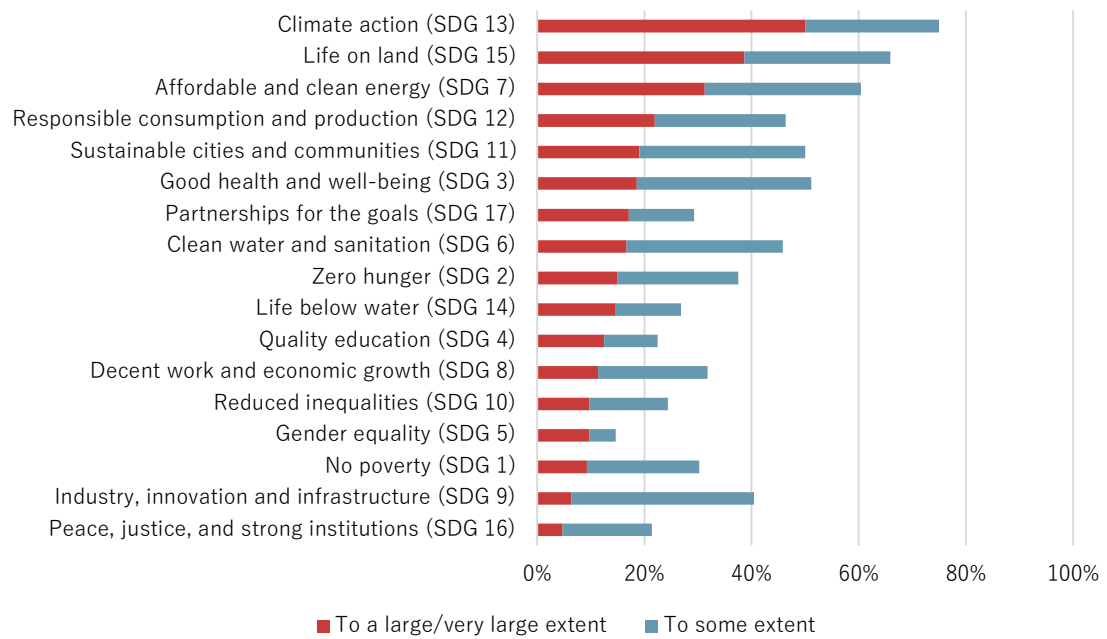
Source: Overton data supplied by IIASA.

Researcher respondents were asked to judge to what extent they believe that their IIASA collaboration has, or eventually will, contribute to addressing the Sustainable Development Goals (SDGs), see Figure 17. The most commonly SDGs addressed are Climate action (SDG 13), Life on land (SDG 15) and Affordable and clean energy (SDG 7), which correlates quite well with the Overton results in Table 6.

The correlations are further underlined by examples mentioned in interviews with former KTSA members, which include IIASA contributions to IPCC-processes and global scenarios to manage goal conflicts in climate negotiations, and socioeconomic scenarios and systems issues in climate modelling, which in turn provide input to local and regional models in Sweden. Members explain that benefits of IIASA collaboration are reaped both through use of IIASA data and through collaboration in joint projects. One former KTSA member mentions IIASA support to development of policy support in complex contexts including goal conflicts, such as in development of the Swedish strategy for the management of game animals (*Strategi för svensk viltförvaltning 2022–2029*). Another former member argues that collaboration with IIASA is important for the future of Swedish society and goes on to say that the potential in collaborating with IIASA is huge. However, to reap benefits it is crucial to begin with defining what results collaboration should lead to. Yet another former member highlights IIASA's importance in promoting the systems perspective, which is often overlooked and without which incorrect conclusions may be drawn.



Figure 17 Contribution of IIASA collaboration to addressing the Sustainable Development Goals according to researchers (n=56).



Source: Researcher web survey.

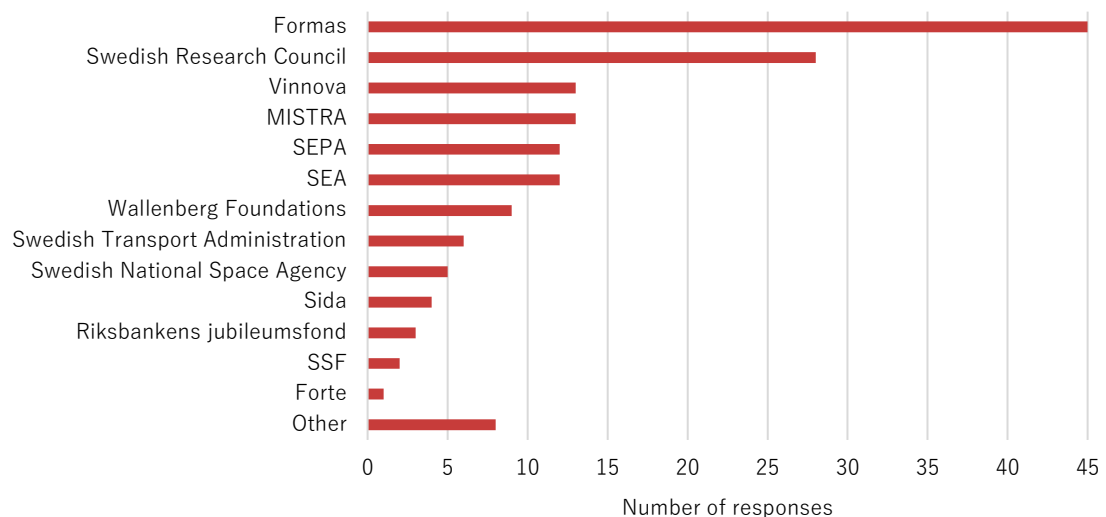
5 Swedish membership

This chapter presents some results of our surveys and interviews with the Swedish research community that has worked with IIASA in recent years. It goes on to describe some international perspectives on membership from NMOs in the USA, UK and Norway, and to summarise the conclusions of the three assessments of Swedish membership done prior to this one. The chapter then presents evidence about the management and administration of the Swedish membership.

5.1 Researchers' views on IIASA membership

Our researcher survey shows that the researchers surveyed by far consider Formas as their most important Swedish funder, see Figure 18, followed by the Swedish Research Council and – clearly considerably less important – Vinnova, the Swedish Foundation for Strategic Environmental Research (MISTRA), SEPA and SEA. The EU is most commonly mentioned by respondents who answered 'Other'. (Since multiple answers were permitted there are almost three times as many responses as respondents.)

Figure 18 Researchers' view on the importance of Swedish funders of research (n=57).



Source: Researcher web survey.

The researchers tend to believe that the Swedish IIASA membership is important in several ways, but mainly for international research collaboration, for Sweden to be able to influence IIASA's research priorities, and to influence European and international policymaking, see Figure 19.

Figure 19 Researchers' view on the importance of Sweden being a member of IIASA (n=55).²⁵



Source: Researcher web survey.

One researcher respondent argues that the opportunities that the membership brings largely have not been realised:

There is a very high potential for all of the above, however, this potential has not been utilized by Sweden. It would be possible for Sweden to take advantage of the possibilities at IIASA for influencing policy at national, EU and global level, with the aim of contributing to independent research carried out in IIASA networks. Swedish research and researchers could contribute much more to the development and co-creation of knowledge taking place at IIASA, which is then being part of the knowledge base for policy development at EU and global level through for instance IPBES, IPCC, EEA, etc.

Other respondents see little value in the membership for themselves:

I don't really see a value in Sweden's membership in IIASA for my own research or the research in my field.

In my case, working with IIASA scientists did not grow out of Swedish membership. It came from other contacts.

In interviews, most researchers emphasise the YSSP and postdoc opportunities that the membership entails. They argue that the capacity building and the professional development participants in these programmes experience are of high added value both for the individual and for Swedish research in systems analysis in general.

Most researchers argue that Sweden should adopt a more strategic approach to its IIASA membership. A couple of researchers indicate that an effective way to ensure value for money would be through further promoting participation in YSSP.

²⁵ Truncated alternative ends with '... of opportunities to tackle environmental or societal challenges'.



5.2 International perspectives on IIASA membership²⁶

IIASA's membership has fluctuated over time, reflecting changes in the geopolitical context and varying degrees of national satisfaction with the Institute. Several countries have assessed whether to withdraw from IIASA at various times. We have not been able to find any published documentation on this outside Sweden, but our interviewees assure us that internal assessments have been done in their countries and elsewhere, and that additional ones were in progress at the time of writing. The frequency with which this question arises may partly be driven by the status of IIASA as a non-treaty organisation, so that membership contributions are regularly questioned in the course of normal budgeting processes.

Both the US and UK governments severed links with IIASA in 1982, apparently because President Reagan and Prime Minister Thatcher felt that it was not useful to remain involved with an organisation that (not without justice) was widely regarded as a nest of spies. The consequence in the USA was that IIASA funding moved from the National Science Foundation (NSF) to the independent Academies of Science, while the UK actually stopped being a member. The UK formally rejoined in 2015, under pressure from Chief Scientist Mark Walport, who argued that IIASA did work of very high scientific quality, provided a way to build UK systems analysis capacity – especially in integrated assessment modelling – and would be a valuable channel for science diplomacy.

Several member countries' research and innovation funders have recently suffered budget cuts, including the USA, UK, Norway and Sweden (though not Formas). This seems to have helped trigger further consideration of the value of the IIASA membership fee, whether the benefits obtained from IIASA justify it, and whether the IIASA management is sufficiently responsive to national needs.

Interviewees tended to see the interactions between the NMOs and IIASA as ritualised, or as one put it, 'Nothing actually happens at the Council meetings'. There was no effective mechanism for the NMOs to influence the research agenda, or through which IIASA reaches out to the member states to understand and prioritise common research needs. The Strategic Initiatives research group of the current strategy was seen by one NMO as potentially trying to make up for that deficit, but as an inadequate response.

The lack of responsiveness on the IIASA side was, however, matched by a failure to make demands on the side of the NMOs. One interviewee said that 16 members states have national IIASA committees, but 'none of them actually *do* anything'. Very few people from the USA, UK or Norway (or Sweden) participate in the YSSP. Our interviewees pointed out, however, that while there is always some cooperation with IIASA based on existing research networks, additional participation in activities like the YSSP required NMOs actively to market and fund them, and that this was little done. (The picture may of course be completely different in other countries with lower systems analysis capacity.)

Interviewees argued that IIASA is present in global research networks and communities involved with systems analysis. They also pointed to the high degree of project cooperation with IIASA taking place, especially through the EU Framework Programme. Partly because IIASA promotes open access and open science, many of IIASA's important research tools and results are available at no charge. Hence, it is possible to free-ride, taking benefits from IIASA in the form of public knowledge goods without sharing the costs. NMOs recognise that if more than a few member states withdraw in favour of free-riding, the Institute's economy would

²⁶ We interviewed people from the NMOs in the USA, UK, Norway and Sweden.



be undermined, resulting in a 'tragedy of the commons' in which the public goods are lost to everyone.

5.3 Past assessments of Swedish participation in IIASA

As far as we can determine, Sweden is the only country systematically to publish independent assessments of the value of maintaining its IIASA membership. Three such assessments have been produced before this report.

An assessment by SISTER in 2003 found that:²⁷

- The reasons for Swedish participation in IIASA were unclear – there was no strategy or goal
- Most potential Swedish policy users of IIASA such as SEA, the Public Health Institute, and the Swedish Board of Agriculture cooperated little with IIASA. SEPA cooperated more actively, making use of the RAINS model, for example, while some specialised Swedish research centres also engaged actively
- Countries such as the Netherlands that promoted and funded national interaction with IIASA got much more out of the relationship than those that did not. (The Netherlands nonetheless later withdrew from IIASA)
- More broadly, there was scope for the international community to use IIASA better, and it would be possible to organise joint actions to ensure this
- Formas had in 2001 'more or less willingly' taken over the role of NMO from Forskningsrådsnämnden (FRN) when it was abolished, as a result of the reorganisation of the Swedish research and innovation funding system that year. However, Formas was given neither a formal mandate to act as NMO nor a budget to fund the Swedish IIASA Committee and the membership fee. The assessment suggested Formas should:
 - Launch a funding programme supporting Swedish cooperation with IIASA
 - Reform the Swedish IIASA committee so that it played an active role in linking Swedish actors to IIASA projects
 - Establish an IIASA secretariat at Formas
 - Coordinate with other Swedish agencies funding and partnering with IIASA

A second assessment by NIFU in 2010 was triggered by low and declining interest among young Swedish researchers in attending YSSP or other forms of mobility to IIASA. NIFU attributed this partly to the reluctance of Nordic researchers in general to take up mobility opportunities, often because of family commitments, partly because recruiting at Nordic universities tends to be somewhat inbred and hence it is risky to spend a period abroad, and partly due to insufficient proactivity at Formas and in the Swedish IIASA Committee.²⁸

The report noted that in the period when FRN acted as the NMO, it had a dedicated budget of SEK2m (over and above the membership fee) dedicated to IIASA activities and slightly less than one full-time equivalent programme officer. When Formas took over, the budget was withdrawn. (It is not clear how much administrative capacity Formas dedicated to IIASA in the early years, but we note that currently it allocates only 10 percent of a programme officer to the work.) However, a strength of the Swedish IIASA Committee in this period was that

²⁷ S. Sörlin, M. Carlsson, B.-M. Drotts-Sjöberg och G. Melin, 'Utvärdering av det svenska medlemskapet vid IIASA', SISTER, 2003.

²⁸ K. E. Brofoss, 'Svensk medlemskap i IIASA: En evaluering', NIFU, 2010.



Formas' Director General took over the chair for a number of years, underlining the importance Formas placed in IIASA membership.

Like the earlier assessment, NIFU pointed to the lack of national goals or a national strategy for participating in IIASA. NIFU argued that Formas needed to take decisions about the need for further development and spreading of systems analysis in Swedish research and policy. NIFU argued that the Swedish IIASA Committee was essentially a talking-shop, and while it could access Formas' funding through normal competitive channels, it needed goals, a strategy and a budget of its own in order to become more active, and to increase the benefits of membership to Sweden. This would involve mapping potential beneficiary communities within Sweden and informing Swedish policymakers about areas where their work could benefit from IIASA inputs, as well as improving information dissemination about IIASA and the exploitation of IIASA alumni.

DAMVAD Analytics reviewed Sweden's IIASA membership most recently, in 2018. Unlike the two earlier assessments, which assumed Swedish membership would continue, DAMVAD recommended withdrawal. The review was done during the year after the Institutional and Governance Reviews, and echoes their complaints about IIASA being an outdated, centralised and intransparent organisation, while pointing out that reforms were in progress whose outcomes were uncertain but which could turn out to be positive. It focused on the low degree of utilisation of resources and opportunities at IIASA by Swedish researchers and postgraduate students. Visits between IIASA and Swedish organisations were mainly with the leading, large universities. The volume of Swedish joint publications with IIASA had grown from about 2014, mainly in social sciences. Overall, the pattern of joint publications in 2010–2017 tilted towards environmental, and agricultural and biological sciences, energy, social sciences, and earth and planetary sciences – exactly the kinds of fields where large, complex systems are studied – with much less interaction in traditional scientific disciplines.²⁹

5.4 Management and administration of the Swedish IIASA membership

We interviewed eleven former KTSA members for this assessment.³⁰ They were divided on whether the Swedish IIASA membership is important in practical terms. Some former members argued that the Swedish membership is important to harvest benefits of IIASA's work, while others suggested that it is of marginal importance. Several of them contended that most benefits probably could be had anyway, but they nevertheless tended to agree that membership is a moral obligation of political relevance, rather than a research necessity. The former members argued that Sweden has not used its membership to try to influence global research agendas and likely has had little influence on IIASA's research priorities. IIASA was also said to be important for forming consortia to respond to calls for proposals, although, again, several interviewees argued that researchers would find each other even if Sweden were not a member. However, former members agreed that YSSP and postdoc positions are important opportunities for Swedish (or Sweden-based) researchers. When it comes to postdocs, one interviewee hypothesised that the absence of postdocs from Sweden (in 2002–2023) more was due to ignorance of the opportunity than to lack of interest.

The former KTSA members explained that the Committee's mission first and foremost was national and not that closely connected to the IIASA membership, for which reason it was reasonable to establish a committee. However, since members are (mostly) unpaid, a

²⁹ 'Review of Sweden's membership in IIASA', DAMVAD Analytics, 2018.

³⁰ KTSA's mandate has now expired. A decision on the role and membership of a new committee depends on Formas reaching a decision on continuing Sweden's IIASA membership.



committee is a fragile instrument that requires a strong chairperson and a competent secretary. The former members agreed that the Committee had both, but also that Formas did not allocate sufficient time for the secretary to meet its needs. Given the committee solution and the limited resources from Formas, the former members nevertheless believed that the Committee was successful in promoting systems analysis at rather high level, including through a seminar in the parliament and through a debate article. Their focus on and influence over IIASA was however very limited, despite the fact that most were experts in aspects of systems analysis in Sweden.

While some former KTSA members mentioned other potential hosts for the Swedish NMO, including SMHI, RISE, IVL and SRC, they unanimously agreed that a research funder is needed and that the best solution no doubt is Formas, whose thematic focus clearly best coincides with the research interests of IIASA. The main reason for preferring a research funder is that it can issue calls for research proposals to facilitate reaching the objectives of the Swedish membership, but a research funder also brings legitimacy nationally and internationally. One former member suggested that Formas ought to use the huge opportunity provided by hosting the NMO to couple the membership to national investments.

Former KTSA members suggested that first of all Formas needs to decide what it wants to focus on and what it wants to achieve via the IIASA membership. This aligns with many of the invited responses to the 2018 assessment, which said Formas should develop a strategy for Sweden's IIASA membership. On the other hand, former members explained that if the main focus is to promote research on and the use of systems analysis, then a close connection to IIASA is not so important, and a committee with a different membership would be a better way to reach out to as many potential Swedish stakeholders as possible. Alternatively, if Formas' main objective is to administer the Swedish IIASA membership and to maximise its benefits for Sweden, then a committee probably is not the right instrument. Rather, Formas personnel should liaise directly with universities. Either way, former KTSA members agreed that Formas ought to allocate greater resources in the future, both in terms of its own personnel and in terms of targeted calls for research proposals to facilitate reaching Formas' objectives for the membership.



6 Conclusions and recommendations

In this final chapter we summarise the main findings of the previous chapters, draw out overall conclusions, and formulate a set of recommendations.

6.1 Background

IIASA was established in 1972, on the initiative of the governments of the USA and USSR, as a way to build trust between parties on opposite sides in the Cold War. The Institute focused on building capacity and doing research in civil applications of the new discipline of systems analysis, which could be used to help tackle global problems such as environmental sustainability that were important to all sides. IIASA quickly became established as the global centre of excellence in this new field, attracting both leading scientists and additional member states, and tackling leading applications of systems analysis in areas such as environment, resource use, health, and climate change. After the end of the Cold War, IIASA broadened its strategy and membership to take on broader research challenges associated with systems analysis. The change over time from the original East-West axis in the membership towards a North-South axis clearly introduced new needs and problems in applied systems analysis, and once more increases the need for capacity building.

IIASA's strategy, structure and processes were naturally shaped by the date of its funding and its original mission. Its research autonomy was a very important way to protect its neutrality and trustworthiness in the Cold War context. Subsequently, as IIASA has grown and focused increasingly on applied systems analysis, there has been a greater need to connect with, articulate and respond to societal challenges. By the second half of the 2010s, some NMOs challenged IIASA's hierarchical structures, inappropriate gender balance, and what were by then out-dated management and governance practices. This resulted in an Institutional review by an independent panel in 2017, and a series of reforms within IIASA, although at least some members still see IIASA as intransparent and insufficiently responsive to national and global needs. A key remaining issue is that the role of the NMOs in governance is essentially to supervise IIASA as an organisation, while end-users such as universities, research institutes, environment protection agencies and so forth have no role in setting the research agenda. To be effective, as the institutional review panel stressed, IIASA will also require increased engagement by NMOs to develop their own goals for IIASA participation and to become more active in making use of the opportunities IIASA membership provides.

Over time, IIASA's economics have changed, with important implications for the Institute. The originally generous funding from the membership has not kept up with cost inflation, and some members have been unable to pay at certain times. The new generation of members from the global South pay lower fees than the former generation. The resulting cost pressure appears to have driven IIASA increasingly to rely on a majority of external, competitive project funding, overwhelmingly from the EU Framework Programmes, whose changing agendas therefore influence what IIASA does. It also squeezes the resources available for doing 'core' or fundamental research and methods development, potentially undermining IIASA's traditional strength in this area.

6.2 What IIASA produces

IIASA started at a time when there was a tendency to be rather sloppy in defining goals or to use of 'theories of change' that explain the mechanisms through which state interventions are expected to generate societal benefits. A theory of change for IIASA would work at two levels:



- It would indicate that IIASA's activities are expected to generate benefits at member-state level through capacity-building, making research tools and methods, and producing research results. These should enable member states to use systems analysis more widely and effectively, and increase the quality of policy interventions, resulting in more welfare and increased sustainability at the national level
- There should also be impacts at the global level, building on the national-level benefits but also developing tools and using joint research activities to tackle societal challenges and support global sustainability

Assessments of the value of IIASA membership tend to focus on the national level, but need to take better account of the global level.

Some discussions of IIASA's value to Sweden tend to dismiss its impacts on individual researchers and their careers, seeing these as private rather than public benefits. However, science is fundamentally a collective activity. Scientists self-organise in global networks, which Derek de Solla Price famously called 'invisible colleges' – global networks among (primarily leading) researchers, who recognise each other as experts, collaborate and compete, share knowledge about the leading edge of their science before it is published, recommend each other to sit on panels and committees, and so on.³¹ These networks dominate, prioritise, quality-assure and legitimate scientific research. One of IIASA's key contributions is to enlarge and enrich these global networks through capacity-building and joint research, bringing Swedish researchers into the networks and creating value not only from research results but also through supporting absorptive capacity at national and international levels.

However, there is a clash between what IIASA produces and its economics. In addition to capacity development and networking benefits, it produces research results and tools available to all – members and non-members alike. In economic terms, these are 'public goods'. They are 'non-excludable' and 'non-rival'; that is, it is impossible to prevent people from getting hold of them, while at the same time the consumption of the good by one person does not prevent others from also consuming it. There is no incentive for private investors to produce public goods because they cannot get an economic return on their investment, hence public goods are normally produced by the state, which invests tax money in order to reap a social rather than an economic benefit. (This is why the state funds basic research.)

IIASA's membership-based economics, however, are appropriate to making collective or 'club' goods. It is as if some people got together and built a tennis club – but then decided to let everyone else use the facilities as well. It largely works because the NMOs are prepared to act collectively to fund public knowledge goods at the international level. IIASA is sustained by this public spirit, but is unstable because only a few members need to leave to make the Institute unviable – and then no-one gets to play tennis. This problem is discussed among the NMOs in terms of balancing the opportunities to free-ride on IIASA's production and a 'moral' obligation to pay a fair share of the production costs to ensure IIASA's continued existence. This dilemma is more acute for IIASA than for other international research partnerships because it is an NGO, and not a treaty organisation, and therefore much easier to leave.

6.3 Sweden in the governance of IIASA

Past assessments of Swedish participation, like this one, find that the need for greater NMO activity also applies in Sweden. Conversations with other NMOs highlight the same issue. The

³¹ D. de Solla Price, *Little Science, Big Science*, Columbia University Press, 1963.



invited responses to the 2018 assessment of Swedish membership largely rejected its conclusion that Sweden should withdraw, because it did not take sufficient account of the research benefits of membership and because its timing at the start of a reform process was unfortunate. Now that the shape of a reformed IIASA is becoming clear, better information about these institutional aspects is available to inform a decision.

In principle, all IIASA member countries should have a national IIASA committee to support their NMO. This was the case in Sweden until 2019, when the committee was repurposed to support the understanding of development of systems analysis in Sweden. It has succeeded to a modest degree in this mission, but has not played a material role in relation to IIASA. IIASA's own governance structure is not particularly receptive to signals from the end-users of IIASA. This leaves unanswered the question of how to link national needs to IIASA via the NMO.

6.4 Swedish collaboration with IIASA

In Chapter 3 we found that Sweden's IIASA participation in terms of researchers affiliated to IIASA (as employees, guest researchers or postdocs), participating in YSSP, participating in joint projects and visiting IIASA or hosting IIASA visitors, is rather modest. In contrast, the extent of Sweden's combined output in terms of access to networks, access to IIASA's resources, income from joint projects and co-authored papers, is considerable. Formas' Directors General have participated actively in IIASA governance and been important in stimulating reforms, but, other than that, the Agency has assigned only marginal resources to make use of the opportunities the membership provides.

In Chapter 4 we learnt that the benefits of membership for individual researchers are quite significant (though there is clearly a positive bias among survey respondents). YSSP participants unanimously agree that their research careers have benefitted to a remarkable extent, which is evidenced by four in five now being active at universities or research institutes. Moreover, all but one of 24 YSSP participants remain active in Sweden. There is evidence of Swedish capacity building in systems analysis and there appears to be coherent research groups collaborating with IIASA at least at SU, KTH, LU, IVL, LTU and SMHI.

Researchers believe that Sweden has benefitted from increased awareness among policymakers of opportunities to tackle environmental and societal challenges, which has led to more informed policymaking. This is demonstrated by a notable number of Swedish policy papers citing IIASA research, mainly on climate change and greenhouse gas emissions, and transportation-related air pollution. The Swedish organisations most commonly citing IIASA research are research organisations and government agencies.

Although we do not advocate a strict translational judgement, it nevertheless may be useful to consider that Sweden's share of IIASA's total membership fees in 2024 is slightly less than 7 percent and its NMO is 5 percent of the total number of NMOs (though three of them, for different reasons, will not pay the fee in 2024). It is challenging to conclude whether most participation modes, outputs and benefits mentioned above are 'reasonable' in light of Sweden's membership fee (and Formas' additional direct investments related to IIASA). However, a simple comparison of Sweden's membership fees with the income to Swedish participants in 39 joint projects with IIASA in 2020–2023 yields a leverage close to seven. We cannot assess how much of this that is additional, but it does not take much to equal the membership fee.

While Formas is in itself not a very large organisation, it is very big compared with the IIASA membership fee, which is in turn much smaller than most of the programmes Formas runs.



Administrative logic provides a force tending to drive out such small things, irrespective of their value – not through ill will, but because there is a scale curve in research and innovation funding. As we have found in benchmarking R&D funding programme processes across several countries, administration costs as a percentage of direct costs are lower in big programmes than in small ones, so – other things being equal – the efficient administrator prefers to fund big things.³²

There is also an organisational logic that pushes towards driving small international activities out from national funding agencies, which we have been able to observe across a series of assignments for different parts of the Nordic Council of Ministers and its agencies concerned with research and innovation, as well as in evaluating national agencies such as the Research Council of Norway. Such agencies typically act as NMOs, for example in NordForsk, Nordic Energy Research, and in supporting activities of the Council. Administrators of national funding agencies tend to complain that the costs of coordination are high, while the amounts of money involved are low. They often regard the money ‘sent to Copenhagen’ as their own and would prefer to keep it at home, under their own control.³³ They may also regret that such small things tend to fit badly into their normal business and IT systems. But they are normally overruled by their ministries, which value international cooperation for a variety of research-related and political reasons.

Such economic and organisational considerations have their own importance but need to be considered separately from research and innovation policy.

6.5 Recommendations

While the overriding purpose of this report is to support a decision about whether and how Sweden should continue its membership of IIASA, as we indicated in Chapter 1, the political and diplomatic aspects of this decision are beyond our scope. Our recommendations are therefore based solely on the research policy dimension.

Sweden should continue its membership of IIASA

It would be nice to be able to compare the costs and benefits of IIASA membership in monetary terms. Sadly, few of the data needed to do this are available, and heroic assumptions would be needed in the process of attributing effects to the membership versus other parts of the context. Thus, while some numbers are available, determining the balance of costs and benefits would be more an act of judgement than of calculation.

The direct cost of Sweden’s membership is EUR717.5k in 2024, and is likely to rise at least incrementally, driven by inflation. In context, this is not a large sum of money: about 0.4 percent of Formas’ total grants. Formas additionally allocates 10 percent of a project officer’s time to administer the IIASA membership and the Director General’s time to participate in IIASA management and governance (the latter was particularly large in the late 2010s, which helped trigger IIASA’s Institutional Review).

The benefits of IIASA membership include access to world-class expertise and to big collaborative research projects of international importance; access to YSSP, postdoc and guest researcher opportunities that are extremely effective in training young researchers and

³² J. Stroyan, E. Arnold and J. Senker, “Administrative Burdens and Procedural Rules in the European Union’s Research Programmes and those of the Individual Member States: A Comparative Study”, European Parliament, Directorate-Generate for Research, 1998.

³³ E. Arnold, A. Eriksson, S. Faugert and T. Jansson, “Building Nordic strength through more open R&D funding: The next step in NORIA”, Nordic Council of Ministers, 2014.



initiating them into the global systems analysis invisible college; the ability to produce large volumes of high-quality research in systems analysis; and a significant amount of policy influence within Sweden. There are additional benefits at the global level with longer pathways to impact, such as inputs to the IPCC process, which in turn influence both international and national policy. The benefits that are quantifiable in monetary terms involve a deal of guesswork but are likely to be significantly higher than the membership fee. The benefits of IIASA membership appear especially important because they support our understanding and ability to intervene in complex systems to address the societal challenges and the SDGs. This has become an increasing policy concern in recent years. Finally, while the political dimensions of a decision to withdraw are beyond our scope, the research policy implication of a withdrawal by Sweden if, as is plausible, accompanied by a small group of others, would be the loss of the public goods IIASA produces – a disbenefit to Sweden and to everyone else.

Formas should continue to be Sweden's NMO

Most NMOs are national funding agencies or academies. The argument for funding agencies is that they have the legitimacy of government in representing member states, as well as having research funding budgets that they can use to complement and amplify the benefits of the IIASA membership. The argument for academies is that they represent the scientific community and tend to isolate IIASA from national policy, though they generally have no significant amounts of money with which to fund research. While isolation from national policy was an advantage in the Cold War period, today it has become a problem, as we illustrate above. Alternatives discussed are using a university as the NMO (as Israel does), or one or more policy users of IIASA results, such as meteorological, environmental or health agencies. These alternatives are widely rejected as having the potential for bias, with the NMO representing individual national actors rather than the member state as a whole.

For the reasons mentioned above, our interviewees almost unanimously advocate that the NMO should be a funding agency. In thematic and disciplinary terms, Formas is the most logical choice – as is evidenced by the fact that Formas is the most important funder of IIASA-relevant research in Sweden. Thematically, MISTRA could be considered as an alternative, but its scope is narrower than Formas' and its formal status as a foundation independent of government would make it problematic. Especially as the focus of policy turns towards the societal challenges and there is an increasing need to link national-level agencies as well as researchers that depend on systems analysis to IIASA, our conclusion must be that Formas is the best placed organisation to be Sweden's NMO and that there is no credible alternative.

Formas has lacked a formal instruction to act as NMO for well over 20 years, without any evident mishap. We see no overriding reason to suggest that this be changed. An argument for the *status quo* is that it is consistent with IIASA's NGO status, and that it strengthens Formas' ability to exert influence over IIASA by threatening to walk away. An argument for formalising an instruction is that this would give Sweden's commitment to IIASA the weight of government. These are tactical decisions for the future that we hesitate to second-guess now.

Formas needs to become more active in order to capture the benefits of IIASA membership

Three previous assessments have advocated that Formas develop a strategy for the IIASA membership. We do not consider this motivated (or realistic) given that the membership fee amounts to a mere 0.4 percent of Formas' total grants. However, Formas should focus its



resources to achieve impacts, so we recommend it defines national objectives for IIASA membership.

The resources that Formas should allocate include significant personnel time, additional stipends and more effective communication activities to reach out beyond existing researcher networks to reach more potential YSSP participants, postdocs and guest researchers, thus sharing the benefits of IIASA collaboration more widely and pulling more young Swedish researchers into the systems analysis invisible college and building further capacity in Sweden to tackle the societal challenges. Formas should consider the potential relevance of IIASA to its programmes and clarify when and how it may fund collaboration between Swedish and IIASA researchers.

Another issue is whether the systems-analysis-related research community in Sweden is of adequate size and quality to tackle current and future needs, given the changing policy context. While the KTSA made brave attempts with limited resources to tackle aspects of this question, its remit was mainly to promote systems analysis as such. Researchers gave us a clear picture of the role of IIASA membership in both our survey and our interviews, but nobody was able to provide the systemic perspective needed to answer this question properly. This kind of instrumental or tools-based perspective is easily overlooked and neglected in a research funder, which naturally deals in disciplines, cross-disciplinary work and research themes. This question, if it is to be addressed, appears to us to deserve the attention either of Formas' analysis group in combination with those of other funders and users of systems analysis, or of a group of peers cutting across institutions and disciplines – possibly both.

Leaving aside withdrawal from IIASA, which we do not recommend, Formas could therefore:

- Continue 'business as usual' with IIASA, acting as NMO while devoting very limited resources over and above the membership fee. This is likely to continue the present level of benefit, without taking advantage of the likely greater benefits available through devoting more time and resources within Formas
- Review its ambitions for the IIASA relationship in the context of its other strategic plans, set and communicate national objectives, and decide how many additional resources to devote to increase the benefits obtained:
 - One aspect would involve increased communications effort towards the Swedish research community and offering a greater number of stipends for YSSP, postdoc and guest researcher schemes
 - A second would be to build a link between the Swedish systems analysis community and Formas in its NMO role, either using a reformed KTSA that includes representatives of both universities and relevant government agencies or via direct outreach by Formas personnel. The objective would be to build a foundation to influence IIASA's research agenda towards Swedish and collective needs, in cooperation with other NMOs
- Consider whether it needs to intervene further in the development of systems analysis capacity at the national level, in the light of its increased role in systems innovation and tackling the societal challenges. A reformed KTSA would probably lack the analytical clout to provide the initial analysis but could be an important instrument in keeping it relevant and communicating among the relevant stakeholders as it is implemented



Formas should work together with other NMOs to ensure the reform process at IIASA continues, because the needed modernisation is still incomplete

While the benefits of IIASA membership have been considerable in the past, we see a continuing need for reform at IIASA – both to complete the process of modernisation and to support the changing policy focus towards societal challenges and systems innovation.

Recent reforms at IIASA, together with a complete change of leadership in the last four years, show that the Institute is capable of reform and modernisation. However, further changes are needed for IIASA to adjust to current research policy and societal needs. Triggering the Institutional Review, launching the reform process, and breaking off relations with Russia following the invasion of Ukraine are good recent examples of the power of NMOs acting in concert, and the Swedish NMO has been among the ringleaders in instigating these changes. The Swedish NMO should, in concert with other concerned NMOs, drive through additional changes to:

- Establish a mechanism in the IIASA governance structure to enable two-way dialogue between the Institute and key end users to give end users meaningful collective influence on significant parts of the Institute's research agenda
- Review the role of basic research and methods development, potentially finding a mechanism to add to, or 'ring-fence', part of the budget to ensure the continuation of this crucial activity, which is key to IIASA's influence and capacity-building role
- Expand the capacity of YSSP, postdoc and guest researcher opportunities further to increase its contributions to capacity-building and to build more links within the systems analysis research community



Appendix A Interviewees

Helén Andersson	SMHI
Anne-Sophie Crépin	KVA
Göran Enander	
Lisa Eriksson	Trafikanalys
Oskar Franklin	IIASA
Marianne Hall	LU
Paula Hallonsten	Energigas Sverige
Klaus Hammes	Energimarknadsinspektionen
Hördur Haraldson	SEA
Arne Jernelöv	
Dilip Khatiwada	KTH
Olga Kordas	KTH
Ourania Kosti	(US) National Academy of Sciences
Johan Kuylenstierna	Formas
Gabriele Messori	SUA
Malin Mobjörk	Formas
Jana Moldanova	IVL
Anna Nilsson Vindefjärd	IVA
AnnaKarin Norling	Sida
Tarjei Nøstvedt Malme	Research Council of Norway
Ingrid Petersson	Ipcon Consulting
Joacim Rocklöv	UMU
Erik Roos	Formas
Ahti Salo	Aalto University
Tord Snäll	SLU
Mats Svensson	HaV
Magnus Tannerfeldt	Formas
Sarah Webb	UK Research and Innovation – Natural Environment Research Council
Elisabeth Wetterlund	LTU



Appendix B Web surveys

B.1 Methodology

The mailing list for the survey of researchers was constructed by merging the following datasets provided by IIASA:

1. Swedish co-authors in joint IIASA–Sweden papers 2020–2023 (from Scopus)
2. Swedish partners in joint IIASA–Sweden projects 2020–2023 (IIASA data)
3. Visitors to and from IIASA 2020–2023 (IIASA data)

Swedish co-authors were extracted from dataset 1, including email addresses to corresponding authors, while email addresses for other authors with more than one publication were googled (authors with only one publication were not surveyed). Datasets 2 and 3 included email addresses to most individuals, but ones who were (through googling) deemed not to be researchers (but rather administrators) were excluded and thus not surveyed, as were duplicate addresses and two individuals from dataset 3 who had participated in YSSP in 2014–2023 (to avoid sending them multiple survey invitations).

Email addresses to YSSP participants were found through googling.

After the initial invitation, we sent two reminders. In connection with the second, Formas also sent an encouraging invitation.

Table 7 presents the number of invitations that were sent out, how many of them bounced, the number of responses, and the response rate for each survey.

Table 7 Survey invitations and responses.

	Invitations	Invalid	Responses	Response rate
Researchers	163	31	62	47%
YSSP participants	22	0	16	73%

Source: Web surveys.

B.2 Researcher survey

Introduction

Formas has commissioned a study on the outcomes and impacts of Sweden’s membership in the International Institute for Applied Systems Analysis (IIASA).

According to IIASA, you have collaborated with the Institute. This survey aims to learn from your experiences of your IIASA collaboration. Your responses will inform the scope and focus of Formas’ future support to applied systems analysis, including the Swedish membership in IIASA.

We are most grateful for your assistance.

Background to IIASA collaboration

Please indicate the nature of your collaboration with IIASA. Multiple alternatives may be selected.

- Participant in IIASA conference, symposium, workshop etc.
- Participant in research project with IIASA



- Co-author of scientific paper with IIASA
- IIASA employee
- Postdoc at IIASA
- Participant in the Young Scientists Summer Program (YSSP)
- Other, please specify in comment box

Please assess to what extent the following motives were important for you to collaborate with IIASA.

(Not at all/To a small extent/To some extent/To a large extent/To a very large extent + Don't know)

- To collaborate with specific IIASA researcher(s)
- To collaborate with researchers from other organisations
- To access IIASA's methods, models, algorithms, software etc.
- To access IIASA's databases
- To access IIASA's network
- To receive funding from third party (through project with IIASA)
- To address specific environmental or societal challenge(s)
- To produce knowledge to influence policy related to specific environmental or societal challenge(s)
- Other, please specify in comment box

To what extent do you view IIASA as a centre of research excellence in systems analysis? Is it...

- World-leading
- Strong and internationally visible but not world-leading
- About the same level as other centres on related topics

Which do you regard as the best two or three international centres of research excellence in systems analysis? (Include IIASA if you think it is one of them.)

Comment box

Outcomes and impacts of IIASA collaboration

Please assess whether your IIASA collaboration has resulted in, or is expected to result in, the following outcomes for you and/or your organisation.

(Has already been achieved/Will be achieved in the future/Will not be achieved/Not applicable + Don't know)

- Improved methods, models, algorithms, software etc. for systems analysis
- New methods, models, algorithms, software etc. for systems analysis
- Knowledge that may contribute to practical management of specific environmental or societal challenge(s)
- Knowledge that may influence policy related to specific environmental or societal challenge(s)
- New international project with IIASA



- New international project with other organisation(s)
- New Swedish project
- Scientific paper with IIASA co-author
- Scientific paper without IIASA co-author
- Other, please specify in comment box

Please assess whether your IIASA collaboration has contributed to, or is expected to contribute to, the following broader societal impacts.

(Has already been achieved/Will be achieved in the future/Will not be achieved/Not applicable + Don't know)

- Increased public awareness of environmental or societal challenge(s)
- Increased awareness among policymakers of opportunities to tackle environmental or societal challenge(s)
- More informed global/international policymaking on environmental or societal challenge(s)
- More informed European policymaking on environmental or societal challenge(s)
- More informed Swedish policymaking on environmental or societal challenge(s)
- Other, please specify in comment box

Please assess to what extent you believe that your IIASA collaboration has, or eventually will, contribute to addressing the Sustainable Development Goals (SDGs).

(Not at all/To a small extent/To some extent/To a large extent/To a very large extent + Don't know)

- No poverty (SDG 1)
- Zero hunger (SDG 2)
- Good health and well-being (SDG 3)
- Quality education (SDG 4)
- Gender equality (SDG 5)
- Clean water and sanitation (SDG 6)
- Affordable and clean energy (SDG 7)
- Decent work and economic growth (SDG 8)
- Industry, innovation and infrastructure (SDG 9)
- Reduced inequalities (SDG 10)
- Sustainable cities and communities (SDG 11)
- Responsible consumption and production (SDG 12)
- Climate action (SDG 13)
- Life below water (SDG 14)
- Life on land (SDG 15)
- Peace, justice, and strong institutions (SDG 16)
- Partnerships for the goals (SDG 17)



Which Swedish organisations – public or private – do you consider as the main users or beneficiaries of your research?

Comment box

Sweden's IIASA membership

Please assess the importance of Sweden being a member of IIASA for...

(Not at all/To a small extent/To some extent/To a large extent/To a very large extent + Don't know)

- Your research
- Global/international research collaboration in your field
- Public awareness of environmental or societal challenge(s)
- Awareness among policymakers of opportunities to tackle environmental or societal challenge(s)
- Global/international policymaking on environmental or societal issues
- European policymaking on environmental or societal issues
- Swedish policymaking on environmental or societal issues
- Sweden to be able to influence IIASA's research priorities

Please indicate the most important of the following Swedish research funders for your research. Multiple alternatives may be selected.

- Formas
- Swedish Research Council (Vetenskapsrådet)
- Swedish Research Council for Health, Working Life and Welfare (Forte)
- Swedish Governmental Agency for Innovation Systems (Vinnova)
- Swedish Energy Agency (Energimyndigheten)
- Swedish International Development Cooperation Agency (Styrelsen för internationellt utvecklingssamarbete, Sida)
- Swedish Environmental Protection Agency (Naturvårdsverket)
- Swedish Transport Administration (Trafikverket)
- Swedish National Space Agency (Rymdstyrelsen)
- Swedish Foundation for Strategic Environmental Research (Stiftelsen för miljöstrategisk forskning, MISTRA)
- Swedish Foundation for Strategic Research (Stiftelsen för strategisk forskning, SSF)
- Riksbankens jubileumsfond (RJ)
- Wallenberg Foundations
- Other, please specify in comment box

Thank you for sharing your experiences!



B.3 YSSP participant survey

Introduction

Formas has commissioned a study on the outcomes and impacts of Sweden's membership in the International Institute for Applied Systems Analysis (IIASA).

According to IIASA, you have participated in the Young Scientists Summer Program (YSSP). This survey aims to learn from your experiences of YSSP and what it has meant for your career. Your responses will inform the scope and focus of Formas' future support to applied systems analysis, including the Swedish membership in IIASA.

We are most grateful for your assistance.

Background

How did you find out about YSSP? Multiple alternatives may be selected.

- I found the information through IIASA's website, newsletter or social media
- I found the information through Formas' website, newsletter or social media
- I was informed through IIASA activities or seminars
- I was informed through Formas activities or seminars
- My supervisor told me about YSSP
- A colleague (other than my supervisor) told me about YSSP
- Other, please specify in comment box

Please assess to what extent the following motives were important when you chose to apply to YSSP.

(Not at all/To a small extent/To some extent/To a large extent/To a very large extent + Don't know)

- To address specific environmental or societal challenge(s)
- To collaborate with IIASA researchers
- To access IIASA's methods, models, algorithms, software, databases etc.
- To build/extend my international network
- To get international experience
- Other, please specify in comment box

Outcomes of YSSP participation

Please assess whether your YSSP participation has resulted in, or is expected to result in, the following outcomes for yourself.

(Has already been achieved/Will be achieved in the future/Will not be achieved/Not applicable + Don't know)

- Continued collaboration with IIASA
- Continued access to IIASA's methods, models, algorithms, software, databases etc.
- Increased understanding of specific environmental or societal challenge(s)
- Continued collaboration with other former YSSP participants
- Increased international network



- Thesis completed in less time
- Thesis of higher quality
- Inspired pursuit of a continued research career (beyond thesis defence)
- Other, please specify in comment box

Please assess whether your YSSP participation has contributed to, or is expected to contribute to, the following outcomes for yourself.

(Has already been achieved/Will be achieved in the future/Will not be achieved/Not applicable + Don't know)

- New international project with IIASA
- New international project with other organisation(s)
- New Swedish project
- Scientific paper with IIASA co-author
- Scientific paper without IIASA co-author
- Other, please specify in comment box

Career development

To what extent would you say that your YSSP participation has been beneficial to your career so far?

- To a very large extent
- To a large extent
- To some extent
- To a small extent
- Not at all

At what university did you defend your thesis?

Comment box

Please list your employers and types of duties following your thesis defence in chronological order.

First employer

Name of first employer after defence: Comment box

Country of first employer: Comment box

Type of first employer:

- University
- Research institute
- Public-sector organisation (other than university or research institute)
- Non-governmental organisation (NGO)
- Company (private or public)
- Other, please specify in comment box

Type of duties at first employer:

- Research in field related to YSSP project



- Research in other field
- No research-related duties
- Other, please specify in comment box

Research collaboration at first employer:

- Yes, with IIASA
- Yes, with Swedish organisation(s), please specify which in comment box
- Yes, with both IIASA and Swedish organisation(s), please specify which in comment box
- No research collaboration with other organisations

Have you had additional employers?

- Yes [if yes, same questions as for first employer]
- No

Thank you for sharing your experiences!



Appendix C Abbreviations

CTH	Chalmers University of Technology
Forte	Swedish Research Council for Health, Working Life and Welfare
GU	University of Gothenburg
HaV	Swedish Agency for Marine and Water Management
HHS	Stockholm School of Economics
HIG	University of Gävle
IFN	Research Institute of Industrial Economics
IVA	Royal Swedish Academy of Engineering Sciences
IVL	IVL Swedish Environmental Research Institute
JU	Jönköping University
KAU	Karlstad University
KI	Karolinska Institutet
KSLA	Royal Swedish Academy of Agriculture and Forestry
KTH	Royal Institute of Technology
KVA	Royal Academy of Sciences
LIU	Linköping University
LNU	Linnaeus University
LTU	Luleå University of Technology
LU	Lund University
MAU	Malmö University
MDU	Mälardalen University
MISTRA	Swedish Foundation for Strategic Environmental Research
MIUN	Mid Sweden University
RISE	Research Institute of Sweden
SEA	Swedish Energy Agency
SEI	Stockholm Environment Institute
SEPA	Swedish Environmental Protection Agency
Sida	Swedish International Development Cooperation Agency
SIWI	Stockholm International Water Institute
SLU	Swedish University of Agricultural Sciences
SMHI	Swedish Meteorological and Hydrological Institute
SRC	Stockholm Resilience Centre
SSF	Swedish Foundation for Strategic Research



SSNC	Swedish Society for Nature Conservation
SU	Stockholm University
SUA	Young Academy of Sweden
SVT	Sveriges Television
UMU	Umeå University
UU	Uppsala University

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