Advancing Systems Analysis

Self-evaluation report

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1 Overall Program Achievements

ASA: 'What', 'how', and 'why'

The ASA Program develops and deploys advanced systems-analytical approaches to tackle the complexity of pressing sustainability challenges. We operate at the intersection of science, data, technology, and policy & practice to produce relevant and timely outcomes for stakeholders and funders.

ASA builds on IIASA's rich tradition in operations research, optimization, and optimal control—core methodologies that served as the backbone of systems analysis in the 20th century. In response to the new realities of the 21st century, including the funding landscapes that prioritize applied research, we have embraced a much broader focus. Our methodological toolbox has expanded to include game theory, complexity science, data science, and machine learning, as well as 'soft' systems-analysis approaches. The institutional reorganization in 2020 consolidated scientists and teams from across IIASA, whose productivity and impact stem from working on diverse applications. Uniting these applications is the deployment of a particular methodology or addressing cross-cutting issues such as resilience or cooperation.

We leverage a diversity of methodologies and work with different applications across multiple domains to fuels innovation and bolster our ability to respond to the evolving landscape of societal needs with high levels of agility. ASA research thrives on *interdisciplinarity*, bringing together researchers from diverse backgrounds in a flexible and dynamic research environment to delve into the intricate interconnections of socio-economic-environmental systems. Transferring methods across disciplines enables harnessing new perspectives to obtain novel insights.

Of 496 articles by ASA researchers since 2021,

- 191 (39%) match the search criteria 'economic AND environmental AND social AND system'.
- 263 (53%) articles contain the term 'co-production'.

Furthermore, our research is increasingly *transdisciplinary*, conducted in partnership with policy, practice, civil society, and the private sector. Genuine transdisciplinarity signifies that we do not merely act as consultants providing research to clients for their agendas; rather, we engage in co-creating agendas and charting the directions of inquiry and action in collaboration with our partners.

ASA continuously conducts horizon scanning to identify promising novel matches between methodologies and applications across all thematic areas of the IIASA research agenda. Proofs-of-concept of new methodologies and pilot applications test the outcomes of horizon scanning efforts and showcase their potential. Successful approaches are further developed either within the program or in other IIASA or partner settings.

Progress towards objectives

The Research Plan 2021-2024 has set out five interrelated objectives for ASA to organize its activities operationalizing the program's ambitious vision and mission. Over the review period, through the collective effort of its research groups, ASA has made substantial progress in all five objectives.

Amidst the burgeoning landscape of **new data and data-science tools**, one of our objectives was to leverage these advancements to better **diagnose vulnerabilities and barriers hindering sustainable development**. Significant progress has been made towards comprehensive environmental monitoring through the integration of Earth observation with Citizen Science and Machine Learning[1,2,3]. Highly detailed maps of land use and land cover (LULC) allow rapid assessment of anthropogenic impacts on ecosystems[4]. Pioneering novel applications beyond LULC have offered insights into socio-economic development patterns[5,6]. Deeper understanding of local communities' resilience to climate-related disasters has emerged through innovative utilization of citizen science powered by machine learning[7]. Initial investigations with data from social media have illustrated high potential of this novel source of unique data in capturing real-time sentiments of individuals regarding pressing societal challenges, for example, energy and food security[8].

Given that modelling serves as a cornerstone methodology to inform decisions regarding socio-economic-environmental systems, our second objective was to advance our **suite of modelling frameworks** to bolster our ability to promptly address rapidly evolving policy needs and societal challenges. Ensuring high agility necessitates the development of **modelling frameworks** spanning **various levels of complexity**. Stylized models describing complex processes with a few equations can be used for hypothesis testing and to explore the richness of system's dynamics including non-linearities, multiple equilibria, and tipping points, without demanding extensive development time or computational resources. For example, stylized models developed during the initial months of the COVID-19 outbreak provided insights into the trade-offs associated with policies aimed at mitigating the pandemic[9,10,11,12]. On the other hand, agent-based models (ABM) include detailed representation of a large number of heterogeneous entities, their complex behaviours, and dynamic interactions. For example, our macro-economic ABM (MacroABM) evaluated diverse socio-economic impacts of disruptive events such as migration[13] and floods[14] in Austria across sectors and household groups, offering a level of detail suitable for targeted policy making. Notably, our ABM simulations often require using high-performance computing (HPC) or other advanced technologies[15].

> Of 496 articles by ASA researchers since 2021, 202 (41%) contain the phrase "we develop a new model".

Making a real-world impact necessitates transcending disciplinary boundaries and working in partnership with stakeholders beyond the realm of science. ASA researchers advance feasible and effective ways of **engaging with policymakers, the private sector, civil society, and citizens**. We engage with policymakers in processes of co-production of theories of change, data, interventions and insights[16,17,18,19]. The use of pre-developed processes and tools facilitates deliberations and enhances impact[20,21,22,23]. Furthermore, we involve laypeople in citizen science projects which typically involve large-scale campaigns requiring specially designed web-based tools[24]. ASA has amassed extensive experience in developing such tools, which not only aid us in future research, but are also made available to a wide community[25]. While the private sector remains a rather rare partner for publicly funded science, ASA seeks to harness collaboration opportunities as companies embrace greater social responsibility. For example, ASA has partnered with the IT sector to jointly explore novel machine learning

and AI tools[1]. Or, our collaboration with the (re)insurance sector strives to address the rapidly evolving landscape of socio-environmental risks and resilience[26].

We combine data, interdisciplinary modelling, and transdisciplinarity to analyze increasingly **systemic social-ecological risks** and to support decisions aimed at **enhancing resilience**. The 2007-2008 financial crisis sparked a surge of global research into systemic risk focused on the financial sector. ASA has consistently provided research to inform the mitigation of such risks and fortify financial systems for the future[27]. In our ever more interconnected world, many other risks are becoming increasingly systemic. Interconnections among system components can serve as a key driver of systemic risk, whereby the malfunction of one part can propagate throughout the entire system, posing a threat to its functionality. In our ever more interconnected world, many other risks are becoming increasingly systemic, where the malfunction of one system's component can spread and threaten its overall functionality. ASA researchers generated guidance, applications and policy proposals for the management of increasingly systemic and existential multi-hazard risk in the context of climate change[28,29,30,31]. Additionally, we innovate approaches for analyzing urban resilience as an emergent property from interconnections among economic activities as well as carbon, water and energy metabolisms within cities[32,33,34]. Engagement with our key stakeholders, including policymakers, the private sector, and citizens ultimately serves to **enhance trust and shared understanding** of systems analysis methods and tools and has at various times strongly contributed **to policy impact**. We share the view that the adoption of an **open science** paradigm is not only a prerequisite for trust but also a societal responsibility of science and hence we strive to make our research outputs as open as possible. Notably, ASA is leading a project within IIASA's Strategic Initiatives Program that analyzes how trust in science can be facilitated through citizen engagement.

Full texts are available in the IIASA's publication database PURE for 344 (76% of a total of 452) articles by ASA researchers since 2021. Since 2021, ASA made publicly available 44 datasets and 14 model codes, mainly via GitHub.

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Highlights of academic achievement

Full texts are available in the IIASA's publication database PURE for 372 (75% of a total of 496) articles by ASA researchers since 2021.

Since 2021, ASA researchers authored and co-authored 496[a] articles published in international journals, including 3 articles in Science, 7 in Nature, and 6 in PNAS (see Appendix F, Table F1 for the full list of ASA publications and Table F2 for the list of journals, where ASA researchers published most frequently). Prominent, highly cited ASA researchers include Michael Obersteiner (H-index 88), Ulf Dieckmann (H-index 64), Linda See (H-index 59), and Steffen Fritz (H-index 59)[b]. Michael Obersteiner maintains consistent presence on the

[a] According to IIASA PURE; data retrieved on 31.05.2024

[b] The H-index data are from SCOPUS; data retrieved on 31.05.2024

Highly Cited Researchers list by Clarivate. Seven ASA researchers were recognized in the 2023 Research.com Top Scientists ranking.

Furthermore, ASA research has been recognized by prizes and awards. For example, in 2021 Sebastian Poledna won the paper competition in complexity and macroeconomics from the Rebuilding Macroeconomics (RM) Network. Brian Fath received the 2022 University System of Maryland Board of Regents Faculty Award for Excellence in research, scholarship, and creativity. Three ASA researchers were among finalists of the 2021 Decision Analysis Practice Award.

Collaboration with other IIASA programs

ASA expertise and research approaches are often complementary to IIASA's other research programs providing a strong foundation for mutually beneficial collaboration. Collaborations include multi-year joint research endeavors, specific joint projects, and bottom-up initiatives of researchers.

> Joint publications can serve as a proxy indicator of collaboration. Since 2021, 18% of papers co-authored by ASA researchers included collaborators from the BNR program, 10% from ECE, 7% from POPJUS, and 2% from EF.

To name a few examples, with our competence in Earth Observation, we collaborate with BNR on using these data to inform land use models . Our expertise in risk analysis is utilized in collaborative research with POPJUS, ECE, and BNR focusing on global climate, flood, forest fire, drought, and health risks and resilience[36,37,38]. Collaboration with EF explored optimal pathways in economic growth models using optimal control[9,10,11,12]. Evolutionary game theory has been used for modeling of eco-evolutionary vegetation dynamics, a collaboration between ASA and BNR[39]. ASA and ECE have undertaken a joint research endeavor to develop and apply a flexible medium-complexity Earth systems model[40,41].

2 Science for Society

Policy Impact

Any discussion of the societal impact of science must acknowledge the diversity of the underlying epistemological perspectives[c]. While the positivist worldview centers on the provision of actionable science-based recommendations, the constructivist approach sees influence through interactions, and the performative perspective emphasizes the role of 'translators'. Naturally, the actual utilization of knowledge depends on multiple factors, including the quality and relevance of research, but also the capacity of users to access and evaluate the research findings[d].

[c] Greenhalgh, T., Raftery, J., Hanney, S. *et al.* (2016). Research impact: A narrative review. BMC Medicine 14(78) https://doi.org/10.1186/s12916-016-0620-8

[d] Sørensen, O.H., Bjørner, J., Holtermann, A., Dyreborg, J., Sørli, J.B., Kristiansen, J., Nielsen, S.B. (2022). Measuring societal impact of research—Developing and validating an impact instrument for occupational health and safety. Research Evaluation 31(1) 118–131 https://doi.org/10.1093/reseval/rvab036

At ASA, our understanding of policy impact generally aligns with the research theory of change suggested by Belcher & Halliwell[e] (see Figure A1 in Appendix A). When designing research projects, even those which focus on advancing or development of new methodologies, we are mindful of their potential to make *conceptual*, *instrumental*, or *strategic* impacts on real-world socio-economic-environmental systems, whether at global, national, or local scale.

Most of our efforts concentrate on advancing research as our 'sphere of control'. We disseminate insights from our studies to a broad audience extensively via policy briefs[42,43,44,45,46,47] and various other channels (e.g. social media, newsletters). We have embraced novel dissemination methods, such as podcasts, and also in-person interactive engagement with laypeople, including younger generation.

Once high-quality research is available, any act of meaningful interaction with it, according to the interactionism theory, can induce changes in knowledge, attitude, skills, relationships, and behaviour (KARSB) of involved partners and stakeholders, leading to impact within our 'sphere of influence'. These KARSB changes enhance the likelihood of transitions in policy and practice (*instrumental impact*) and, in some cases, the chance for a system change (*strategic impact*, i.e., our 'sphere of interest'). In most cases, strategic impact is achieved by collective effort of many scientists and scientific institutions. A prime example is the IPCC, which mobilizes the global research community to synthesise the state of knowledge on climate change, thereby shaping international climate discourses and informing policy decisions worldwide. ASA researchers made lead- and contributing-authorship contributions and supported dissemination over the most recent 6th assessment cycle[48,49].

As a testament of our scientific excellence, engagement and relevance, ASA researchers are invited to contribute to targeted science-policy processes and events, which enables conceptual and instrumental impact (see Appendixes B and C). ASA researchers have also been invited as experts to join negotiations on salient issues, such as the EU team for adaptation and Loss&Damage climate policy.

Participatory research involving stakeholders and collaborative research in partnership with decision-makers are particularly powerful channels for generating impact. Many ASA projects involve partnerships and participatory research offering effective platforms for co-creation of research and insights. Participatory research often aims at informing specific policies or decisions (instrumental impact) by identifying compromise areas or solutions that balance the diverse and often poorly understood interests and concerns of stakeholders. ASA examples include work on contested Loss&Damage climate policy, where our engagement with policy and civil society over the years contributed to the consensual decision at COP28 to set up a Loss&Damage fund[50,51]. As another example, the Master Strategy for the Energy Sector 2020-2030 in Jordan was informed by a participatory process led by ASA researchers that revealed trade-offs and identified compromise solutions acceptable for major stakeholders' groups.

[e] Belcher, B., Halliwell, J. (2021). Conceptualizing the elements of research impact: towards semantic standards. Humanities and Social Sciences Communications 8(183) https://doi.org/10.1057/s41599-021-00854-2

In our experience, long-term close partnerships involving trustful, often informal relationship between researchers and decision-makers, provide effective channels for making impact. The adoption by the Bank of Canada our MacroABM for forecasting inflation resulted from such cooperation[52], as an example.

Partnerships are also key for science-practice *implementation research*. ASA engages in such research, where a prime example is the partnership with the Flood Resilience Alliance (now Climate Resilience Alliance), with ASA researchers working jointly with INGOs to conduct and validate disaster resilience measurement as well as to assess the applicability and effectiveness of resilience-enhancing interventions in 500 highly vulnerable communities in over 50 countries[7].

Science diplomacy

IIASA's Strategy 2021-2030 puts emphasis on science diplomacy, aspiring to "provide long-term scientific support and infrastructure as a neutral science-based broker on emerging global and regional challenges that can only be addressed through cooperation and collaborative work". ASA strongly shares this aspiration and initiates research with a science-diplomacy component. As one example, amidst growing geopolitical tensions, our project Emerging trade routes between Europe and Asia provided a safe environment for experts from various countries to share their perspectives on the highly debated topic of shipping in the Arctic, facilitating mutual understanding and contributing invaluable insights for anticipating future developments[53].

At no other time has multilateral international cooperation been as crucial as it is today, yet it coincides with one of the most severe historical crises facing multilateralism. To contribute to strengthening multilateralism, ASA researchers collaborated with the Sherpa G20 India Presidency in 2022 and led the preparation of four policy papers[54,55,56,57], engaging 27 leading international experts to offer insights into the complexities of potential multilateral institutional reforms. Many of the recommendations made in these policy papers found traction and resonance in the G20 New Delhi Leaders' Declaration.

Capacity development

Strengthening the capacity of the nexl.t generation of researchers and decision-makers in systems analysis is an important dimension of ASA's impact. ASA therefore actively contributes to IIASA's capacity development and training activities. In 2021-2023, ASA researchers supervised and co-supervised 45 participants of the Young Scientists Summer Program (YSSP) with four projects receiving special YSSP awards and honorary mentions for their quality. ASA's researcher Brian Fath has been serving as the YSSP's Scientific Coordinator since 2011. Furthermore, many ASA researchers contribute to IIASA's inaugural Summer School for Systems Modeling taking place in 2024. NODES organized several introductory statistics and GIS courses for YSSPers and an open GEO hackathon week at IIASA in June 2024 for advanced students to explore geospatial analysis on HPC infrastructure.

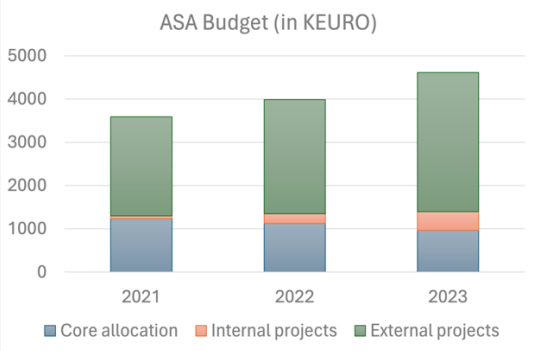
Focusing on the current generation, since 2021, ASA's research groups conducted multiple trainings on their tools for different audiences from students to experts. For example, SYRR

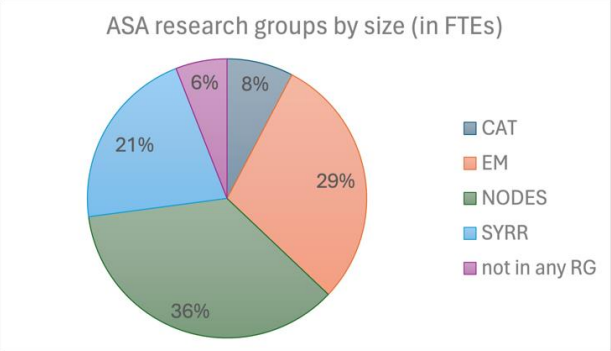
offered trainings to eight IIASA's MO countries on their CATSIM model that provides support for disaster-vulnerable countries for risk management decisions.

3 Resources

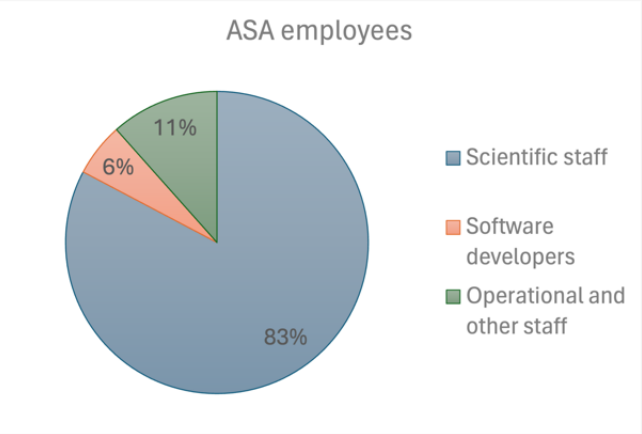
ASA's activities are funded primarily through third-party funding with the core funding being used for strategic investment and to support operations (see Appendix D for the ASA budget over years). To summarize, in 2021-2023, the ASA overall budget increased by 28%, and FTEs grew from 46 in 2021 to 55 in 2023, an increase of 18%.

Income from external funding increased by 40% (see Appendix E for the list of ASA projects) and core funding decreased by 22%. As IIASA's internal funding approach has been shifting towards project-based allocation, the opportunity for strategic investment into exploratory research and agile response to societal needs has been decreasing.





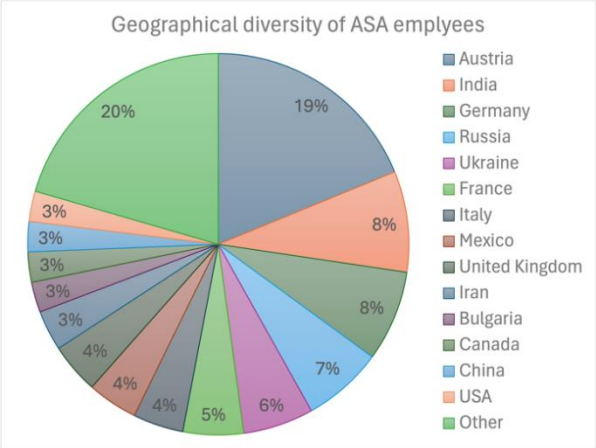
4 People

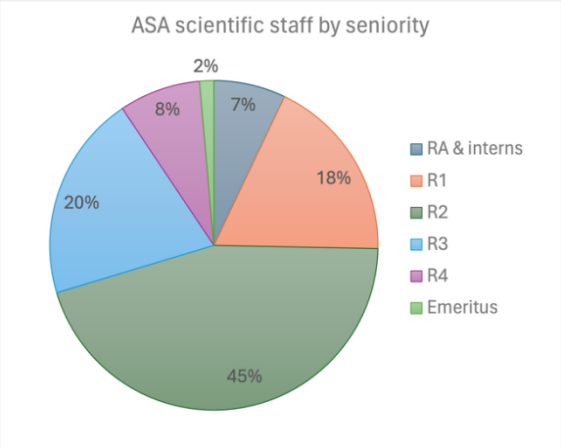


ASA generates research and societal impact through the collective effort of its scientific staff, supported by software developers, operational and other essential personnel. In 2021-2024[f], ASA employed 117 staff from 34 countries, 38% women and 62% men. ASA comprises scientists at various stages of their careers. This diversity in seniority ensures a broad range of expertise, perspectives, and mentorship opportunities, fostering a rich and dynamic research environment where fresh ideas and innovative approaches of junior scientists combine with the experience and wisdom of senior colleagues.

[f] The HR statistics used in the report covers the period of 01.01.2021-31.03.2024. In all pie charts here, percentages are based on the person-months data. Currently, IIASA has the following categories of scientific staff: Interns, Research Assistants (RA), Researchers (R1), Research Scholars (R2), Senior Research Scholars (R3), Principal Research Scholars (R4), and Emeritus Research Scholars.

In line with IIASA's spirit of an international hub, many of our researchers engage with ASA on a part-time basis, often combining it with teaching at universities or other professional commitments. Furthermore, in 2021-2024, ASA hosted 88 guest researchers from 29 countries. Part-time and guest contract arrangements allow us to connect with different communities and geographies and leverage these connections enhancing richness of our research and impact.





ASA's Novel Data Ecosystems for Sustainability Research Group (NODES)

NODES main mission as per the IIASA 2021-2024 Research Plan was to mobilize the tools of citizen and data science combined with Earth observations (EO) and other data sources to monitor, analyze, and foster progress toward the UN Sustainable Development Goals (SDGs). To achieve this, NODES has focused on three main cross-fertilizing pillars, namely: advancing the field of Citizen Science (CS); enriching EO; and exploiting the digital revolution.

Advancing the field of Citizen Science

NODES employs CS to engage people in scientific research and knowledge production, from data collection in its most basic form to fully co-created research projects. Stemming from our seminal publication in Nature Sustainability on citizen science and the UN SDGs,[58] NODES has been conducting pioneering work in the application of CS to address the significant data gaps in the SDGs, in partnership with, among others, the UN statistical offices.[59,60] This has led to a significant policy impact in the case of Ghana, where CS contributions to SDG monitoring for marine plastics are now officially recognized by the UN.[61,62] Meanwhile this approach is now being replicated in other countries in Africa, e.g., Sierra Leone, Nigeria. In addition, similar CS-based approaches are being applied to address shortcomings in SDG monitoring, e.g., health and wellbeing.[63]

NODES has contributed numerous innovative, free and open datasets to the research community via its CS platform Geo-Wiki, including datasets on land use change and forest management, among others.[64,65] These datasets are used in subsequent research by both IIASA researchers[66] and the wider research community.[67] As part of our mandate, NODES has launched multiple successful open digital CS applications (e.g., CropObserve, Street Level Validator) which are used to drive some of our ongoing research efforts, in particular on the topic of food security. Supporting these efforts, NODES has invested considerable effort in the science of CS, developing new methods of analyzing and working with CS data. In particular, we contributed several Bayesian approaches to the literature recently to increase the efficiency of CS data collection and optimize crowdsourcing.[68,69] We also address key issues in CS such as participant engagement and retention, data quality assurance and bias correction, as well as ethical considerations regarding data sharing and trust. We contribute to the discourse regarding CS and the development of free and open reference datasets based on contributions from citizens.[70]

In 2022, IIASA and partners officially launched the Citizen Science Global Partnership (CSGP). This network intends to mainstream CS and maximize the benefits of CS for global monitoring. NODES continues to obtain significant levels of CS-related external funding, recently launching several new CS initiatives. NODES leads the Urban ReLeaf Project (2023-2026) which addresses urgent urban climate issues while CROPS (2024-2027) aims to upscale CS.

Enriching Earth observation

NODES has a global reputation for enriching EO data with CS and crowdsourcing methods via its Geo-Wiki online platform. Numerous monitoring campaigns have been designed to collect a variety of new and novel datasets, which have allowed us to discover and track a variety of changes to the Earth's surface.[71,72] In particular, NODES has made significant research contributions in recent years to various aspects of global land use monitoring, contributing to the production of the EU's Copernicus global land service, and more recently to the European Space Agency's (ESA) WorldCover and WorldCereal Programs. These efforts provide critical baseline data for multiple EU policies including the new EU Deforestation Regulation on Deforestation-free products. As part of its longstanding relationship with ESA, IIASA is both contributing and hosting key global above ground vegetation validation datasets within the GEOTrees Network. This forms the in-situ component of the planned biomass satellite launch in 2024. Furthermore, as partner of CCI biomass, IIASA contributes its knowledge on global validation of bio-geophysical datasets.[73]

Part of a concerted effort to detect and measure the impact of various forms of commodity extraction across the globe, NODES has developed novel methods for commodity monitoring generating and compiling numerous open datasets (i.e. Mining, Oil Palm, Cocoa, Deforestation). A recent commentary raises concerns about the extensive, yet largely unmeasured, environmental and societal consequences of mining activities worldwide[74]. Since 2021, NODES has acquired substantial amounts of external funding to support its EO activities via national agencies, European funders, and global foundations. One of our recently awarded European projects, Open-Earth-Monitor, aims to build a FAIR-compliant cyberinfrastructure to accelerate the uptake of environmental information.

Exploiting the digital revolution

NODES is placing increasing emphasis on merging crowdsourcing techniques with AI methods, exploiting the power of computer vision[75–77]. We recently launched the Picture Pile Platform, a crowdsourcing tool, which allows for the rapid labeling of various forms of imagery, e.g., drone, street-level, satellite, etc. The resulting image libraries are then ideal input to machine learning applications and can address a multitude of SDG data gaps.[78] With the recent developments around big data and AI, we now have the capability to rapidly classify large amounts of data, and we are actively pursuing this in several research projects e.g. RapidAI4EO, EvoLand and Global Pasture Watch. The overarching goal is to establish the foundations for the next generation of ESA's Copernicus suite of products.

NODES has recently ventured into several novel areas of data science to explore the potential of such technologies to address data gaps in the SDGs. In particular, the ESA funded CAMALIOT project investigated the use of data received from navigation satellites via mobile phones to improve weather forecasting.[79] In addition, NODES, in partnership with the UNICEF recently launched the Donate Water App in the context of the YOMA project. Users of the app receive tokens for online purchases (using blockchain technology) in return for providing in-situ information on water quality, with over 5000 submissions to date across three African countries. In the process, young Africans gain valuable skills in the digital economy.

NODES has been awarded numerous external grants to support our efforts to exploit digital technologies. Within the GRANULAR project, we lead efforts to develop novel indicators of sustainable rural development across Europe to address the EU Rural Vision. These include e.g., web scraping, exploitation of social media, machine learning, CS, and others to address rural challenges e.g., accessibility, mobility, depopulation, employment and wellbeing. In 2024 NODES is hosting two international big data events; a Hackathon aimed at advanced data scientists who wish to exploit High Performance Computing (HPC), and; a global workshop aimed at practitioners who wish to derive policy impact from big EO data.

NODES Highlights of Scientific Output and Policy Impact

- Adopting a citizen science approach to addressing the problem of plastic pollution in marine environments, Ghana has become the first country to **integrate this type of data on marine plastic litter into its official monitoring** and reporting processes. A new study presents this innovative approach on Ghana's citizen science journey and offers a pathway that can potentially be adopted in other countries.[61]

- Accurate estimates and forecasts of crop area and yield play an important role in guiding policy decisions related to food security, especially in light of the growing impacts of climate change. IIASA researchers and colleagues[80] highlight the value of integrating remote sensing and data sharing for **timely agricultural information critical for food security** and sustainability planning. This work builds upon ESA's WorldCereal Project and related research activities.[81]

- Almost one billion people are still living without access to reliable and affordable electricity, which in turn negatively affects health and welfare, and impedes sustainable development. A recent IIASA-led study[82] proposed a **novel method to estimate global economic wellbeing** using nighttime satellite images, building upon our previous research[83]. If applied over time, the method used in this study could provide opportunities to track wellbeing and progress toward SDG 1, helping to better inform energy and aid policy around the globe.

- Exploiting the capabilities of crowdsourcing, NODES has produced the most **comprehensive free and open spatial dataset to date on the drivers of tropical forest loss**[64]. Armed with this knowledge, we then focused on global protected areas, documenting significant amounts of deforestation occurring in national parks, even with strict protection levels[66].

- A recent commentary published in Nature[84], raises concerns about the extensive, yet largely unmeasured, environmental and societal consequences of mining activities worldwide and the subsequent policy impact. Global industrial and artisanal mining is having a significant detrimental effect in biodiverse regions of the globe[74]. With the global appetite for minerals expected to rise sharply in the coming decades, especially for clean energy technologies, comprehensive and transparent data on mining impacts is critical. Hence NODES has been **contributing to the most comprehensive spatial datasets openly available on global mining**[85,86].

SWOT Analysis

Strengths	**Challenges**
• Reputation in CS and remote sensing well established • Very diverse set of skills in group – geography, forestry, mathematics, statistics, economics, social science • Increasingly close links to policy circles and UN • Invited to winning proposals, or able to form winning consortia • Strong development team with desktop and mobile apps and game experience – along with design capabilities	• Utilise our own derived datasets and tools to their maximum potential • Ensure our results are more visible (including data) • Place more emphasis on research/publishing as currently overstretched with projects/proposals • Update and enhance our CS platform Geo-Wiki (geo-wiki.org) • Improve communication means and channels to tackle broad scope of research being undertaken
Opportunities	**Threats**
• Working in an exciting, highly innovative research field with rapid changes • Collaboration potential is high among various research disciplines for our expertise • Funding for CS related research is plentiful and increasing • High demand for Geo-Wiki and our crowdsourcing/CS tools • Increasing need in AI and Computer Vision for classified Image libraries	• Increasingly research groups worldwide engage with CS hence competition is increasing (for funding, for partnerships, for impact) • Funder's priorities sometimes take us out of our niche area of expertise • Lack of inclusivity in CS is a growing problem

ASA's Exploratory Modeling of Human–Natural Systems Research Group (EM)

EM is an agile group of young researchers who came together from three different former programs of IIASA with the shared goal of developing cutting-edge systems-analytical methods, tools, and models to address the most pressing global sustainability challenges—much in the spirit of the overall ambition of the ASA program.

Empowering young researchers as principal investigators

EM aspires to empower younger researchers. Over the last four years, several early- and mid-career scientists successfully took on leadership positions, acted as principal investigators, and led studies. In 2021-2024, more than half of all EM projects were led by researchers with a PhD from less than ten years ago. Several early- and mid-career EM scientists became first-time principal investigators acquiring third-party funding from the Austrian Climate Research Programme (ACRP), the Anniversary Fund of the Austrian National Bank (OeNB), and a prestigious Marie Curie fellowship.

- 14 projects (59%) in EM are led by female PIs or PIs with a PhD from less than ten years ago
- From 2022, 5 early- and mid-career EM scientists became first-time PIs generating 905.000 EUR

Contributing with new models to address evolving policy needs and societal challenges

The group's agility was demonstrated by its rapid response to the COVID-19 pandemic with diverse models (*aligning with ASA Objective C*). We examined lockdown policies using optimal control (*EM Highlight 2*).[10–12,87–89] By employing agent-based modeling (ABM), we conducted the first economic forecasts of the effects of lockdown policies early in the pandemic (*EM Highlight 1*).[90,91] Since then, we have developed this approach further in collaboration with the Bank of Canada to allow for more accurate projections for inflation, particularly during the current surge (*EM Highlight 3*).[52] In addition, we provided and maintained the widely used open-access IIASA COVID-19 tracker on daily regional COVID-19 statistics for European countries at the highest possible granular spatial resolution (NUTS3 sub-district level).[92]

EM published 10 papers and reports on the COVID-19 pandemic

- 6 using optimal control theory
- 3 use agent-based modelling
- 1 open-source dataset

Embracing new approaches and technologies to develop new models

EM embraces new approaches and leverages advancements in computing capabilities *(ASA objective A)*. In collaboration with the University of Tokyo, we developed the first macroeconomic ABM for supercomputers,[15] allowing explicit representation of the behavior of each individual and firm in a country to study distributional impacts at an unprecedented level of granularity. This was showcased on Fugaku, which was the world's fastest supercomputer at the time, and we now routinely use the Vienna Scientific Cluster (VSC), Austria's largest supercomputer. To enable massively parallel computing without costly facilities, we utilize general-purpose computing on Graphics Processing Units (GPUs). GPUs aid in machine learning for projects like CMAF, which advances agricultural commodity price forecasting, and Plant-FATE, which applied this approach to eco-evolutionary vegetation modeling to predict species and regions vulnerable to climate change.

Advancing methods and models in all thematic areas according to the research plan

Overall, since 2021, EM has made substantial progress in advancing methods and models in all three thematic areas of the Research Plan, contributing to the major objective of ASA to innovate approaches and tools *(ASA objective B)*. In the area of socioeconomic complexity (a), EM made a breakthrough in advancing the methodology of ABM and has developed the first ABM that is competitive with traditional models in macroeconomic forecasting—enabling previously unachievable applications of ABMs (*EM Highlight 1*).[91] This achievement built on the investment of the former ASA program and the Systemic Risk and Network Dynamics (SRND) cross-cutting project. In addition, several studies applied ABM to model complex dynamic feedback between different domains. For example, we used ABM to study how climate stress, financial constraints, and different financial instruments may affect rural-urban migration in smallholder farmer communities.[93,94] In another study, ABM was utilized in combination with micro-level data to model the effects of climate-induced supply-chain disturbances.[95]

EM advanced Earth systems models *(thematic area b)* by developing a new Bayesian-inferred carbon-climate model to explore linkages between socio-economic systems and the Earth system in a probabilistic framework that accounts for technological and socio-economic uncertainties. This novel model was first used to study mitigation pathways robust to physical uncertainty and economic modeling choices.[96] In addition, the development of the compact Earth system model OSCAR, with which we contributed to Working Group I of the IPCC's 6th assessment report and the annual Global Carbon Budget,[97–99] and participated in the first comprehensive intercomparison of reduced-complexity models (RCMs[9]), was continued.[40,49] The flexibility of the model was also used to investigate global interactions between climate, crop yields, and mitigation potential, discovering a potential tipping point in the climate system after which the yield of bioenergy crops might be reduced too much to effectively be used as a source of negative emissions, making it even harder to combat climate change.[41]

In the area of macro-level systems models (c), a multitude of stylized models was developed to provide high-level insight into novel challenges or examine new solution options in problems related to the transformation to sustainability, by modeling linkages between human and natural systems. For example, we used optimal control to examine freshly introduced COVID-19 lockdown policies (*EM Highlight 2*).[10–12,87–89] We created an innovative, collaborative modeling framework to create globally consistent national pathways for transforming food and land-use systems (*EM Highlight 4*).[100,101] We developed a new model consistent with IPCC scenarios to assess the impact of a novel carbon pricing instrument on achieving net negative emissions for implementing 1.5°C-scenarios *(EM Highlight 5),*[102,103] and we incorporated a fairness perspective into policy optimization models for sharing the burden of climate mitigation and adaptation.[104]

Highlights of scientific output and policy impact

[9] RCMs are helpful to synthesize knowledge from the various lines of evidence including data from complex models and observations to estimate temperature, climate sensitivity, and other key quantities in a computationally efficient manner.

Developing an agent-based model for macroeconomic forecasting

We developed the first ABM that is competitive with traditional models for macroeconomic forecasting.[91] This model combines data from multiple sources to offer a detailed, dynamic representation of the economy, encompassing various sectors and actors. Its forecasting ability introduces novel applications previously unachievable with ABMs, such as predicting economic responses to unforeseen global events like financial crises and pandemics. The model's utility was first demonstrated during the COVID-19 pandemic, accurately projecting the economic impacts of lockdown measures in Austria.[90] Due to its proven effectiveness, the model has been adopted by numerous institutions and is now utilized in diverse applications.

Optimal control theory to provide insights into pandemic response

We investigated whether lockdowns and vaccines are substitutes or complements during the interim from vaccine approval to widespread vaccination.[11] Using a dynamic optimization model that considers epidemiological and economic factors, we found that lockdown intensity should typically decrease as more people are vaccinated, reflecting conditions in developed countries. However, different strategies may be optimal depending on specific parameter values. Strategies that disregard previous infections perform nearly as well as those that consider them. Sometimes, minor increases in vaccine availability can significantly change the optimal approach, favoring longer, stricter lockdowns. This highlights the complex interplay between policy decisions, vaccine distribution, and public health outcomes.

Using agent-based modeling to inform monetary policy of Canada

In collaboration with the Bank of Canada (BoC), we developed an ABM for monetary policy analysis. The model departs from rational expectations and introduces richer household and firm heterogeneity, marking an advancement in the toolkit of central banks.[52] The ABM allowed the BoC to have more accurate projections for inflation, particularly during the current surge. The BoC now routinely uses the model as part of their in-house core macro models, marking the first instance a major central bank has adopted an agent-based model to inform monetary policy. Its success has sparked interest from several other central banks, including the Bank of Italy, the Bank of Spain, and the Hungarian Central Bank, which are now adapting the model for their own use.

Developing a collaborative modeling framework facilitating sustainability transformations

We created an innovative, collaborative modeling framework to create globally consistent national pathways for transforming food and land-use systems.[100,101] This framework allows local researchers to independently use national models to explore mid-century pathways, which are then integrated into globally consistent national pathways by the framework. Currently, over 200 researchers across 24 country teams utilize the framework. These teams are part of the Food, Agriculture, Biodiversity, Land-Use, and Energy (FABLE) Consortium, which operates under the Food and Land Use Coalition (FOLU), which aims to understand how countries can transition towards sustainable land-use and food systems.

Operationalizing the net-negative carbon economy

We developed a new model consistent with IPCC scenarios to assess the impact of a novel carbon pricing instrument—Carbon Removal Obligations (CROs)—on achieving net negative

emissions for implementing 1.5°C scenarios. By requiring emitters to cover the costs for the removal of previously emitted CO_2, our findings suggest that CROs could significantly mitigate risks related to net negative emissions, such as the risk of default by carbon debtors. This approach, involving charging interest on "carbon debt," offered a valuable contribution to the global climate policy discussion. It was presented to EU negotiators before the recent COP in Dubai and has now become a fundamental theme of the Climate Overshoot Commission.

SWOT Analysis

Strengths	**Challenges**
• Diverse expertise and knowledge to innovate in many topics and explore new models and methods • Flexibility and agility to react with new models to societal challenges, such as COVID-19 or the inflation surge • Embracing of new approaches and technologies, such as super and cloud computing • Large number of diverse external projects from multiple funding sources • Many young and first-time PIs giving staff room to develop and grow	• Expertise and focus of the RG is on exploration rather than on exploitation • Getting external funding for innovative approaches and basic research is difficult • Lack of stability with many smaller internal and externally funded projects • External funding is tied to deliverables, which makes it difficult to find time to collaborate, mentor, and write new proposals • Getting access to the latest technologies and software, such as cloud computing is difficult
Opportunities	**Threats**
• Maturing models developed in EM are ripe for exploitation (MacroABM, OSCAR, FABLE, etc) and could became future IIASA flagship models • Larger external projects could provide more stability and allow for more collaboration • More open-access publishing and open-source models could lead to more citations and higher visibility • Large suite of models of different complexities to react to the next big societal challenge	• Large percentage of funds comes from external funding • High fluctuation in funding is possible when relying on smaller, externally funded projects • Successful models can consume EM work (in exploitation) rather than continuing the exploration of new models and methods • Risk that in EM developed models get passed to other RGs and will be exploited there without adequate recognition

ASA's Systemic Risk and Resilience Research Group (SYRR)

The SYRR group's mission is to analyse the increasingly systemic socio-ecological risks associated with global and local change, and with policy, practice and civil society co-generate options for building resilience. SYRR operationalised its mission by crafting four objectives (see below), which the team addressed with inter- and transdisciplinary science. Research outcomes have been targeted at understanding risk and resilience as well as informing and co-generating possible actions for policy, practice and the private sector with a focus on the most vulnerable. A strong focus has been on disaster risk, climate change, ecological risk, and increasingly human health (health impacts, pandemics). The research conducted has been highly collaborative within ASA and other IIASA groups as well as partners across the globe.

Further developing and strengthening the unique approach for addressing existential and systemic risk policy issues

SYRR, in close collaboration with other leading research institutions, policy and practice, developed guidance on systemic and multi-hazard risk[28, 105], on comprehensive risk management in development cooperation[106] and urban areas.[18] We experimented with the innovative physical climate storyline approach[107] to explore complex impact transmission pathways and unfoldings of event cascades under future climate conditions.[107] One key focus has been on understanding existential climate-related risk,[31] which is seeing increasing attention. Concepts of adaptation limits and social tipping points[108] provide inroads into understanding when risk in social systems becomes existential, for which we are setting up a global repository. We studied lessons from COVID-19,[109] which included the need for improved data to understand the contagion effect in complex systems as well as a lack of governance models for such systemic risk manifestation. Further applications of risk and resilience analysis to health (with SHAW) and food show the power of systems-oriented risk analysis.[110] Ongoing work has the group working with about 100 communities and regions across Europe in the CLIMAAX and P2R projects to innovate systemic risk and resilience analyses for impact,

Advancing & applying quantitative estimation methods to assess emerging systemic risks and disaster resilience

In collaboration with the ASA's NODES group, SYRR further advanced the widely used and currently only validated flood resilience measurement F/CRMC tool towards multi-hazard (heat, wildfire) resilience. Global work on validation shows the tool is valid and reliable,[7] community-led work by INGOs shows the usefulness in terms of addressing difficult and salient question, such as that of informing retreat and relocation hotpots, as done, e.g., for Bangladesh. We advanced the analysis of displacement risk under climate change, where we identified rising incidents as well as costs of displacement.[111] We further extended the focus of our fiscal risk assessment model CatSim[112] and related economic modelling to multi risk contexts (pandemics) as well as other risk aspects (with ASA's EM and CAT groups, and IIASA's EF and ECE programs).[113] We use multi-model approaches[114] including macroeconomic and agent-based[115] analysis to understand the distributional[116] consequences of disaster risk on households and the aggregate economy as we as evaluate policy, such as through insurance

and social protection applications in a context of ambiguity or autonomous adaptation.[117] With supply chain and lifeline disruptions as well as system failure proliferating in socio-ecological systems exposed to today's polycrises modelling work using statistical processes, machine learning and big data[117] offers enhanced insight for better representing multiple lifeline disruptions,[118] understanding systemic risk from disaster and climate risk[119] as well as ecological collapse, such as in fishing populations.[120]

Developing and applying ecological network principles to the resilience in socio-ecological systems general focus

We developed novel socio-ecological resilience and network analytical methods and applied these to urban risk and resilience issues. Building on the concept of urban metabolism, jointly applied both input-output and ecological network analyses to study direct and indirect greenhouse gas emissions as well as energy and water footprints in comparative studies across major European, Chinese and Latin American cities.[32, 121] Using system dynamics modelling, SYRR researchers (with EM and others) studied the dynamics of socio-ecological systems and settlements affected by climate change, biodiversity loss and other risk drivers[121] using network analytical methods, we addressed methodological challenges related to the concepts of reciprocity in food webs and economic networks,[122] functional connectivity in dynamical systems process[123] and the use of efficient indicators for studying the robustness of populations in the context of habitat loss.[124] We will further proceed to study urban resilience in the context of low-carbon and inclusive development trajectories.

Further developing and applying methods to inform risk management and climate adaptation decision-making

For dealing with complex and dynamic climate-related risk, we develop evidence-based insight on adaptive risk management for global and EU policy applications including for the reform of the EU Solidarity Fund.[125] We work on the triple resilience dividend decision-making approach, a novel and improved decision-support method for disaster and climate resilience, where current implementation has been found by ASA lead authorship in the IPCC to be inadequate as "small scale, fragmented and reactive."[48,126] In addition to standardly considered risk reduction benefits, this approach considers positive and negative externalities, such as unlocked socio-economic potential where risk is reduced, as well as co-benefits generated from risk reduction investment that also creates developmental gain (e.g., in health infrastructure). SYRR has been engaged strongly in creating evidence at community-scale,[127] nature-based solutions, water,[128] for equitable outcomes[129] and at macroeconomic scale.[130] To work towards solutions in the context of the climate and other multiple, connected polycrises, participatory modelling[19] is an essential starting point for SYRR to then proceed further in term of engaging in science for implementation, most notably through the work in the Flood/Climate Resilience Alliance, where we engaged with leading NGOs and the private sector for understanding and building resilience in vulnerable communities across the globe. In addition to the C/FRMC tool other boundary objects for co-generation developed in this Alliance include forensic post-disaster analysis[131] and a cross-cutting initiative on gender, inclusion and disability.[132] A key focus of the Climate Resilience Alliance underway is on

resilience in multi-hazard context, for which we currently include storm, heat and drought risks into our toolbox. Lead authorship work for the IPCC[48] has revealed that in the climate crisis, incremental approaches are reaching their limits and the role of systemic change through transformation is seeing increasing attention. SYRR research has addressed knowledge gaps,[133] with POPJUS assessed concepts and framings,[134] the role of learning[135] and studied climate risk[136] and transformational resilience capacity[137] in hot-spot countries and systems, nature-based solutions[138] and wildfire[139] risk. Given limited evidence on transformation, a multi-author book with the Climate Resilience Alliance is providing concrete evidence of implementation by NGOs, policy and the private sector along various case studies and synthesis. Applications on ecological and pro-poor planning for disaster risk in urban spaces reflects the growing importance for considering the urban space as a risk generator, but also a resilience solution space.[140] SYRR (with input by POPJUS) researchers over the last few years strongly published and engaged with policy and practice to significantly contribute to the breakthrough in climate policy negotiations that led to the establishment of the Loss&Damage fund for supporting the most-vulnerable for coping with climate impacts and risks.[141]

SYRR Highlights of Scientific Output and Policy Impact

- Research that generated **guidance and modelling work on multi-hazard**[28] **and systemic risk**[105] has well responded to a strong need by policy and practice at local, national, and international scales to help better understand the multiple drivers of disaster and climate risk as well as understanding risk as increasingly dependent and leading to collapse as limits to 'adaptation' are being breached.[28, 108]
- The C/FRMC **resilience assessment** tool, co-generated in transdisciplinary collaboration with leading international INGOs and the private sector in the Flood Resilience Alliance (now Climate Resilience Alliance), has been further developed, validated and informed resilience building in more than 50 countries and 500 very vulnerable communities creating tangible impact for more than 3 million people across the globe.[7]
- **Innovative research on the tightly interlinked urban metabolism** using socio-ecological resilience and network analytical methods led to enhanced insight on understanding and shaping urban resilience interventions integrated with developmental transitions, such as resilience that supports circular economy applications in key cities across the world.[121]
- **Research on Loss&Damage** led to a climate policy breakthrough with the decision on a Loss&Damage fund for the most climate-vulnerable countries at COP27. Impact has been achieved through a first stocktake book on the issue with close to a million access items currently,[142] a policy forum in Science,[143] various other publications, including on finance,[141] quantification of needs and governance[144] as well as leading synthesis on this contested item in IPCC reports, as well as the lead in a Flood Resilience Alliance Flagship Report.[145] Policy engagement also involved in a SYRR researcher being invited to negotiate this item for the EU.
- The concept of **triple resilience dividend decision-making** offers a novel way for **co-benefits-based decision-making** to sway decision-makers to further invest into disaster risk reduction and development jointly. We created evidence for various community-scale

risk management implementation interventions,[127] nature-based solutions and water sector,[128] for distributional outcomes[129] and at macroeconomic scale.[130]

SWOT Analysis

Strengths	**Challenges**
• Strong standing in int'l risk research with long history and large network • Diverse, gender-balanced, young, and motivated international team with expertise in natural and social sciences, engineering, economics, statistics and humanities • Rich methodological toolbox combining soft and hard systems analysis engenders capacity to truly tackle transdisciplinary problems • Demonstrated ability to go deep into the science-policy-practice space (work with practice locally, negotiate with policy globally) • Research reaching across scales covering studies at the local/community level with global insight • Proven ability to develop and maintain innovative partnerships along the science-policy-practice interface • Integration of health (systems) research with risk and resilience agenda • Strong cooperation at IIASA (with all programs), leading and actively involved in Strategic Initiatives • Strong capacity to leverage funding from international public and private sector sources • Strong network incl. alumni (former YSSPers, post-docs) and guest scholars from diverse set of scientific backgrounds and nationalities • Consultative group leadership: transparency in communication and strong team work	• Finding balance between universal "big messaging" vs. reporting local nuance • Publishing on confidential practice and policy insights • High transaction costs involved in science-policy-practice work vs. focus on publications • Dependency on external funding and proposal writing efforts
Opportunities	**Threats**
• Increasing attention tp policy and public to climate, disaster and other risk research in the wake of the climate crisis, complex risks and polycrises • Further linking at scale of systemic and existential risk research to global tipping points work • Further exploit capacity to involve IIASA researcher in transdisciplinary research issues for impact • Further harness networking and funding opportunities for IIASA researcher to connect to policy, practice and private sectors • Capacity to connect soft and hard systems analysis methods for advancing emergent systemic risk research field • Offering further open access models and data	• Trade-off between quick and "big messaging" vs. nuanced and slow insight relevant for policy and practice impact • Increasing confidentiality of practice and private sector data • Reduced/stagnant NMO funding • Increasingly competitive funding landscape • Impact of AI on evidence-based applied research

• Integrating AI in research agenda • Further making use of IIASA NMO network	

ASA's Cooperation and Transformative Governance Research Group (CAT)

The ASA's Cooperation and Transformative Governance (CAT) group mission as stated in the IIASA 2021-2024 Research Plan has been **to analyse governance and decision-making processes under uncertainty, complexity, ambiguity, and volatility while incorporating systems thinking into strategic policy planning, addressing social dilemmas and wicked policy issues while applying interdisciplinary approach**.

CAT operationalised its mission by inter- and transdisciplinary science to support feasible, science-based, participatory, compromise-oriented public policy planning. The group conducts research on multiple strategic goals and priority directions when strategic goals followed by formulation of criteria which should be satisfied to achieve these goals, leading to identification of factors, policies, and actions. At the centre of its research is the decision-making process with multiple stakeholders and criteria, which reflect national development goals and are typical for various sectors. The focus of the research is on multiple viable factors that affect criteria directly or indirectly via other factors in interdependent or interconnected sectorial issues. Multiple strategic goals and priority directions when a strategic goal is an overall policy to be designed and priority direction is a specification of a strategic goal.

The CAT research group has as a goal the research on societal transformation driven by technological innovations and industrial transformations, such as energy transitions or digitalization, as well as environmental or health related crise.

To research the societal transformation CAT research group contributes to development of methodologies for participatory governance on managing social dilemmas and public wicked problems in the cause of societal transformations. This includes the development of methodologies on cooperation models, decision support systems and participatory modelling to research on existing and emerging governance challenges, and their complex structures and dynamic evolutions on such topics as health-related issues, climate change, societal transitions and digitalization.

Further developing and strengthening the unique approach to address multiple strategic goals and factors in cooperation and transformative governance

This work aligns with CAT's methodological ambition to advance the use of models to understand and support decision-making under volatility, uncertainty, complexity, and ambiguity. The methodology of addressing several strategic goals and multiple viable factors was significantly expended through research on how system maps, multi-criteria decision analysis, participatory scenarios, behavioral economics analysis and optimization models can facilitate a shared understanding of a problem's complexity, promote critical thinking, and identify potential leverage points. The further development of such participatory methodologies as foresight and multi-criteria decision analysis supports the CAT's goals to facilitate stakeholder dialogue on complex issues, bring parties in conflict to a shared understanding, and assist decision-making under deep uncertainty.

Advancing and applying quantitative and qualitative methods of behavioural economics and institutional analysis in governance research, including social factors, engagement and ownership of governance processes

In the field of behavioral economics the CAT group was developing and refining theoretical frameworks, alongside employing advanced statistical techniques such as Structural Equation Modeling (SEM), AMOS and SmartPLS to analyze complex relationships and validate theoretical constructs. The focus was on understanding the underlying mechanisms driving adaptation and mitigation behavior in various contexts, ranging from economic decision-making to social dilemmas and management of common goods including individuals' willingness to engage in climate change mitigation, and adaptation policies and the effectiveness of different incentive structures in promoting environmentally sustainable behavior[146] [147].

Advancing and applying multi-criteria optimization for research on complex governance issues and cooperation governance

Further on, the essential for risk governance methodology of multi-criteria decision analysis (MCDA) was developed and expended. The CAT research group developed the methodology which facilitates the use of automatically generated weights (often called surrogate weights) to represent user information[148]. This is world-leading methodology research in this area[149].

Advancing and applying methodology of causal loop diagramming for governance of transition and transformation processes as well as governance of common goods

CAT group contributed to development of methodology of systems mapping, also known as causal loop diagramming (CLD), is a key systems thinking tool used to visualize the components of a complex system and the interconnections between them. It enables building a shared understanding of the system and identifying its key drivers and leverage points. This methodology was applied for case studies of COVID-19 pandemic to investigate the impact of the COVID-19 pandemic on a broader human–society–environment system [150].

Advancing and applying methodology of systems maps

The methodology of systems map of the national well-being system and scenario planning as a foresight approach was further developed to explore plausible future developments of a complex system under high uncertainty. CAT group further developed this methodology and applied it to investigate futures of the Arctic, a region undergoing rapid changes. The scenarios were co-created with experts from various countries in a participatory process[151].

Advancing and applying methodology of governance of systemic risks and nexus issues

CAT group contributed to the development of a methodology to analyse the dynamic and interactive conditions of natural disaster risks and possible risks of compound chain events (systemic risks) to make better predictions regarding possible future risk exposure and vulnerability. Namely, CAT group contributed to the development of “Integrated catastrophe modeling and management framework” by linking catastrophe risk models (CRM) with stochastic optimization (STO) techniques for the design of optimal and robust mitigation and adaptation strategies for risks of all kinds. Further contribution was provided to develop methodology for analysis of policies in interdependent systems of food-energy-water-environmental (FEWE) sectors which require integrated coherent planning and coordinated

policies for sustainable development and security nexus. Such an integrated Energy-Food-Water-Environment (EFWE) decision support system (DSS) enables to develop robust systemic regulations for disintegrated distributed EFWE systems in the presence of risks and uncertainties of various kinds relying on robust distributed models' linkage and optimization methods[152].

Developing and applying innovative methods in governance such as usage of artificial intelligence tools

Social Intelligence Mining (SIM) is the artificial intelligence tool developed by CAT. This tool excels in parsing the vast landscape of digital discourse, offering insights into public sentiment with unprecedented precision and depth. It harnesses the power of cutting-edge technologies including advanced statistical methods, AI, machine learning, and deep learning. Key applications include trend identification, crisis management, influencer marketing, and beyond, proving essential for engaging with audiences and navigating the digital zeitgeist. The SIM tool contributes greatly to the topic of risk governance with the following research capacities: enhanced predictive analytics to foresee trends and societal shifts before they enter the mainstream, more nuanced sentiment analysis capable of understanding complex emotions and sarcasm, providing a deeper understanding of public opinion, greater integration with other data sources for a holistic view of societal trends and improved user interfaces and visualization tools that make data accessible to a wider range of users, from experts to novices[153,154].

Highlights of scientific output and policy impact

- CAT researchers developed a ***cloud-based online service platform*** that offers support in analyzing and evaluating dynamic risk scenarios and systemic risks caused by multi-hazard disasters. The perform is based on in-depth assessments of the interactions between hazards and their resulting impacts in various sectors. In addition, it allows for analysis of the current risk situation and study how alternative future scenarios could change multi-hazard impact chains[155].
- CAT researchers introduced a ***Social Media Intelligence Mining Tool*** which allows to redefine our understanding of public sentiment and discourse across digital landscapes. The tool is designed to revolutionize the extraction, analysis, and reporting of intelligence information from a myriad of social media and web platforms, including X (formerly Twitter), Google, and news outlets. It leverages the latest technological advancements, it seamlessly integrates advanced statistical techniques, web and text mining, artificial intelligence (AI), machine learning, and deep learning, among others[154].
- CAT researchers developed methodology for ***intelligent risk analysis and multi-criteria assessment*** of the effectiveness of COVID-19 counteraction using a combined approach to identifying the dynamics model. The methodology's focus is on the development of metrics and indicators to assess different scenarios and their impact on changing hazards, as well as the potential impact of different scenarios on the hazards posed by different models[156].

- CAT researchers contributed to the UK Research and Innovation (UKRI)/Natural Environment Research Council (NERC)'s Constructing a Digital Environment Program which is an expert network of leading influencer-practitioners, thought-leaders, and scientific and technical authorities, whose work aims to identify best practices in the digital environment and to influence UK environmental policy thinking, drawing on expertise in the methodologies and tools for assessing, analyzing, monitoring, and forecasting the state of the natural environment.
- CAT researchers contributed to the work of the United Nations Environment Programme's (UNEP) Foresight Expert Panel established in cooperation with the International Science Council (ISC). UNEP has partnered with the ISC to advance science-based strategic foresight and futures thinking to enable better preparedness and proactive engagement with future challenges, and to inform and guide decisions for the benefit of the global environment. The Foresight Expert Panel was established to aid in processes to identify and evaluate emerging issues and signals of change, and to guide and oversee this critical work.

SWOT analysis

Strengths	**Challenges**
• Multidisciplinary expertise, for example, in behavioral economics, multi-criteria optimization, participatory modelling and scenario development • Diversification of available skills • Strong methodological basis in research on governance • Availability of models and tools developed within the ASA program and CAT group • Research combining applied and methodological focus • Experience in stakeholders' engagement • Experience in science to policy	• Dependency on external funding and proposal writing efforts

• Connection to science and policy discourses for dissemination of results • A geographically diverse, gender-balanced motivated international team with expertise in natural and social sciences, engineering, economics, statistics and humanities • Combination of soft and hard systems analysis engenders capacity to truly tackle transdisciplinary problems	
Opportunities	**Threats**
• Potentials of AI in data collection • Societal transition and transformation processes caused by technological innovations, geopolitical and other challenges highlighting the growing importance of theory of changes • Ongoing transition processes such as energy transition, digital transition and others and potentials for research • Networking and collaborative opportunities provided by digital solutions • Potentials for high impact research due to involvement into research activities of stakeholders from practice • Growing opportunities in science to policy domain	• Accessibility of data from social media and internet platforms such as recent developments with X (former Twitter) • Stakeholders fatigue in participatory research • Increasingly competitive funding landscape • Too high work load on partners from test and case studies • Ethical issues with usage of AI

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Appendix A Research Impact – a Generic Theory of Change

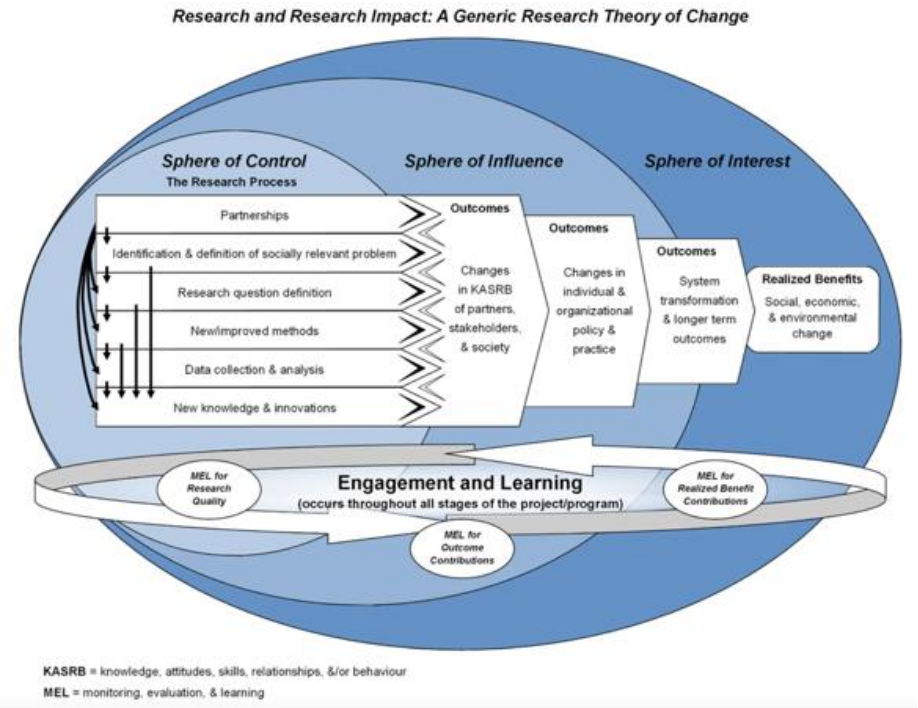

Figure A1: Research outputs and outcomes – a generic theory of change. Source: Belcher & Halliwell (2021)[d]. Three types of outcomes from left to right broadly correspond to typology highlighted by Sørensen *et al.* (2022)[c], following Weiss (1979)[h]: Conceptual use is when research findings are used to change and frame the understanding of an issue at individual or organizational level; Instrumental use designates that users use the research findings to design new procedures or incorporate them into methods or tools; Strategic use is indicated when research is used persuasively to support existing and influence new policies, procedures, and processes.

[h] Weiss C.H. (1979). The Many Meanings of Research Utilization. Journal of Public Administration Review 39: 426-431 https://doi.org/10.2307/3109916

Appendix B Selected Science-Policy Processes

At the global scale:

- Luis Gomez Echeverri has been co-leading a major global UNDESA-UNFCCC initiative engaging with a group of high-level experts to help policy- and decision-makers maximize the impact of policies and actions by tackling the climate and development crises together in a synergistic way. The initiative issued its first report in 2023 and is in the process of issuing four thematic reports and a synthesis report. The focus is on creating a roadmap and a vision to 2030 and beyond to 2050 and on the transformations required for a more sustainable future.
- Nadejda Komendantova has provided input on the methodology of participatory research and foresight to the United Nations Environment Programme's (UNEP) Foresight Expert Panel which, in cooperation with the ISC, aims to identify and evaluate emerging issues and signals of change that could have implications for the environment.
- Michael Obersteiner is a steering member of the United Nations Office for Disaster Risk Reduction (UNDRR) and contributed to the 2022 Global Assessment Report Disaster Risk Reduction (GAR). Reinhard Mechler participated in the science advisory group of the UNDRR to inform best practice and generate guidance on climate risk analysis and management for the implementation of the Sendai Framework in disaster risk reduction.
- Reinhard Mechler acted as lead author on Working Group II of IPCC's 6th Assessment Report and a contributing author on the Summary for Policymakers, which involved participation in the plenary approval session with the 195 member countries of the IPCC. Thomas Gasser contributed to Working Group I of the IPCC's 6th Assessment Report on The Physical Science Basis. With the reduced-complexity Earth system model OSCAR, he contributed to Chapter 7, "The Earth's energy budget, climate feedbacks, and climate sensitivity."
- Since 2021, as a member of its Executive Committee, Elena Rovenskaya has been contributing to the work of Committee on Data of the International Science Council (ISC), towards its mission to promote global collaboration to improve the availability and usability of data for all areas of research.
- Michael Obersteiner serves in the Climate Overshoot Commission, which is a group of eminent global leaders that investigates and develops a comprehensive strategy to reduce climate risks. In 2023, he contributed to the report Reducing the Risks of Climate Overshoot.

At the regional scale:

- Nadejda Komendantova and Hossein Hassani contributed insights on the methodology on text mining for public perceptions using social media to the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) seminar

which was hosted under the auspices of the UN Asia and the Pacific Data Integration Community of Practice.

- Ian McCallum and Ivelina Georgieva, contributed to the establishment of a Terms of Reference for an EU Biodiversity Observation Coordination Centre. Based on this initiative, the European Parliament has allocated 5M € to the preparatory action "EU Biodiversity Observation Centre" (item PA 09 24 01). The European Commission (DG ENV) will open a tender in 2024 to launch the Centre in 2025.
- Steffen Fritz and Juan Carlos Laso Bayas provided technical assistance to the European Commission on the topic of indirect land-use change (ILUC), contributing to a review of feedstock expansion onto land with high carbon stock, as input for the determination of high-ILUC fuels.
- Stefan Hochrainer-Stigler conducted a study for the EU parliament on the reform of the EU Solidarity Fund (EUSF) that provides post-disaster compensation to EU member countries.

At the national scale:

- Nadejda Komendantova has been appointed as an international expert for the UK Research and Innovation (UKRI)/Natural Environment Research Council (NERC)'s Constructing a Digital Environment Program which aims to develop, for the first time, the thinking and practice around a digitally enabled environment, providing benefits for policymakers, businesses, communities, and individuals. The focus of the program is the combination of environmental science, with computer science, data science, and behavioral science.
- Dilek Fraisl has been advising the Ghanaian Statistical Office to adopt a citizen science approach to addressing the problem of plastic pollution in marine environments, becoming the first country in the world to integrate this type of data on marine plastic litter into its official monitoring and reporting processes.

Appendix C Selected Science-Policy Events

At the global scale:

- Dilek Fraisl presented the Citizen Science Global Partnership at a high-level event exploring emerging issues on Data Governance hosted by the UN Statistical Division. The session titled "Evolving data governance frameworks in the public sector", aimed at exploring current arrangements on coordination and governance of data across systems.
- Dilek Fraisl organized a session on “Building Trust in Citizen Science Data” and co-organized another on “Building the evidence to rebuild trust in governance systems” at the World Data Forum 2023 (WDF) in partnership with several UN agencies, National Statistical Offices, Civil Society Organizations and others. Fraisl is also a member of the UN WDF Program Committee.
- Nadejda Komendantova and Hossein Hassani launched the Social Intelligence Mining Tool at the press conference during COP 28 as well as at various sessions such as “Data - Driven Solutions: The Key Role of Data in Tracking Climate Change”.
- Reinhard Mechler actively presented and informed on Loss&Damage science and policy side events involving also participation of COP presidencies at COP 26, 27, 28.
- Reinhard Mechler represented IPCC and acted as a chair in UNFCCC's Glasgow Dialogue on climate risk management policy at UNFCCC's subsidiary body event in 2022 in Bonn.
- In 2023, Sebastian Poledna gave an invited talk on how agent-based modelling can be used to conduct detailed evaluations of indirect impacts from natural disasters at a joint IMF-World Bank Seminar Series on Climate Macroeconomics which supports the Coalition of Finance Ministers for Climate Action.

At the regional scale:

- Since 2021, Elena Rovenskaya has consistently contributed to the annual Budapest Eurasia Forum organized by the Hungarian National Bank providing input to shape the agenda of the events and leading one of its sessions. The Forum convenes high-level participants from policy, business, and expert communities to engage in dialogues on pressing global challenges such as geopolitics, the global economy and trade, and sustainable development and their implications for Eurasia.
- Ian McCallum presented a proposal for the EU Biodiversity Observation Coordination Centre (EBOCC), designed to streamline data collection, modelling, and knowledge-building for consistent reporting on European biodiversity trends, at the Biodiversa+ Science-Policy Forum. Attendees included the European Commission and member state representatives, with the presentation followed by a panel discussion on implementation.
- ASA researchers have provided insights to several significant events gathering policymakers in the field of competition law and policy from BRICS countries. Our contributions underscored the significance of adopting a systems approach to economic competition, which also encompasses sustainability considerations.

- In 2023 Stefan Hochrainer presented to the EU parliament on the reform of the EU Solidarity Fund, that provides post-disaster compensation to EU member countries.

At the national scale:

- In 2021, researchers from EM and the Bank of Canada (BoC) started a new partnership with the goals of developing an agent-based model of the Canadian economy based on IIASA research and applying the agent-based model to meet the BoC policy and research mandates. The first results of the collaboration, a detailed analysis of the effects of policies during the COVID-19 pandemic on the Canadian labor market, were presented at the 2021 Bank of Canada Annual Economic Conference.
- In 2022, ASA launched a science-based dialogue in Kazakhstan on carbon farming and trading involving high-level policy-makers and other relevant stakeholders. By bringing together expertise in ecology, economics, and policy analysis, the dialogue has informed Kazakhstan's strategies for developing economically viable agriculture-based carbon sequestration solutions. The dialogue continued at COP 28 in Dubai.

Appendix D ASA Budget

Table D1: ASA budget and FTEs, by years.

	2021	2022	2023
Income, EURO thousand			
Core allocation	1233	1121	961
Internal projects	66	224	433
External projects	2294	2642	3221
TOTAL, EURO thousand	**3593**	**3987**	**4614**
Income, % of TOTAL			
Core allocation	34%	28%	21%
Internal projects	2%	6%	9%
External projects	64%	66%	70%
FTEs			
Scientific FTEs	38	40	45
Non-scientific FTEs	8	8	9
TOTAL	**46**	**48**	**55**

Table D2: FTEs by research group and years.

	2021	2022	2023	TOTAL over years	% of TOTAL ASA
FTEs by ASA RGs					
CAT	4,56	3,43	3,48	11,46	8%
EM	14,89	14,76	14,10	43,74	29%
NODES	16,00	16,60	20,73	53,33	36%
SYRR	8,34	10,60	12,55	31,49	21%
not in any RG	2,53	2,62	3,71	8,86	6%
TOTAL	**46,31**	**48,01**	**54,57**	**148,88**	

Appendix E ASA Projects

Table E1: Externally funded ASA projects. The table incudes all projects active during 2021-2023, including those, which started before 2021. When multiple several IIASA cost centers are involved, the lead cost center is marked with an asterisk (*). If an ASA cost center leads a project, the total amount earned is shown. For projects led by non-ASA cost centers, only the ASA portion of the budget is presented.

Project nickname	Project title	ASA host cost center	Start-End Year	Duration (M)	Project funder	All IIASA cost centers involved				Contracted amount, EURO	Project webpage
SAbERES	Land-use planning and financial innovation	EM	2023-2027	57	Federal Republic of Germany, represented by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (Germany)	EM				1 961 283	
ZFRA 2+	ZFRA 2+: Zurich Flood Resilience Alliance 2	NODES	2018-2024	84	Zurich Insurance Company Ltd (Switzerland)	NODES	SYRR*			1 375 000	https://iiasa.ac.at/projects/flood-resilience
OEMC	Open-Earth-Monitor Cyberinfrastructure	NODES	2022-2026	48	European Commission, European Research Executive Agency (Belgium)	NODES				1 107 125	https://iiasa.ac.at/projects/oemc
Urban ReLeaf	Citizen-powered data ecosystems for inclusive and green urban transitions	NODES	2023-2026	48	European Commission, DG European Research Council Executive Agency (ERCEA) (Belgium)	NODES				980 000	https://iiasa.ac.at/projects/urban-releaf-citizen-powered-data-ecosystems-for-inclusive-and-green-urban-transitions
LandSense	A Citizen Observatory and Innovation Marketplace for Land Use and Land Cover Monitoring	NODES	2016-2021	53	European Commission, DG Executive Agency for Small and Medium-sized Enterprises (EASME) (Belgium)	NODES				905 176	https://iiasa.ac.at/projects/landsense-citizen-observatory-and-innovation-marketplace-for-land-use-and-land-cover
ZCRA	Zurich Climate Resilience Alliance (ZCRA)	SYRR	2024-2027	48	Zurich Insurance Company Ltd (Switzerland)	SYRR				762 310	
GPLM	Global Pasture and Livestock Monitoring	NODES	2022-2025	29	Bezos Earth Fund (USA)	NODES				761 474	

RECEIPT	REmote Climate Effects and their Impact on European sustainability, Policy and Trade	SYRR	2019-2023	52	European Commission, DG Executive Agency for Small and Medium-sized Enterprises (EASME) (Belgium)	SYRR*	AFE	IBF		700 000	https://iiasa.ac.at/projects/receipt
PEOPLE	People-Centered Economic Modelling for Equitable Climate Policy	EM	2024-2027	48	Vienna Science and Technology Fund (WWTF) (Austria)	EM*	MDM			648 313	
PVN SRC2018	Platform Value Now: Value capturing in the fast emerging platform ecosystyem 2018-2021	CAT	2018-2021	40	Academy of Finland (Finland)	CAT				588 806	https://iiasa.ac.at/projects/platform-value-now
CLIMAAX	CLIMAte risk and vulnerability Assessment framework and toolboX	SYRR	2023-2027	48	European Commission, European Climate, Infrastructure and Environment Executive Agency (CINEA) (Belgium)	SYRR				561 250	https://iiasa.ac.at/projects/climaax
P2R	Pathways to Resilience	SYRR	2023-2027	60	European Commission, European Climate, Infrastructure and Environment Executive Agency (CINEA) (Belgium)	SYRR				500 938	https://iiasa.ac.at/projects/p2r
FABLE_FOLU2.0	FOLU 2.0 Strategy	EM	2021-2022	24	World Resources Institute (USA)	NODES	EM*	CAT		495 023	https://iiasa.ac.at/projects/fable
MYRIAD-EU	Multi-hazard and sYstemic framework for enhancing Risk-Informed mAnagement and Decision-making in the E.U.	SYRR	2021-2025	48	European Commission, Research Executive Agency (REA) (Belgium)	EM	SYRR*			490 050	https://iiasa.ac.at/projects/myriad-eu
FRAMEwork	Farmer clusters for Realising Agrobiodiversity Management across Ecosystems	NODES	2020-2025	60	European Commission, Research Executive Agency (REA) (Belgium)	NODES				482 500	https://iiasa.ac.at/projects/framework
TMon	Transparent Monitoring in Practice: supporting post-Paris land use sector mitigation	NODES	2021-2024	45	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) (Germany)	NODES				480 353	

RESCUE	Response of the Earth System to overshoot, Climate neUtrality and negative Emissions	EM	2022-2026	48	European Commission, European Climate, Infrastructure and Environment Executive Agency (CINEA) (Belgium)	EM*	IACC			465 375	https://iiasa.ac.at/projects/rescue
RESTORE +	Integrated Decision Support System to Address Restoration and Sustainable Agriculture on Degraded Land	NODES	2017-2023	82	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) (Germany)	NODES	AFE*	IBF		450 000	https://iiasa.ac.at/projects/restore-addressing-landscape-restoration-on-degraded-land-in-indonesia-and-brazil
GRANULAR	Giving Rural Actors Novel high-resolution data and Useable tools to Lead public Action in Rural areas	NODES	2022-2026	48	European Commission, Research Executive Agency (REA) (Belgium)	NODES*	IBF			437 563	https://iiasa.ac.at/projects/granular-better-knowledge-for-better-rural-policies
NEFM	Natural Ecosystems & Forest Management	NODES	2023-2025	23	World Resources Institute (USA)	NODES				427 800	
WorldCereal	ESA ITT Global Crop Mapping at Field Scale	NODES	2020-2026	78	European Space Agency (ESA) (France)	NODES				395 000	https://iiasa.ac.at/projects/worldcereal
ABM_topolicy	ABM_topolicy: Agent-based models to inform economic policies towards migration	EM	2019-2023	48	Austrian Science Fund (FWF) (Austria)	EM	EQU*			386 221	https://iiasa.ac.at/projects/agent-based-models-to-inform-economic-policies-on-migration-abm2policy
COMFORT	COMFORT: Our common future ocean – quantifying coupled cycles of carbon, oxygen, and nutrients for determining and achieving safe operating spaces with respect to tipping points	EM	2019-2023	48	European Commission, Executive Agency for Small and Medium-sized Enterprises (EASME) (Belgium)	EM				380 000	https://comfort.w.uib.no/
ERM	Medium Complexity Earth System Risk Management	EM	2019-2022	42	Austrian Science Fund (FWF) (Austria)	EM				367 359	https://iiasa.ac.at/projects/erm-medium-complexity-earth-system-risk-management
AGORA	A Gathering place to cO-design and co-cReate Adaptation	CAT	2023-2025	36	European Commission, European Climate, Infrastructure and Environment Executive Agency (CINEA) (Belgium)	CAT				364 375	https://iiasa.ac.at/projects/agora

IFBN 2	International Forest Biomass Network 2	NODES	2018-2024	74	European Space Agency (ESA) (Netherlands)	NODES*	AFE			359 828	
CORE	sCience and human factOr for Resilient sociEty	CAT	2021-2024	37	European Commission, DG European Research Council Executive Agency (ERCEA) (Belgium)	CAT				359 100	https://iiasa.ac.at/projects/core
RECREATE	RECREATE: Resource nexus for transformation to circular, resilient, and liveable cities in the context of climate change	SYRR	2019-2022	45	Austrian Research Promotion Agency (FFG) (Austria)	SYRR*	PM	EQU		340 000	https://iiasa.ac.at/projects/resource-nexus-for-transformation-to-circular-resilient-and-liveable-cities-in-context-of
MEDiate	Multi-hazard and risk informed system for Enhanced local and regional Disaster risk management	CAT	2022-2025	36	European Commission, Research Executive Agency (REA) (Belgium)	CAT				333 750	https://iiasa.ac.at/projects/mediate
ILUC-HCS	ILUC-HCS: Support for the implementation of the provisions on ILUC set out in the Renewable Energy Directive, Lot 1	NODES	2020-2023	44	European Commission, DG Environment (Belgium)	NODES	IBF			323 249	https://iiasa.ac.at/projects/iluc-hcs
Co-Inform	Co-Creating Misinformation-Resilient Societies	CAT	2018-2021	40	European Commission, Research Executive Agency (REA) (Belgium)	CAT				311 218	https://iiasa.ac.at/projects/co-inform
ENFORCE	Empower citizeNs to join Forces with public authORities in proteCting the Environment	NODES	2024-2028	48	European Commission, Research Executive Agency (REA) (Belgium)	NODES				296 875	
FABLE_FOLU2.0-A3	Food, Agriculture, Biodiversity, Land-Use, and Energy (FABLE) FOLU 2.0 (Amendment 003)	EM	2023-2023	12	World Resources Institute (USA)	NODES	EM*			295 348	https://iiasa.ac.at/models-tools-data/food-agriculture-biodiversity-land-and-energy-fable-scenathon
DECIPHER	Improved economic methods for decision-making on climate and environmental policies	SYRR	2022-2025	36	European Commission, European Climate, Infrastructure and Environment Executive Agency (CINEA) (Belgium)	SYRR				290 000	https://iiasa.ac.at/projects/decipher

EuropaBON	EuropaBON: Development of a European Biodiversity Observation Network (Europa BON) to integrate existing data streams and effectively monitor the status of Europe's ecosystems	NODES	2020-2024	42	European Commission, DG Executive Agency for Small and Medium-sized Enterprises (EASME) (Belgium)	NODES*	BEC			278 224	https://iiasa.ac.at/projects/europabon
PARATUS	Promoting disaster preparedness and resilience by co-developing stakeholder support tools for managing the systemic risk of compounding disasters	CAT	2022-2026	48	European Commission, Research Executive Agency (REA) (Belgium)	CAT				270 625	https://iiasa.ac.at/projects/paratus
EVOLAND	Evolution of Copernicus Land Monitoring Services	NODES	2023-2025	36	European Commission,European Health And Digital Executive Agency (HADEA) (Belgium)	NODES				267 375	
DIRECTED	Integrated Disaster Risk Reduction for extreme climate events: from early warning systems to long term adaptation and resilience building	SYRR	2022-2026	48	European Commission, Research Executive Agency (REA) (Belgium)	SYRR				258 750	https://iiasa.ac.at/projects/directed
E-SHAPE	EuroGEOSS Showcases: Applications Powered by Europe	NODES	2019-2023	48	European Commission, DG Executive Agency for Small and Medium-sized Enterprises (EASME) (Belgium)	NODES				258 550	https://iiasa.ac.at/projects/eurogeoss-showcases-applications-powered-by-europe-e-shape
Com-DPE	Applying Complexity Science to Modeling the Digital Platform Economy	ASA	2022-2024	22	Center for the Competition Policy Development and Protection Joint Stock Company (Kazakhstan)	ASA				255.000	
CROPS	Curating, Replicating, Orchestrating, and Propagating Citizen Science across Europe	NODES	2024-2027	48	European Commission, Research Executive Agency (REA) (Belgium)	NODES				253 750	
DigFaSt	Digital platforms, fair competition and sustainability	ASA	2020-2022	17	Higher School of Economics (HSE) (Russia)	ASA				250 000	

	transformations: Plausible futures										
W4.0	Macroeconomic Effects of Digitalisation in Austria	EM	2023-2027	48	Austrian National Bank, Anniversary Fund (OeNB) (Austria)	EM				249 000	
FutureGVC	Future pathways of global value chains and their impacts on Austria	EM	2024-2028	48	Austrian National Bank, Anniversary Fund (OeNB) (Austria)	EM				249 000	
MAGIC	Marginal lands for Growing Industrial Crops: Turning a burden into an opportunity	NODES	2017-2021	54	European Commission, Research Executive Agency (REA) (Belgium)	NODES*	IBF			230 000	
WorldCover ph.2	World Cover (Phase 2)	NODES	2020-2022	22	European Space Agency (ESA) (France)	NODES				228 204	https://iiasa.ac.at/projects/world-cover
FABLE_FOLU2.0-A4	Food, Agriculture, Biodiversity, Land-Use, and Energy (FABLE) FOLU 2.0 Amendment 004	EM	2024-2025	12	World Resources Institute (USA)	EM				223 524	
ZDSC	Delivering Incentives to End Deforestation: Global Ambition, Private/Public Finance, and Zero-Deforestation Supply Chains	EM	2016-2021	65	Environmental Defense Fund (EDF) (USA)	EM				203 008	https://previous.iiasa.ac.at/web/home/research/researchPrograms/EcosystemsServicesandManagement/NORAD_DITED.html
WeObserve	WeObserve: Coordinating citizen observatories across Europe	NODES	2017-2021	40	European Commission, DG Executive Agency for Small and Medium-sized Enterprises (EASME) (Belgium)	NODES				202 515	https://iiasa.ac.at/projects/weobserve-ecosystem-of-citizen-observatories-for-environmental-monitoring
LAMASUS	LAnd use and MAnagement modelling for SUStainable governance	NODES	2022-2026	48	European Commission, Research Executive Agency (REA) (Belgium)	NODES	BEC	AFE	IBF*	200 000	https://iiasa.ac.at/projects/lamasus
F-TRADEMARK	Food Trade Dependency under Climatic and Socio-Political Shocks–Measuring and	ASA	2025-2027	36	European Commission, Research Executive Agency (REA) (Belgium)	ASA				199 441	

	Managing Food Risk (F-TRADEMARK)										
Orbitas	Protecting forests by catalyzing corporate and financial reforms	EM	2020-2021	15	Norwegian Agency for Development Cooperation (NORAD) (Norway)	EM				192 403	https://www.norad.no/en/front/funding/climate-and-forest-initiative-support-scheme/grants-2013-2015/projects/protecting-forests-by-catalyzing-corporate-and-financial-reforms/
global_foodscapes	Phase II Foodscapes Science Research Program	EM	2022-2024	26	The Nature Conservancy (USA)	EM*	BEC			190 000	https://iiasa.ac.at/models-tools-data/foodscapes
Plant-FATE	Evolution of plant functional traits for drought resilience	EM	2019-2021	24	European Commission, Research Executive Agency (REA) (Belgium)	EM				186 167	https://iiasa.ac.at/projects/plant-fate
CMAF	A comprehensive method for medium-term analysis and forecasting (CMAF) of global monthly prices of agricultural commodities	EM	2024-2026	24	European Commission, DG Research Executive Agency (REA) (Belgium)	EM				183 601	
FNIT	Comprehensive Framework for Future of Water-Energy-Food Nexus and Socio-Environmental Issues in a Transboundary River Basin	ASA	2024-2026	24	European Commission, DG Research Executive Agency (REA) (Belgium)	ASA				183 601	
ITHACA	planned relocatIon as adapTation in a cHAnging ClimAte	SYRR	2022-2024	29	European Commission, Research Executive Agency (REA) (Belgium)	SYRR				174 167	https://iiasa.ac.at/projects/ithaca
MacroMode	Macroeconomic Modelling of Indirect Risks for Climate Risk Management	EM	2019-2022	32	Austrian Climate Research Program (ACRP) (Austria)	EM	SYRR			169 327	https://iiasa.ac.at/projects/macromode
NUNATARYUK	The effect of climate change on Arctic permafrost and its socio-economic impact, with a focus on coastal areas	EM	2017-2023	72	European Commission, DG Executive Agency for Small and Medium-sized Enterprises (EASME) (Belgium)	EM*	IBF			168 763	https://iiasa.ac.at/projects/nunataryuk

ESM2025	Earth System Models 2025	EM	2021-2025	48	European Commission, European Climate, Infrastructure and Environment Executive Agency (CINEA) (Belgium)	EM	ECE*			165 150	https://iiasa.ac.at/projects/esm2025
GlobalShield	Supporting Fiscal resilience against Climate Hazards in Developing Countries from the Global Shield	SYRR	2023-2024	12	Frankfurt School of Finance & Management (Germany)	SYRR				159 889	
CHOICE	Mainstreaming Integrated Assessment Models by embedding behavioural change and actor heterogeneity, and increasing their outreach to citizens, communities and industrial actors	NODES	2023-2026	36	European Commission, European Climate, Infrastructure and Environment Executive Agency (CINEA) (Belgium)	NODES	IBF*			154 250	
Global Landscap	Global Landscapes: RFS-IIASA Rapid Spatial Analysis	EM	2020-2021	11	The Nature Conservancy (USA)	EM*	BEC	AFE		150 000	https://iiasa.ac.at/projects/global-landscapes-rfs-iiasa-rapid-spatial-analysis
PPP	The Picture Pile Platform	NODES	2021-2023	24	European Commission, European Research Council Executive Agency (ERCEA) (Belgium)	NODES				150 000	https://iiasa.ac.at/projects/picture-pile-platform
PETRA	The role of persistence in tackling Austria's climate target: Policies for the transport sector	EM	2019-2022	27	Austrian Climate Research Program (ACRP) (Austria)	EM				148 517	https://iiasa.ac.at/projects/petra-role-of-persistence-in-tackling-austrias-climate-target-policies-for-transport
SRM	The option value of solar radiation management in climate risk management	EM	2023-2024	18	The Grantham Foundation (United Kingdom)	EM				147 000	
GEOEssential	GEOEssential / ERA-PLANET	NODES	2017-2021	48	European Commission, DG Research and Innovation (Belgium)	NODES				142 148	
CAMALIOT	Application of machine learning technology for GNSS IoT data fusion	NODES	2021-2022	20	European Space Agency (ESA) (Netherlands)	NODES				139 681	https://iiasa.ac.at/projects/camaliot

eu-citizen.sci	eu-citizen.science	NODES	2019-2021	36	European Commission, Research Executive Agency (REA) (Belgium)	NODES				139 000	
FABLE-FAO	Technical and science-policy engagement services to support country development of sustainable food and land use pathways	EM	2023-2024	13	Food and Agriculture Organization of the United Nations (FAO) (Italy)	EM				126 865	
SATFARM	Identifying drivers of Cropland yield stress with high resolution in-situ and Satellite data in Austria	NODES	2020-2022	27	Austrian Research Promotion Agency (FFG) (Austria)	NODES				124 596	https://iiasa.ac.at/projects/satfarm-services
COACCH	CO-designing the Assessment of Climate CHange costs	SYRR	2017-2021	48	European Commission, DG Executive Agency for Small and Medium-sized Enterprises (EASME) (Belgium)	SYRR	AFE	IBF*		113 750	https://iiasa.ac.at/projects/coacch
PHOENIX	Resilience to Socio-environmental Global Challenges	SYRR	2023-2023	7	Austrian Science Fund (FWF) (Austria)	ASA	SYRR			113.561	https://iiasa.ac.at/projects/phoenix
Crowd2Train	Automatically generating agricultural ground reference training data using crowd sourcing and citizen science	NODES	2020-2022	26	European Space Agency (ESA) (Italy)	NODES				109.804	
YOMA support	UNICEF-Yoma Operational Research	NODES	2022-2024	24	Botnar Foundation (Switzerland)	NODES				109 000	https://iiasa.ac.at/projects/yoma-or-project
C4C	Citizens for Copernicus – Combing Copernicus and Crowdsource data for Forest Resources Monitoring	NODES	2023-2026	36	Austrian Research Promotion Agency (FFG) (Austria)	NODES				104 919	https://iiasa.ac.at/projects/c4c
PF-Paths	Integrating permafrost into our global solution for climate change	EM	2024-2027	36	Woodwell Climate Research Center (USA)	EM				99 700	
RapidAI4EO	Advancing the state-of-the-art for continuous land monitoring	NODES	2021-2023	27	European Commission, Research Executive Agency (REA) (Belgium)	NODES				96 375	https://iiasa.ac.at/projects/rapidai4eo

SPARCCLE	Socioeconomic Pathways, Adaptation and Resilience to Changing CLimate in Europe	SYRR	2023-2027	42	European Commission, European Climate, Infrastructure and Environment Executive Agency (CINEA) (Belgium)	SYRR	IBF	IACC*	MDM	94 313	https://iiasa.ac.at/projects/sparccle
IRM	Resilience impact of smart support for CDRFI and implied policy recommendations	SYRR	2022-2023	22	Frankfurt School of Finance & Management (Germany)	SYRR				90 090	https://iiasa.ac.at/projects/smartsupport
NDI Think-Tank	NDI Think-Tank: Development of think tank functions of the Northern Dimension Institute	ASA	2019-2022	42	European Commission, DG for Neighbourhood and Enlargement Negotiations (NEAR) (Belgium)	ASA	CAT			85 375	https://iiasa.ac.at/projects/emerging-trade-routes-between-europe-and-asia
AgroServ2.0	Effects of deforestation-driven changes in extreme heat and precipitation on the Brazilian land economy - an integrated assessment	EM	2022-2022	6	Gordon and Betty Moore Foundation (USA)	EM				82 200	
EconTrans	Embedding climate policies into deep economic transformations	EM	2018-2021	34	Austrian Climate Research Program (ACRP) (Austria)	EM*	EQU			81 332	https://iiasa.ac.at/projects/econtrans
EYE-CLIMA	Observation-based approach for vErifYing Emissions of CLIMAte forcers	NODES	2023-2026	48	European Commission, European Climate, Infrastructure and Environment Executive Agency (CINEA) (Belgium)	NODES	AFE	PM*		80 120	https://iiasa.ac.at/projects/eye-clima
China_soy market	Investigating China's soy market vulnerability to deforestation induced price and price volatility shocks	EM	2020-2021	13	Gordon and Betty Moore Foundation (USA)	EM				80.000	
SOCCA	Soils for Climate Change adapted Agriculture	NODES	2020-2023	36	NÖ Forschungs- und Bildungsges.m.b.H. (NFB) (Austria)	NODES				79 858	
CaMEA	CaMEA: Towards Carbon Market in Eurasia	ASA	2022-2023	13	Center for the Competition Policy Development and Protection Joint Stock Company (Kazakhstan)	ASA				75 000	

EcoAntitrust 23	EcoAntitrust 23: Applying an Ecological Approach to Competition Regulation of Digital Platform Ecosystems	ASA	2023-2024	15	Center for the Competition Policy Development and Protection Joint Stock Company (Kazakhstan)	ASA				75 000	
CAMEA23	Carbon Farming in Kazakhstan: Unlocking the Potential	ASA	2023-2024	14	Center for the Competition Policy Development and Protection Joint Stock Company (Kazakhstan)	ASA				75 000	
TransBuild	Creating incentives for deep transformative changes in the building sector	EM	2023-2026	36	Austrian Climate Research Program (ACRP) (Austria)	EM				73 996	
BIOCLIMAPATHS	Assessing cross-sectoral impacts and socio-economic resilience in bioeconomy-aligned pathways subject to climate risks	EM	2019-2022	36	Austrian Research Promotion Agency (FFG) (Austria)	EM				67 275	https://iiasa.ac.at/projects/bioclimapaths
MFRBED	Study for a methodological framework and assessment of potential financial risks associated with biodiversity loss and ecosystem degradation	EM	2022-2024	14	European Commission, DG Environment (Belgium)	EM				65 007	
INFLA	Distributional implications of a high inflation, high interest rate environment	EM	2024-2026	24	Austrian Academy of Sciences (ÖAW) (Austria)	EM				64 000	
SEBS	Sentinel Economic Benefits Study	EM	2017-2024	89	European Association of Remote Sensing (EARSC) (Belgium)	EM				60 073	https://iiasa.ac.at/projects/sebs
InfraNorth	Global Economics and Geopolitics of Arctic Transport Infrastructures	CAT	2021-2024	36	European Research Council Executive Agency (ERCEA) (Belgium)	CAT				60 000	https://iiasa.ac.at/projects/infranorth

RGEE-ETH	RGEE: Remote Sensing for Ecology and Conservation: using technology to support restoration projects	NODES	2021-2021	9	ETH Zürich (Switzerland)	NODES				53 194	
CONSTRAIN	Constraining uncertainty of multi decadal climate projections	EM	2019-2023	54	European Commission, DG Executive Agency for Small and Medium-sized Enterprises (EASME) (Belgium)	EM				52 745	https://iiasa.ac.at/projects/constrain
Eco-FAn	Developing Digital Ecosystems Sustainably: Ecological Foundations of Antitrust	ASA	2021-2022	13	Higher School of Economics (HSE) (Russia)	ASA				50 815	
CCI BIOMASS	CCI+ BIOMASS PHASE I, II	NODES	2018-2021	36	European Space Agency (ESA) (United Kingdom)	NODES*	AFE			50 045	
ZEAFOLU	Exploring Low Carbon Futures: Achieving Zero Emissions From Agriculture, Forestry and Other Land Use in Eisenwurzen And Beyond	EM	2017-2021	49	Austrian Academy of Sciences (ÖAW) (Austria)	EM	EQU*			50 000	https://iiasa.ac.at/projects/zero-emissions-from-agriculture-forestry-and-other-land-use-in-eisenwurzen-and-beyond
ENVINEQUE	ENVINEQUE: An Empirical analysis environmental inequality in the EU	EM	2019-2022	40	Austrian Science Fund (FWF) (Austria)	EM				49 553	https://iiasa.ac.at/projects/empirical-analysis-of-environmental-inequality-in-eu-envinequ
MUSE	MUltisource data package tools and SErvices	NODES	2022-2023	18	European Space Agency (ESA) (France)	NODES				48.000	
Helmets LabCrops	Helmets Labeling Crops	NODES	2021-2023	21	The Meridian Institute (USA)	NODES				46 161	
IRP_assessment	Sciency-policy Interface in Support of Resource Efficiency: The International Resource Panel	EM	2022-2023	21	United Nations Environmental Programme (UNEP) (Kenya)	EM				44 735	
GreenFin	Scaling-up green finance to achieve the climate and energy targets: an assessment of macro-financial opportunities and challenges for Austria	EM	2019-2021	22	Austrian Climate Research Program (ACRP) (Austria)	EM				44 649	https://iiasa.ac.at/projects/greenfin

SimSAEV	Simulating the environmental and socio-economic effects of shared Autonomous Electric Vehicles: the case of Vienna	EM	2018-2021	42	Austrian Climate Research Program (ACRP) (Austria)	EM				43 649	https://iiasa.ac.at/projects/simsaev
ArctiC MaPS	Mitigating the Global Threat from Thawing Permafrost: the Arctic Carbon Monitoring and Prediction System	EM	2021-2024	36	Quadrature Climate Foundation (QCF (United Kingdom)	EM				41 315	
CLOUD4GEO	(Digitale) Forschungsinfrastrukturen	NODES	2023-2026	42	Federal Ministry for Education, Science and Research (BMBWF) (Austria)	NODES				40 000	
ISC-MOSci	Contribution to the ISC coordinated initiative Unleashing Science: Delivering Missions for Sustainability	ASA	2022-2022	8	International Science Council (France)	ASA				35 000	
SOFA2024	State of Food and Agriculture 2024	EM	2023-2024	6	Food and Agriculture Organization of the United Nations (FAO) (Italy)	EM				33 000	
CCI BIOMASS 2	CCI Biomass Phase 2	NODES	2022-2025	36	European Space Agency (ESA) (France)	NODES				32 500	
DGTWIN	DGTWIN: The Digital Twin Earth Precursors	EM	2020-2021	13	European Space Agency (ESA) (Italy)	NODES	EM*			31 998	
CS4SDGs	Citizen Science for the SDGs	NODES	2020-2021	20	UN Sustainable Development Solutions Network (SDSN Association) (USA)	NODES				30 000	
DIoD	DIoD: Monetary and Distributional Implications of Climate-related Disasters - A macroeconomic assessment	EM	2021-2024	42	Austrian National Bank, Anniversary Fund (OeNB) (Austria)	EM	WAT	EQU*		28 139	https://iiasa.ac.at/projects/diod
PostHarvestColl	PostHarvestColl: Pilot for Alternative Data Collection for APHLIS using PhotoQuest	NODES	2020-2022	28	Bill and Melinda Gates Foundation (BMGF) (USA)	NODES				26 559	

CS-SDG-Health	Citizen Science and Health related SDG-indicators	NODES	2021-2021	1	World Health Organization (WHO) (Malaysia)	NODES				22 111	
IKI_MX_prep	Land-use planning and financial innovation to increase Mexico's resilience to climate change	EM	2021-2021	8	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) (Germany)	EM				21 355	
CS4SDG 2.0	Citizen Science for the SDGs 2.0	NODES	2022-2023	8	Sustainable Development Solutions Network (SDSNA) (USA)	NODES				20 000	
HDR-AGENCY	HDR-AGENCY: Background Paper for the 2023 Human Development Report	ASA	2023-2023	5	United Nations Development Programme (UNDP) (USA)	ASA				20 000	
Restor	Restor: Remote Sensing for Restoration: using technology to support restoration monitoring	NODES	2021-2022	5	Restor Eco AG (Switzerland)	NODES				19 066	
Resilient_FoodSys	Building resilient development paths in the wake of Covid-19: A review of concepts and their applications with specific focus on food systems	SYRR	2022-2022	5	World Resources Institute (USA)	SYRR				18 028	
SA-EOW-FIN	Systems analysis support for the Economy of Well-being Steering System	CAT	2023-2023	5	Finnish Institute for Health and Welfare (Finland)	CAT				16 023	
GEOID	Expert support GEOID consortium	NODES	2023-2024	4	European Environment Agency (Denmark)	NODES				14 994	
PovertyMapping3	Poverty, demography and hunger mapping collaboration with World Data Lab, Vienna	NODES	2020-2021	12	World Data Lab (Austria)	NODES				12 500	
ARA Climate Risk	ARA Climate Risk: Participation in Adaptation Research Alliance (ARA) shared learning process on climate risk	SYRR	2022-2022	0	International Institute for Environment and Development (IIED) (United Kingdom)	SYRR				3 000	

Table E2: ASA projects funded by IIASA. The table incudes all projects active during 2021-2023, including those, which started before 2021. When multiple several IIASA cost centers are involved, the lead cost center is marked with an asterisk (*). If an ASA cost center leads a project, the total amount earned is shown. For projects led by non-ASA cost centers, only the ASA portion of the budget is presented.

Project nickname	Project title	ASA host cost center	Start-End Year	Duration (M)	Project funder	All IIASA cost centers involved				Contracted amount, EURO	Project webpage
TRUST (Science)	Tools for Raising and UnderStanding Trust in systems science through citizen engagement	SYRR	2022-2025	36	IIASA (Austria)	SYRR*	NODES	EQU	PM/S3	360 000	https://iiasa.ac.at/projects/trust
IIASA-NASU	Integrated modeling for robust management of food-energy-water-environmental-social nexus security and sustainable development	CAT	2022-2027	60	IIASA (Austria)	CAT				300 000	https://iiasa.ac.at/projects/integrated-modeling-for-robust-management-of-food-energy-water-land-use-nexus-security-and
TwR 2023	Transformation within Reach	ASA	2023-2023	12	IIASA (Austria)	ASA				143 990	
ISC_ phase2	Critical societal transformations for a sustainable world	ASA	2021-2023	15	IIASA (Austria)	ASA				86 010	
CSGP	Citizen Science Global Partnership	NODES	2020-2025	60	IIASA (Austria)	NODES				30 000	
RFBR-Methods	Methods for intelligent risk analysis and multi-criteria assessment of the effectiveness of COVID-19 counteraction using a combined approach to identifying the dynamics model	CAT	2021-2023	24	IIASA (Austria)	CAT				25 000	https://previous.iiasa.ac.at/web/home/about/210205-IIASA-RFBR-pandemic-research.html
IBGF-PZ	How to share burdens of climate action	EM	2022-2023	7	IIASA (Austria)	EM				25 000	

	fairly? Mapping a space of fair policy options with use of policy-optimization models										
IBGF-DG	Extending the numerical continuation framework for the identification and analysis of structural changes in a general class of dynamic optimization problems	EM	2022-2022	7	IIASA (Austria)	EM				25 000	
IBGF-AB	Systems Science for Peace: Research and Coordination	NODES	2023-2023	6	IIASA (Austria)	NODES				25 000	
IBGF-MW	Data Pooling in the Data Economy	EM	2023-2023	12	IIASA (Austria)	EM				25 000	
IBGF-JB	Robust policies for a deep carbon removal economy	EM	2023-2023	12	IIASA (Austria)	EM				25 000	
IBGF-GS	Advancing the quantification and attribution of land carbon cycle fluxes	EM	2023-2023	7	IIASA (Austria)	EM				25 000	
IBGF-TG	Upgrade of the OSCAR model in anticipation of FastMIP and CMIP7	EM	2024-2024	9	IIASA (Austria)	EM				24 243	
IBGF-PZ 23	Fairness in model-informed sustainable management of natural resources	EM	2023-2023	5	IIASA (Austria)	EM				22 208	
DataPhos	Data modeling for world phosphate production chains	EM	2023-2023	4	IIASA (Austria)	EM				19 166	

Appendix F ASA Publications

Table F1: Most frequent journals for ASA publications (data obtained on 31.05.2024).

Journal	# of papers co-authored by ASA researchers (since 2021)
Environmental Research Letters	11
International Journal of Disaster Risk Reduction	10
Sustainability	10
Scientific Data	9
Sustainability Science	8
Scientific Reports	8
Climate Risk Management	7
Frontiers in Public Health	7
Journal of Cleaner Production	7
Nature	7
Lecture Notes in Computer Science	6
One Earth	6
Proceedings of the National Academy of Sciences of the United States of America	6
Ecological Modelling	5
Journal of Environmental Management	5
Land	5
Nature Communications	5
Nature Food	5
PLoS ONE	5
Earth's Future	5
Current Research in Environmental Sustainability	4
Earth System Science Data	4
Energy Research and Social Science	4
Environment and Planning B: Urban Analytics and City Science	4
Environmental Science and Policy	4
Global Change Biology	4
Journal of Financial Stability	4
Nature Ecology and Evolution	4
Nature Sustainability	4
Regional Environmental Change	4
Remote Sensing of Environment	4
Science of the Total Environment	4
Risk Analysis	4

Table F2: ASA articles in peer-reviewed journals sorted by citations (data obtained on 31.05.2024). The full and up-to-date list of ASA publications can be found here.

#	Title	Journal	Number of citations	Year	Affiliated CC	IIASA Co-authors (other co-authors are omitted)
1	Global Carbon Budget 2021	Earth System Science Data	666	2022	ASA, EM, ECE, IACC	Gasser, Thomas
2	Global Carbon Budget 2022	Earth System Science Data	519	2022	ASA, EM, ECE, IACC	Gasser, Thomas
3	Climate impacts on global agriculture emerge earlier in new generation of climate and crop models	Nature Food	272	2021	EM, BNR, AFE, ASA	Balkovic, Juraj; Folberth, Christian; Khabarov, Nikolay; Skalsky, Rastislav
4	Can N2 O emissions offset the benefits from soil organic carbon storage?	Global Change Biology	177	2021	ASA, EM, BNR, IBF	Frank, Stefan; Obersteiner, Michael; Valin, Hugo
5	Areas of global importance for conserving terrestrial biodiversity, carbon and water	Nature Ecology and Evolution	146	2021	ASA, EM, NODES, BNR, BEC, SI	Jung, Martin; Lewis, Matthew; Shchepashchenko, Dmitry; Lesiv, Myroslava; Fritz, Steffen; Obersteiner, Michael; Visconti, Piero
6	National growth dynamics of wind and solar power compared to the growth required for global climate targets	Nature Energy	145	2021	ASA, CAT	Jewell, Jessica
7	Intergenerational inequities in exposure to climate extremes	Science	142	2021	ASA, EM, BNR, IBF, WAT, ECE, IACC, TISS	Rogelj, Joeri; Zhao, Fang; Chang, Jinfeng; Khabarov, Nikolay; Lutz, Wolfgang; Wada, Yoshihide
8	Pandemic, War, and Global Energy Transitions	Energies	129	2022	ASA, NODES, ECE, IACC, S3, TISS, POPJUS, EQU, SI	Zakeri, Behnam; Gomez Echeverri, Luis; Pachauri, Shonali; Boza-Kiss, Benigna ; Zimm, Caroline; Rogelj, Joeri; Fritz, Steffen; McCollum, David; Srivastava, Leena; Hunt, Julian
9	China's future food demand and its implications for trade and environment	Nature Sustainability	117	2021	ASA, EM, BNR, IBF, YSSP	Zhao, Hao; Chang, Jinfeng; Havlík, Petr; van Dijk, Michiel; Valin, Hugo; Janssens , Charlotte; Obersteiner, Michael
10	Climate warming from managed grasslands cancels the cooling effect of carbon sinks in sparsely grazed and natural grasslands	Nature Communications	114	2021	ASA, EM, BNR, IBF, ECE, IACC	Chang, Jinfeng; Gasser, Thomas; Havlík, Petr; Obersteiner, Michael
11	Citizen science in environmental and ecological sciences	Nature Reviews Methods Primers	91	2022	ASA, NODES	Fraisl, Dilek; Hager, Gerid
12	The number of tree species on Earth	Proceedings of the National Academy of Sciences of the United States of America	90	2022	NODES, BNR, AFE, ASA	Shchepashchenko, Dmitry
13	Operationalizing the net-negative carbon economy	Nature	82	2021	ASA, EM, ECE, PM, TISS	Bednar, Johannes; Obersteiner, Michael; Baklanov, Artem; Wagner, Fabian; Geden, Oliver
14	Plausible energy demand patterns in a growing global economy with climate policy	Nature Climate Change	81	2021	ASA, SYRR, POPJUS, EQU	Rezai, Armon

15	Surge in global metal mining threatens vulnerable ecosystems	Global Environmental Change	75	2021	ASA, NODES	Maus, Victor
16	Empirical estimates of regional carbon budgets imply reduced global soil heterotrophic respiration	National Science Review	73	2021	ASA, EM, BNR, AFE, ECE, IACC	Gasser, Thomas; Shvidenko, Anatoly
17	The effects of indoor air pollution from solid fuel use on cognitive function among middle-aged and older population in China	Science of the Total Environment	71	2021	ASA, CAT	Luo, Yanan
18	Recent advances and future research in ecological stoichiometry	Perspectives in Plant Ecology, Evolution and Systematics	62	2021	ASA, EM	Obersteiner, Michael
19	Climate Sentiments, Transition Risk, and Financial Stability in a Stock-Flow Consistent Model	Journal of Financial Stability	61	2021	ASA, EM	Naqvi, Asjad
20	Eco-evolutionary optimality as a means to improve vegetation and land-surface models	New Phytologist	56	2021	ASA, EM, SYRR, BNR, AFE	Franklin, Oskar; Brännström, Åke; Dieckmann, Ulf; Joshi, Jaideep; Pietsch, Stephan
21	Empirical support for the biogeochemical niche hypothesis in forest trees	Nature Ecology and Evolution	53	2021	ASA, EM	Obersteiner, Michael
22	Contours of citizen science: a vignette study	Royal Society Open Science	53	2021	ASA, NODES	Fraisl, Dilek; Hager, Gerid
23	Transferring awareness into action: A meta-analysis of the behavioral drivers of energy transitions in Germany, Austria, Finland, Morocco, Jordan and Iran	Energy Research and Social Science	50	2021	ASA, CAT	Komendantova, Nadejda
24	The optimal lockdown intensity for COVID-19	Journal of Mathematical Economics	50	2021	ASA, EM, POPJUS, SHAW	Grass, Dieter; Feichtinger, Gustav; Fürnkranz-Prskawetz, Alexia
25	A map of the extent and year of detection of oil palm plantations in Indonesia, Malaysia and Thailand	Scientific Data	50	2021	ASA, BNR	Danylo, Olga; Pirker, Johannes; See, Linda; McCallum, Ian; Hadi, Hadi; Kraxner, Florian; Fritz, Steffen
26	A comprehensive framework for assessing the accuracy and uncertainty of global above-ground biomass maps	Remote Sensing of Environment	50	2022	BNR, AFE, NODES	Shchepashchenko, Dmitry
27	Quantification of systemic risk from overlapping portfolios in the financial system	Journal of Financial Stability	49	2021	ASA, EM	Poledna, Sebastian; Thurner, Stefan
28	National contributions to climate change due to historical emissions of carbon dioxide, methane, and nitrous oxide since 1850	Scientific Data	49	2023	ASA, EM, ECE, IACC	Gasser, Thomas
29	Reconciling regional nitrogen boundaries with global food security	Nature Food	48	2021	ASA, EM, BNR, IBF	Chang, Jinfeng; Havlík, Petr; Leclere, David; Valin, Hugo; Deppermann, Andre; Obersteiner, Michael
30	Russian forest sequesters substantially more carbon than previously reported	Scientific Reports	46	2021	ASA, NODES, BNR, AFE, SI	Shchepashchenko, Dmitry; See, Linda; Shvidenko, Anatoly; Lesiv, Myroslava; Fritz, Steffen; Kraxner, Florian
31	Leveling the cost and carbon footprint of circular polymers that are chemically recycled to monomer	Science Advances	45	2021	ASA, SYRR	Vora, Nemi
32	Delayed use of bioenergy crops might threaten climate and food security	Nature	45	2022	ASA, EM, ECE, IACC	Gasser, Thomas
33	Factors affecting smallholder farmers' technical and non-technical adaptation responses to drought in Iran	Journal of Environmental Management	43	2021	ASA, CAT	Yazdanpanah, Masoud; Komendantova, Nadejda

34	Towards operational validation of annual global land cover maps	Remote Sensing of Environment	40	2021	ASA, NODES, SI	Lesiv, Myroslava; Fritz, Steffen
35	An update on global mining land use	Scientific Data	38	2022	ASA, NODES	Maus, Victor; McCallum, Ian
36	Liquefied natural gas expansion plans in Germany: The risk of gas lock-in under energy transitions	Energy Research and Social Science	37	2021	ASA, CAT	Jewell, Jessica
37	Criticality analysis of a country's transport network via an agent-based supply chain model	Nature Sustainability	37	2021	ASA, EM	Colon, Celian
38	1.6 Million transactions replicate distributed PV market slowdown by COVID-19 lockdown	Applied Energy	36	2021	ASA, EM	Obersteiner, Michael
39	Towards a unified theory of plant photosynthesis and hydraulics	Nature Plants	36	2022	ASA, CAT, EM, SYRR, BNR, BEC	Joshi, Jaideep; Hofhansl, Florian; Dieckmann, Ulf
40	Global Carbon Budget 2023	Earth System Science Data	36	2023	ASA, EM, ECE, IACC	Gasser, Thomas
41	Understanding and modelling wildfire regimes: an ecological perspective	Environmental Research Letters	35	2021	ASA, EM	Joshi, Jaideep
42	Meeting well-below 2°C target would increase energy sector jobs globally	One Earth	34	2021	ASA, CAT	Jewell, Jessica
43	Siberian carbon sink reduced by forest disturbances	Nature Geoscience	34	2023	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry
44	Reduced Complexity Model Intercomparison Project Phase 2: Synthesizing Earth System Knowledge for Probabilistic Climate Projections	Earth's Future	33	2021	ASA, EM, ECE, IACC, TISS	Gasser, Thomas; Quilcaille, Yann; Rogelj, Joeri; Smith, Chris
45	Global forest management data for 2015 at a 100 m resolution	Scientific Data	33	2022	ASA, EM, NODES, BNR, AFE, BEC, IBF, SI	Lesiv, Myroslava; Shchepashchenko, Dmitry; See, Linda; Dürauer, Martina; Georgieva, Ivelina; Jung, Martin; Hofhansl, Florian; Pietsch, Stephan; Kim, Moonil; Di Fulvio, Fulvio; Kraxner, Florian; Visconti, Piero; McCallum, Ian; Obersteiner, Michael; Fritz, Steffen
46	Indicate separate contributions of long-lived and short-lived greenhouse gases in emission targets	npj Climate and Atmospheric Science	33	2022	ASA, EM, ECE, IACC, TISS	Gasser, Thomas; Rogelj, Joeri
47	Historical precedents and feasibility of rapid coal and gas decline required for the 1.5°C target	One Earth	31	2021	ASA, CAT	Jewell, Jessica
48	Time series analysis for global land cover change monitoring: A comparison across sensors	Remote Sensing of Environment	31	2022	ASA, NODES, SI	Lesiv, Myroslava; Fritz, Steffen
49	A pantropical assessment of deforestation caused by industrial mining	Proceedings of the National Academy of Sciences of the United States of America	30	2022	ASA, NODES	Maus, Victor
50	Perspectives on transformational change in climate risk management and adaptation	Environmental Research Letters	28	2021	ASA, SYRR	Deubelli-Hwang, Teresa; Mechler, Reinhard
51	Social media as a driver of the use of renewable energy: The perceptions of instagram users in Iran	Energy Policy	28	2022	CAT, YSSP, ASA	Zobeidi, Tahereh; Komendantova, Nadejda; Yazdanpanah, Masoud
52	What causes spatial carbon inequality? Evidence from China's Yangtze River economic Belt	Ecological Indicators	27	2021	ASA, SYRR, ECE, S3, TISS	Kharrazi, Ali; Ma, Tieju

53	Promoting Public Awareness of Carbon Capture and Storage Technologies in the Russian Federation: A System of Educational Activities	Energies	27	2021	ASA, CAT	Komendantova, Nadejda
54	Systemic-risk-efficient asset allocations: Minimization of systemic risk as a network optimization problem	Journal of Financial Stability	27	2021	ASA, EM	Pichler, Anton; Poledna, Sebastian; Thurner, Stefan
55	Lessons from COVID-19 for managing transboundary climate risks and building resilience	Climate Risk Management	27	2022	ASA, SYRR, BNR, WAT, POPJUS, EQU	Magnuszewski, Piotr; Gaupp, Franziska; Mechler, Reinhard
56	Business recovery from disasters: Lessons from natural hazards and the COVID-19 pandemic	International Journal of Disaster Risk Reduction	27	2022	ASA, SYRR, POPJUS, EQU	Handmer, John; Keating, Adriana
57	Invited perspectives: A research agenda towards disaster risk management pathways in multi-(hazard-)risk assessment	Natural Hazards and Earth System Sciences	27	2022	ASA, SYRR	Hochrainer-Stigler, Stefan
58	Global land characterisation using land cover fractions at 100 m resolution	Remote Sensing of Environment	26	2021	ASA, NODES	Lesiv, Myroslava
59	Respiration of Russian soils: climatic drivers and response to climate change	Science of the Total Environment	26	2021	ASA, EM, NODES, BNR, AFE	Mukhortova, Liudmila; Shchepashchenko, Dmitry; Shvidenko, Anatoly; Khabarov, Nikolay; See, Linda
60	Co-limitation towards lower latitudes shapes global forest diversity gradients	Nature Ecology and Evolution	26	2022	ASA, NODES, BNR, AFE	Kraxner, Florian; Shchepashchenko, Dmitry; Shvidenko, Anatoly
61	Diagnosing destabilization risk in global land carbon sinks	Nature	25	2023	ASA, EM	Obersteiner, Michael
62	De-risking of green investments through a green bond market – Empirics and a dynamic model	Journal of Economic Dynamics and Control	24	2021	ASA, EM	Grass, Dieter
63	Alternative futures for global biological invasions	Sustainability Science	24	2021	ASA, EM	Obersteiner, Michael
64	Failing the formative phase: The global diffusion of nuclear power is limited by national markets	Energy Research and Social Science	22	2021	ASA, CAT, ECE, TISS	Brutschin, Elina; Jewell, Jessica
65	COVID-19 Conspiracy Theories Discussion on Twitter	Social Media and Society	22	2022	ASA, CAT	Erokhin, Dmitry; Komendantova, Nadejda
66	Approaches to Assessing the Strategic Sustainability of High-Risk Offshore Oil and Gas Projects	Journal of Marine Science and Engineering	21	2022	ASA, CAT	Komendantova, Nadejda
67	Estimating global economic well-being with unlit settlements	Nature Communications	21	2022	SI, ASA, NODES, ECE, TISS	McCallum, Ian; Laso Bayas, Juan Carlos; Pachauri, Shonali; See, Linda; Danylo, Olga; Moorthy, Inian; Lesiv, Myroslava; Hofer, Martin; Fritz, Steffen
68	Strong regional influence of climatic forcing datasets on global crop model ensembles	Agricultural and Forest Meteorology	20	2021	ASA, EM, BNR, AFE	Balkovic, Juraj; Folberth, Christian; Khabarov, Nikolay
69	Global red and processed meat trade and non-communicable diseases	BMJ Global Health	20	2021	ASA	Li, Yingjie
70	Research progress and hotspot analysis for reactive nitrogen flows in macroscopic systems based on a CiteSpace analysis	Ecological Modelling	20	2021	ASA, SYRR	Fath, Brian
71	Navigating authority and legitimacy when 'outsider' volunteers co-produce emergency management services	Environmental Hazards	20	2021	POPJUS, EQU, ASA, SYRR	Handmer, John

72	What drives reindeer management in Finland towards social and ecological tipping points?	Regional Environmental Change	20	2021	ASA, CAT, SYRR	Landauer, Mia
73	A perspective on the role of uncertainty in sustainability science and engineering	Resources, Conservation and Recycling	20	2021	ASA, SYRR	Fath, Brian
74	Economic forecasting with an agent-based model	European Economic Review	20	2022	ASA, EM	Poledna, Sebastian
75	Tropical peat subsidence rates are related to decadal LULC changes: Insights from InSAR analysis	Science of the Total Environment	20	2022	ASA, SYRR	Kharrazi, Ali
76	A state-of-the-art decision-support environment for risk-sensitive and pro-poor urban planning and design in Tomorrow's cities	International Journal of Disaster Risk Reduction	20	2023	ASA, SYRR	Sakic Trogrlic, Robert
77	Addressing the human cost in a changing climate	Science	19	2021	ASA, SYRR	Hochrainer-Stigler, Stefan; Mechler, Reinhard
78	Conserving the Cerrado and Amazon biomes of Brazil protects the soy economy from damaging warming	World Development	19	2021	ASA, EM, BNR, IBF	Soterroni, Aline; Valin, Hugo; Obersteiner, Michael
79	Promoting the adoption of residential water conservation behaviors as a preventive policy to sustainable urban water management	Journal of Environmental Management	19	2022	ASA, YSSP, CAT	Zobeidi, Tahereh
80	Public attitudes, co-production and polycentric governance in energy policy	Energy Policy	18	2021	ASA, CAT	Komendantova, Nadejda
81	Gathering support for green tax reform: Evidence from German household surveys	European Economic Review	18	2022	ASA, SYRR, POPJUS, EQU	Rezai, Armon
82	The spatio-temporal dynamics of urban resilience in China's capital cities	Journal of Cleaner Production	18	2022	ASA, SYRR	Fath, Brian
83	Exploring the integration of local and scientific knowledge in early warning systems for disaster risk reduction: a review	Natural Hazards	18	2022	ASA, SYRR	Sakic Trogrlic, Robert
84	Influences of international agricultural trade on the global phosphorus cycle and its associated issues	Global Environmental Change	17	2021	ASA, EM	Obersteiner, Michael
85	Decoupling trends of emissions across EU regions and the role of environmental policies	Journal of Cleaner Production	17	2021	ASA, EM	Naqvi, Asjad
86	Strategic decision-support modeling for robust management of the food–energy–water nexus under uncertainty	Journal of Cleaner Production	17	2021	ASA, BNR, IBF, YSSP, CAT	Cao, Gui-Ying; Yermoliev, Yurii; Ermolieva, Tatiana; Rovenskaya, Elena
87	The existential risk space of climate change	Climatic Change	17	2022	ASA, SYRR	Mechler, Reinhard
88	Toward a forest biomass reference measurement system for remote sensing applications	Global Change Biology	17	2023	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry
89	Integrated global assessment of the natural forest carbon potential	Nature	17	2023	ASA, NODES, BNR, AFE	Kraxner, Florian; Shchepashchenko, Dmitry; Shvidenko, Anatoly
90	The Return of Nature to the Chernobyl Exclusion Zone: Increases in Forest Cover of 1.5 Times since the 1986 Disaster	Forests	16	2021	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry; See, Linda; Kraxner, Florian

91	A value-driven approach to addressing misinformation in social media	Humanities and Social Sciences Communications	16	2021	ASA, CAT	Komendantova, Nadejda; Ekenberg, Love; Danielson, Mats
92	Socio-economic drivers of rising CO2 emissions at the sectoral and sub-regional levels in the Yangtze River Economic Belt	Journal of Environmental Management	16	2021	ASA, SYRR	Kharrazi, Ali
93	Global cooling induced by biophysical effects of bioenergy crop cultivation	Nature Communications	16	2021	ASA, EM, ECE, IACC	Gasser, Thomas
94	Global maps and factors driving forest foliar elemental composition: the importance of evolutionary history	New Phytologist	16	2021	ASA, EM	Obersteiner, Michael
95	The contributions of individual countries and regions to the global radiative forcing	Proceedings of the National Academy of Sciences of the United States of America	16	2021	ASA, EM, ECE, IACC	Gasser, Thomas
96	Amplified warming from physiological responses to carbon dioxide reduces the potential of vegetation for climate change mitigation	Communications Earth and Environment	16	2022	ASA, EM, ECE, IACC	Gasser, Thomas
97	Cognitive theory of stress and farmers' responses to the COVID 19 shock; a model to assess coping behaviors with stress among farmers in southern Iran	International Journal of Disaster Risk Reduction	15	2021	ASA, CAT	Yazdanpanah, Masoud; Komendantova, Nadejda
98	Drought impact in the Bolivian Altiplano agriculture associated with the El Niño–Southern Oscillation using satellite imagery data	Natural Hazards and Earth System Sciences	15	2021	ASA, SYRR, YSSP	Hochrainer-Stigler, Stefan; Pflug, Georg
99	Risk transfer policies and climate-induced immobility among smallholder farmers	Nature Climate Change	15	2021	ASA, EM	Wildemeersch, Matthias
100	COVID-19 European regional tracker	Scientific Data	15	2021	ASA, EM	Naqvi, Asjad
101	Strategy games to improve environmental policymaking	Nature Sustainability	15	2022	ASA, EM	Pietsch, Stephan
102	Early systems change necessary for catalyzing long-term sustainability in a post-2030 agenda	One Earth	15	2022	ASA, EM, ECE, S3	Eker, Sibel; Liu, Qi
103	Evaluating the Downstream Development Strategy of Oil Companies: The Case of Rosneft	Resources	15	2022	ASA, CAT	Komendantova, Nadejda
104	Drivers of tropical forest loss between 2008 and 2019	Scientific Data	15	2022	ASA, NODES, BNR, AFE, BEC, SI	Laso Bayas, Juan Carlos; See, Linda; Georgieva, Ivelina; Shchepashchenko, Dmitry; Danylo, Olga; Dürauer, Martina; Bartl, Hedwig; Hofhansl, Florian; Fritz, Steffen
105	Making Resilient Decisions for Sustainable Circularity of Fashion	Circular Economy and Sustainability	14	2021	ASA, EM	Häyhä, Tiina
106	Mechanisms driving plant functional trait variation in a tropical forest	Ecology and Evolution	14	2021	ASA, CAT, EM, SYRR, BNR, AFE, BEC	Hofhansl, Florian; Brännström, Åke; Dieckmann, Ulf; Franklin, Oskar
107	Demonstrating the potential of Picture Pile as a citizen science tool for SDG monitoring	Environmental Science and Policy	14	2022	ASA, NODES, SI	Fraisl, Dilek; See, Linda; Sturn, Tobias; Moorthy, Inian; Danylo, Olga; McCallum, Ian; Fritz, Steffen
108	Essential earth observation variables for high-level multi-scale indicators and policies	Environmental Science and Policy	14	2022	ASA, NODES	McCallum, Ian

109	A strong mitigation scenario maintains climate neutrality of northern peatlands	One Earth	14	2022	ASA, EM, ECE, IACC	Gasser, Thomas
110	A multi-criteria framework for assessing urban socio-ecological systems: The emergy nexus of the urban economy and environment	Cleaner Environmental Systems	13	2022	ASA, SYRR	Fath, Brian
111	Harmonising the land-use flux estimates of global models and national inventories for 2000–2020	Earth System Science Data	13	2023	ASA, EM, ECE, IACC	Gasser, Thomas
112	Physics-based simulations of multiple natural hazards for risk-sensitive planning and decision making in expanding urban regions	International Journal of Disaster Risk Reduction	13	2023	ASA, SYRR	Sakic Trogrlic, Robert
113	Carbon Cycle Response to Temperature Overshoot Beyond 2°C: An Analysis of CMIP6 Models	Earth's Future	12	2021	ASA, EM, ECE, IACC	Gasser, Thomas
114	Assessing the cascading impacts of natural disasters in a multi-layer behavioral network framework	Scientific Reports	12	2021	ASA, EM, ECE, S3	Naqvi, Asjad; Monasterolo, Irene
115	Soil carbon loss in warmed subarctic grasslands is rapid and restricted to topsoil	Biogeosciences	12	2022	ASA, EM	Richter, Andreas
116	Climate and disaster resilience measurement: Persistent gaps in multiple hazards, methods, and practicability	Climate Risk Management	12	2022	ASA, SYRR, BNR, BEC, POPJUS, EQU	Laurien, Finn; Martin , Juliette
117	Corporate governance performance ratings with machine learning	Intelligent Systems in Accounting, Finance and Management	12	2022	ASA, CAT	Danielson, Mats
118	A crowdsourced global data set for validating built-up surface layers	Scientific Data	12	2022	ASA, NODES, SI	See, Linda; Georgieva, Ivelina; Dürauer, Martina; Karner, Mathias; Fritz, Steffen
119	How can diverse national food and land-use priorities be reconciled with global sustainability targets? Lessons from the FABLE initiative	Sustainability Science	12	2022	ASA, CAT, EM, NODES, BNR, IBF, ECE, IACC	Obersteiner, Michael; Javalera Rincón, Valeria; Sperling, Frank; Perez Guzman, Katya; Steinhauser, Jan; Orduña-Cabrera , Fernando; Neubauer, Rudolf
120	Social considerations are crucial to success in implementing the 30×30 global conservation target	Nature Ecology and Evolution	12	2023	ASA, NODES	Watmough, Gary
121	Implementing Brazil's Forest Code: a vital contribution to securing forests and conserving biodiversity	Biodiversity and Conservation	11	2021	ASA, EM, BNR, AFE, IBF	Soterroni, Aline; Mosnier, Aline; Pirker, Johannes; Obersteiner, Michael
122	Capturing and communicating impact of citizen science for policy: A storytelling approach	Journal of Environmental Management	11	2021	ASA, NODES	Fraisl, Dilek; Hager, Gerid; See, Linda
123	Harvesting forage fish can prevent fishing-induced population collapses of large piscivorous fish	Proceedings of the National Academy of Sciences of the United States of America	11	2021	ASA, CAT, EM, SYRR	Heino, Mikko; Dieckmann, Ulf
124	Post-disaster Recovery in Industrial Sectors: A Markov Process Analysis of Multiple Lifeline Disruptions	Reliability Engineering and System Safety	11	2021	ASA, SYRR	Pflug, Georg; Hochrainer-Stigler, Stefan
125	Differences in the dynamics of community disaster resilience across the globe	Scientific Reports	11	2021	ASA, SYRR	Hochrainer-Stigler, Stefan; Velev, Stefan; Laurien, Finn; Keating, Adriana; Mechler, Reinhard

126	Citizen Science and the Role in Sustainable Development	Sustainability (Switzerland)	11	2021	ASA, NODES, SI	Fritz, Steffen
127	Impact of Lockdowns and Winter Temperatures on Natural Gas Consumption in Europe	Earth's Future	11	2022	ASA, EM	Obersteiner, Michael
128	A Continental Assessment of the Drivers of Tropical Deforestation with a Focus on Protected Areas	Frontiers in Conservation Science	11	2022	ASA, NODES, BNR, AFE, BEC, SI	Fritz, Steffen; Laso Bayas, Juan Carlos; See, Linda; Shchepashchenko, Dmitry; Hofhansl, Florian; Jung, Martin; Dürauer, Martina; Georgieva, Ivelina; Danylo, Olga; Lesiv, Myroslava; McCallum, Ian
129	Chasing up and locking down the virus: Optimal pandemic interventions within a network	Journal of Public Economic Theory	11	2022	ASA, EM, EF	Freiberger, Michael; Grass, Dieter; Kuhn, Michael; Wrzaczek, Stefan
130	21st Century water withdrawal decoupling: A pathway to a more water-wise world?	Water Resources and Economics	11	2022	ASA, EM	Naqvi, Asjad
131	Progressing the integration of climate change adaptation and disaster risk management in Vanuatu and beyond	Climate Risk Management	10	2021	POPJUS, EQU, ASA, SYRR	Handmer, John
132	Finance for Loss and Damage: a comprehensive risk analytical approach	Current Opinion in Environmental Sustainability	10	2021	ASA, SYRR	Mechler, Reinhard; Deubelli-Hwang, Teresa
133	A Multi-Criteria Framework for Pandemic Response Measures	Frontiers in Public Health	10	2021	ASA, CAT	Ekenberg, Love; Komendantova, Nadejda; Danielson, Mats
134	Explaining intention to apply renewable energy in agriculture: the case of broiler farms in Southwest Iran	International Journal of Green Energy	10	2021	ASA, CAT	Yazdanpanah, Masoud; Komendantova, Nadejda
135	Socio-ecological systems modelling of coastal urban area under a changing climate – Case study for Ubatuba, Brazil	Ecological Modelling	10	2022	ASA, SYRR, YSSP	Meirelles De Oliveira, Bruno; Fath, Brian
136	The impact of COVID-19 vaccines on the Case Fatality Rate: The importance of monitoring breakthrough infections	International Journal of Infectious Diseases	10	2022	ASA, EM, POPJUS, SHAW, EF	Sanchez-Romero, Miguel; Fürnkranz-Prskawetz, Alexia
137	Quantifying the synergy and trade-offs among economy–energy–environment–social targets: A perspective of industrial restructuring	Journal of Environmental Management	10	2022	ASA, SYRR, ECE, S3, TISS	Kharrazi, Ali; Ma, Tieju
138	Phases of fossil fuel decline: Diagnostic framework for policy sequencing and feasible transition pathways in resource dependent regions	Oxford Open Energy	10	2022	ASA, CAT	Jewell, Jessica
139	A Bayesian Framework for the Analysis and Optimal Mitigation of Cyber Threats to Cyber-Physical Systems	Risk Analysis	10	2022	ASA, EM	Zebrowski, Piotr
140	A new perspective of innovation toward a non-contact society - Amazon's initiative in pioneering growing seamless switching	Technology in Society	10	2022	ASA, CAT	Watanabe, Chihiro
141	Monitoring and projecting global hunger: Are we on track?	Global Food Security	9	2021	ASA, NODES, POPJUS, MIG	Laso Bayas, Juan Carlos; Crespo Cuaresma, Jesus
142	Shaping the Future of Smart Dentistry: From Artificial Intelligence (AI) to Intelligence Augmentation (IA)	IoT	9	2021	ASA, CAT	Komendantova, Nadejda
143	Amazon's New Supra-Omnichannel: Realizing Growing Seamless Switching for Apparel During COVID-19	Technology in Society	9	2021	ASA, CAT	Watanabe, Chihiro

144	Understanding the influence of Iranian farmers' climate change beliefs on their adaptation strategies and mitigation intentions	Climate and Development	9	2022	ASA, CAT	Zobeidi, Tahereh
145	Estimating the Employment and Fiscal Consequences of Thermal Coal Phase-Out in China	Energies	9	2022	ASA, YSSP	Clark, Alex
146	Lessons learned in developing reference data sets with the contribution of citizens: the Geo-Wiki experience	Environmental Research Letters	9	2022	ASA, NODES, SI	See, Linda; Laso Bayas, Juan Carlos; Lesiv, Myroslava; Shchepashchenko, Dmitry; Danylo, Olga; McCallum, Ian; Dürauer, Martina; Georgieva, Ivelina; Domian, Dahlia; Fraisl, Dilek; Hager, Gerid; Karanam, Santosh; Moorthy, Inian; Sturn, Tobias; Subash, Anto; Fritz, Steffen
147	Investigating the Adoption of Precautionary Behaviors Among Young Rural Adults in South Iran During COVID-19	Frontiers in Public Health	9	2022	ASA, CAT, YSSP	Zobeidi, Tahereh; Löhr, Katharina
148	How the Glasgow Declaration on Forests can help keep alive the 1.5 °C target	Proceedings of the National Academy of Sciences of the United States of America	9	2022	ASA, EM, ECE, IACC	Gasser, Thomas
149	Climate Impact Storylines for Assessing Socio-Economic Responses to Remote Events	Climate Risk Management	9	2023	ASA, SYRR	Hochrainer-Stigler, Stefan; Mechler, Reinhard
150	Phasing out coal for 2 °C target requires worldwide replication of most ambitious national plans despite security and fairness concerns	Environmental Research Letters	9	2023	ASA, CAT	Jewell, Jessica
151	Quantifying global carbon dioxide removal deployment	Environmental Research Letters	9	2023	ASA, EM, ECE, IACC	Gasser, Thomas
152	Declining cost of renewables and climate change curb the need for African hydropower expansion	Science	9	2023	ASA, EM, YSSP	Carlino, Angelo; Wildemeersch, Matthias
153	The feasibility of climate action: Bridging the inside and the outside view through feasibility spaces	Wiley Interdisciplinary Reviews: Climate Change	9	2023	ASA, CAT	Jewell, Jessica
154	On the Matthew effect in research careers: Abnormality on the boundary	Journal of Economic Dynamics and Control	8	2021	ASA, EM	Grass, Dieter
155	Optimal carbon pricing in general equilibrium: Temperature caps and stranded assets in an extended annual DSGE model	Journal of Environmental Economics and Management	8	2021	ASA, SYRR, POPJUS, EQU	Rezai, Armon
156	Causal Loop Diagramming of Socioeconomic Impacts of COVID-19: State-of-the-Art, Gaps and Good Practices	Systems	8	2021	ASA, CAT, EM	Strelkovskii, Nikita; Rovenskaya, Elena
157	Integrating the concept of peacebuilding in sustainability impact assessment	Environmental Impact Assessment Review	8	2022	ASA, CAT	Löhr, Katharina
158	Data-driven quantification of nitrogen enrichment impact on Northern Hemisphere plant biomass	Environmental Research Letters	8	2022	ASA, EM, ECE, IACC	Gasser, Thomas

159	Imagined inclusions into a 'green modernisation': local politics and global visions of Morocco's renewable energy transition	Third World Quarterly	8	2022	ASA, CAT	Komendantova, Nadejda
160	Interdisciplinarity in practice: Reflections from early-career researchers developing a risk-informed decision support environment for Tomorrow's cities	International Journal of Disaster Risk Reduction	8	2023	ASA, SYRR	Sakic Trogrlic, Robert
161	Robust strategies to end global poverty and reduce environmental pressures	One Earth	8	2023	ASA, EM, ECE, S3	Liu, Qi; Eker, Sibel; Obersteiner, Michael
162	An open database on global coal and metal mine production	Scientific Data	8	2023	ASA, NODES	Maus, Victor
163	Towards a framework for systemic multi-hazard and multi-risk assessment and management	iScience	8	2023	ASA, SYRR	Hochrainer-Stigler, Stefan; Sakic Trogrlic, Robert; Reiter, Karina
164	Using EPIC to simulate the effects of different irrigation and fertilizer levels on maize yield in the Eastern Cape, South Africa	Agricultural Water Management	7	2021	ASA, EM, BNR, AFE	Balkovic, Juraj; Pietsch, Stephan
165	Land-use and climate related drivers of change in the reindeer management system in Finland: Geography of perceptions	Applied Geography	7	2021	ASA, CAT, SYRR	Landauer, Mia
166	Urban data/code: A new EP-B section	Environment and Planning B: Urban Analytics and City Science	7	2021	ASA, NODES	See, Linda
167	Introduction to the special issue on unaffiliated volunteering: the universality and importance of volunteering	Environmental Hazards	7	2021	POPJUS, EQU, ASA, SYRR	Handmer, John
168	The impact of roads on sub-Saharan African ecosystems: a systematic review	Environmental Research Letters	7	2021	ASA, EM, POPJUS, EQU, YSSP	Jonas, Matthias; Liu, Wei
169	The Mediterranean Region as a Paradigm of the Global Decoupling of N and P Between Soils and Freshwaters	Global Biogeochemical Cycles	7	2021	ASA, EM	Obersteiner, Michael
170	Reshaping urban infrastructure for a carbon-neutral and sustainable future	Resources, Conservation and Recycling	7	2021	ASA, SYRR	Kharrazi, Ali
171	Amazon's initiative transforming a non-contact society - Digital disruption leads the way to stakeholder capitalization	Technology in Society	7	2021	ASA, CAT	Watanabe, Chihiro
172	A tree's quest for light—Optimal height and diameter growth under a shading canopy	Tree Physiology	7	2021	ASA, CAT, EM, BNR, AFE	Brännström, Åke; Franklin, Oskar
173	Lower-Cost, Lower-Carbon Production of Circular Polydiketoenamine Plastics	ACS Sustainable Chemistry and Engineering	7	2022	ASA, SYRR	Vora, Nemi
174	Climate Warming Mitigation from Nationally Determined Contributions	Advances in Atmospheric Sciences	7	2022	ASA, EM, ECE, IACC	Gasser, Thomas

175	Barriers and Ways Forward to Climate Risk Management Against Indirect Effects of Natural Disasters: A Case Study on Flood Risk in Austria	Climate Risk Management	7	2022	ASA, SYRR	Reiter, Karina; Hochrainer-Stigler, Stefan
176	Spatio-temporal variations in the water quality of the Doorndraai Dam, South Africa: An assessment of sustainable water resource management	Current Research in Environmental Sustainability	7	2022	ASA, SYRR	Kharrazi, Ali
177	Impact of bioenergy crop expansion on climate–carbon cycle feedbacks in overshoot scenarios	Earth System Dynamics	7	2022	ASA, EM, ECE, IACC	Gasser, Thomas
178	Leveraging Street Level Imagery for Urban Planning	Environment and Planning B: Urban Analytics and City Science	7	2022	ASA, NODES	See, Linda
179	Identifying Barriers to Estimating Carbon Release From Interacting Feedbacks in a Warming Arctic	Frontiers in Climate	7	2022	ASA, EM, ECE, IACC	Gasser, Thomas
180	On the contribution of global aviation to the CO2 radiative forcing of climate	Atmospheric Environment	6	2021	ASA, EM, ECE, IACC	Gasser, Thomas
181	The material metabolism characteristics and growth patterns of the central cities of China's Beijing-Tianjin-Hebei region	Ecological Modelling	6	2021	ASA, SYRR	Fath, Brian
182	Adaptive risk management strategies for governments under future climate and socioeconomic change: An application to riverine flood risk at the global level	Environmental Science and Policy	6	2021	ASA, SYRR, POPJUS, EQU	Hochrainer-Stigler, Stefan; Schinko, Thomas
183	Eight decades of adaptive changes in herring reproductive investment: the joint effect of environment and exploitation	ICES Journal of Marine Science	6	2021	ASA, CAT, EM	Heino, Mikko
184	Risk-Layering for Indirect Effects	International Journal of Disaster Risk Science	6	2021	ASA, SYRR	Hochrainer-Stigler, Stefan; Reiter, Karina
185	Onto new horizons: insights from the WeObserve project to strengthen the awareness, acceptability and sustainability of Citizen Observatories in Europe	Journal of Science Communication	6	2021	ASA, NODES, SI	Hager, Gerid; See, Linda; Fraisl, Dilek; Moorthy, Inian; Domian, Dahlia; Fritz, Steffen
186	Two classes of functional connectivity in dynamical processes in networks	Journal of the Royal Society Interface	6	2021	ASA, SYRR	Fath, Brian
187	Changes in fiscal risk against natural disasters due to Covid-19	Progress in Disaster Science	6	2021	ASA, SYRR	Hochrainer-Stigler, Stefan
188	Strengthening climate-resilient development and transformation in Viet Nam	Climatic Change	6	2022	ASA, SYRR	Zhu, Qinhan
189	The global exposure of species ranges and protected areas to forest management	Diversity and Distributions	6	2022	ASA, NODES, BNR, BEC, SI	Jung, Martin; Lewis, Matthew; Lesiv, Myroslava; Fritz, Steffen; Visconti, Piero
190	A review of model-based scenario analysis of poverty for informing sustainability	Environmental Science and Policy	6	2022	ASA, EM, ECE, S3	Liu, Qi; Eker, Sibel; Obersteiner, Michael
191	Just Energy Transition: Learning from the Past for a More Just and Sustainable Hydrogen Transition in West Africa	Land	6	2022	ASA, CAT	Löhr, Katharina; Komendantova, Nadejda
192	Pathway to a land-neutral expansion of Brazilian renewable fuel production	Nature Communications	6	2022	ASA, CAT, BNR, AFE	Jewell, Jessica; Wetterlund, Elisabeth

193	Linking Distributed Optimization Models for Food, Water, and Energy Security Nexus Management	Sustainability (Switzerland)	6	2022	ASA, CAT, EM, BNR, IBF	Yermoliev, Yurii; Ermolieva, Tatiana; Havlík, Petr; Rovenskaya, Elena; Komendantova, Nadejda; Obersteiner, Michael
194	Multi-target scenario discovery to plan for sustainable food and land systems in Australia	Sustainability Science	6	2022	ASA, CAT, EM	Javalera Rincón, Valeria; Obersteiner, Michael; Perez Guzman, Katya; Thomson, Marcus
195	Pathway to achieve a sustainable food and land-use transition in India	Sustainability Science	6	2022	ASA, CAT, EM	Perez Guzman, Katya
196	Temperature Changes Induced by Biogeochemical and Biophysical Effects of Bioenergy Crop Cultivation	Environmental Science and Technology	6	2023	ASA, EM, ECE, IACC	Gasser, Thomas
197	Past decade above-ground biomass change comparisons from four multi-temporal global maps	International Journal of Applied Earth Observation and Geoinformation	6	2023	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry
198	Evenness mediates the global relationship between forest productivity and richness	Journal of Ecology	6	2023	ASA, NODES, BNR, AFE	Kraxner, Florian; Shchepashchenko, Dmitry; Shvidenko, Anatoly
199	Designing the building space of a shopping street to use as a disaster evacuation shelter during the COVID-19 pandemic: A case study in Kobe, Japan	International Journal of Disaster Risk Reduction	5	2021	ASA, SYRR, BNR, WAT, POPJUS, EQU	Yokomatsu, Muneta
200	Agricultural commodity price dynamics and their determinants: A comprehensive econometric approach	Journal of Forecasting	5	2021	ASA, EM, POPJUS, MIG	Crespo Cuaresma, Jesus; Obersteiner, Michael
201	Optimal transition to greener production in a pro-environmental society	Journal of Mathematical Economics	5	2021	ASA, EM	Orlov, Sergey; Rovenskaya, Elena
202	Land Use Increases the Correlation between Tree Cover and Biomass Carbon Stocks in the Global Tropics	Land	5	2021	ASA, NODES, SI	Fritz, Steffen
203	Chapter 4 Two-Stage Nonsmooth Stochastic Optimization and Iterative Stochastic Quasigradient Procedure for Robust Estimation, Machine Learning and Decision Making	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	5	2021	ASA, EM, BNR, IBF	Ermolieva, Tatiana; Yermoliev, Yurii; Obersteiner, Michael; Rovenskaya, Elena
204	Data Fusion and Machine Learning for Innovative GNSS Science Use Cases	Proceedings of the 34th International Technical Meeting of the Satellite Division of the Institute of Navigation, ION GNSS+ 2021	5	2021	ASA, NODES	See, Linda
205	Robust Management of Systemic Risks and Food-Water-Energy-Environmental Security: Two-Stage Strategic-Adaptive GLOBIOM Model	Sustainability (Switzerland)	5	2021	ASA, EM, BNR, IBF	Ermolieva, Tatiana; Havlík, Petr; Yermoliev, Yurii; Khabarov, Nikolay; Obersteiner, Michael
206	A co-designed heuristic guide for investigating the peace-sustainability nexus in the context of global change	Sustainability Science	5	2021	ASA, SYRR	Mechler, Reinhard

207	Finding What You Need: A Guide to Citizen Science Guidelines	The Science of Citizen Science	5	2021	ASA, NODES	Fraisl, Dilek; See, Linda
208	Simulation of migration and demographic processes using FLAME GPU	Business Informatics	5	2022	ASA, CAT, EM	Strelkovskii, Nikita
209	Ecological network analysis of a metabolic urban system based on input–output tables: Model development and case study for the city of Vienna	Cleaner Production Letters	5	2022	ASA, SYRR	Fath, Brian
210	Replacing rice with lower water consumption crops: green policy implications for Iran	Climate Research	5	2022	ASA, CAT, YSSP	Zobeidi, Tahereh
211	Exploring Social Tipping Points and Adaptation Limits in the Context of Systemic Risk	Frontiers in Climate	5	2022	ASA, SYRR	Hochrainer-Stigler, Stefan; Mechler, Reinhard
212	Multi-temporal remote sensing data to monitor terrestrial ecosystem responses to climate variations in Ghana	Geocarto International	5	2022	ASA, SYRR	Kharrazi, Ali
213	Co-Benefits Through Coordination of Climate Action and Peacebuilding: A System Dynamics Model	Journal of Peacebuilding and Development	5	2022	ASA, CAT	Löhr, Katharina
214	How many people need to classify the same image? A method for optimizing volunteer contributions in binary geographical classifications	PLoS ONE	5	2022	ASA, NODES, SI	See, Linda; Sturn, Tobias; McCallum, Ian; Fritz, Steffen
215	A Risk-Informed Decision-Making Framework for Climate Change Adaptation through Robust Land Use and Irrigation Planning	Sustainability (Switzerland)	5	2022	ASA, CAT, EM, BNR, AFE, IBF, WAT	Ermolieva, Tatiana; Havlík, Petr; Frank, Stefan; Kahil, Taher; Balkovic, Juraj; Skalsky, Rastislav; Yermoliev, Yurii
216	Sharing the Burdens of Climate Mitigation and Adaptation: Incorporating Fairness Perspectives into Policy Optimization Models	Sustainability (Switzerland)	5	2022	ASA, CAT, EM, SYRR, BNR, AFE	Zebrowski, Piotr; Dieckmann, Ulf; Brännström, Åke; Franklin, Oskar; Rovenskaya, Elena
217	Employing the TAM in predicting the use of online learning during and beyond the COVID-19 pandemic	Frontiers in Psychology	5	2023	ASA, CAT, YSSP	Zobeidi, Tahereh; Yazdanpanah, Masoud; Komendantova, Nadejda
218	CMIP6 simulations with the compact Earth system model OSCAR v3.1	Geoscientific Model Development	5	2023	ASA, EM, ECE, IACC	Quilcaille, Yann; Gasser, Thomas
219	Microbial growth under drought is confined to distinct taxa and modified by potential future climate conditions	Nature Communications	5	2023	ASA, EM	Richter, Andreas
220	Integrated modeling to achieve global goals: lessons from the Food, Agriculture, Biodiversity, Land-use, and Energy (FABLE) initiative	Sustainability Science	5	2023	ASA, CAT, EM	Perez Guzman, Katya
221	Decadal variability in land carbon sink efficiency	Carbon Balance and Management	4	2021	ASA, EM, ECE, IACC	Gasser, Thomas
222	Indicators for assessing the robustness of metapopulations against habitat loss	Ecological Indicators	4	2021	ASA, CAT, EM, SYRR	Dieckmann, Ulf
223	High-Performance Computing Implementations of Agent-Based Economic Models for Realizing 1:1 Scale Simulations of Large Economies	IEEE Transactions on Parallel and Distributed Systems	4	2021	ASA, EM	Poledna, Sebastian
224	Analysis of the possibility of implementing carbon dioxide sequestration projects in Russia based on foreign experience	International Multidisciplinary Scientific	4	2021	ASA, CAT	Komendantova, Nadejda

		GeoConference Surveying Geology and Mining Ecology Management, SGEM				
225	Big Data and Energy Security: Impacts on Private Companies, National Economies and Societies	IoT	4	2021	ASA, CAT	Komendantova, Nadejda
226	Methods and priorities for human resource planning in oil and gas projects in Russia and OPEC	OPEC Energy Review	4	2021	ASA, CAT	Komendantova, Nadejda
227	Consistence of structural changes in food nitrogen consumption between rural and urban residents in the context of rapid urbanization	Ecological Modelling	4	2022	ASA, SYRR	Fath, Brian
228	The grand challenges facing environmental citizen science	Frontiers in Environmental Science	4	2022	ASA, NODES, SI	Fritz, Steffen; See, Linda
229	Analyzing Russian Media Policy on Promoting Vaccination and Other COVID-19 Risk Mitigation Measures	Frontiers in Public Health	4	2022	ASA, CAT, YSSP	Komendantova, Nadejda
230	A Multi-Criteria Approach to Decision Making in Broadband Technology Selection	Group Decision and Negotiation	4	2022	ASA, CAT	Ekenberg, Love; Danielson, Mats
231	Tracking urban metabolism flows through the lifecycle of buildings, infrastructure, and durable goods at material, product, and sector levels	Journal of Cleaner Production	4	2022	ASA, SYRR, YSSP	Fath, Brian
232	Food web visualisation: heatmap, interactive graph, animated flow network	Methods in Ecology and Evolution	4	2022	ASA, EM	Iskrzynski, Mateusz
233	Invited perspectives: Views of 350 natural hazard community members on key challenges in natural hazards research and the Sustainable Development Goals	Natural Hazards and Earth System Sciences	4	2022	ASA, SYRR	Sakic Trogrlic, Robert
234	Understanding systemic land use dynamics in conflict-affected territories: The cases of Cesar and Caquetá, Colombia	PLoS ONE	4	2022	ASA, CAT	Löhr, Katharina
235	Systemic risks in supply chains: a need for system-level governance	Supply Chain Management	4	2022	ASA, EM, SYRR	Colon, Celian; Hochrainer-Stigler, Stefan
236	A Multicriteria Approach to Modelling Pandemic Response under Strong Uncertainty: A Case Study in Jordan	Sustainability (Switzerland)	4	2022	ASA, CAT	Ekenberg, Love; Komendantova, Nadejda; Danielson, Mats
237	Implications of COVID-19 Mitigation Policies for National Well-Being: A Systems Perspective	Sustainability (Switzerland)	4	2022	ASA, CAT, EM	Strelkovskii, Nikita; Rovenskaya, Elena; Ilmola-Sheppard, Leena; Bartmann, Robin
238	Concerns regarding the proposal for an ecological equation of state: an assessment starting from the organic biophysics of ecosystems (OBEC).	Ecological Modelling	4	2023	ASA, SYRR	Fath, Brian
239	Personal and Professional Mitigation Behavioral Intentions of Agricultural Experts to Address Climate Change	Environmental Management	4	2023	ASA, CAT, YSSP	Zobeidi, Tahereh; Yazdanpanah, Masoud

240	A decentralized approach to model national and global food and land use systems	Environmental Research Letters	4	2023	ASA, EM, BNR, IBF, SI	Javalera Rincón, Valeria; Neubauer, Rudolf; Obersteiner, Michael; Orduña-Cabrera , Fernando; Perez Guzman, Katya; Sperling, Frank; Steinhauser, Jan; Vittis, Yiorgos
241	Mining the Discussion of Monkeypox Misinformation on Twitter Using RoBERTa	IFIP Advances in Information and Communication Technology	4	2023	ASA, CAT	Erokhin, Dmitry; Komendantova, Nadejda
242	Agricultural resilience and adaptive capacity during severe drought in the Western Cape, South Africa	Regional Environmental Change	4	2023	ASA, SYRR, BNR, WAT, YSSP	Hochrainer-Stigler, Stefan; Tramberend, Sylvia
243	Eco-evolutionary modelling of microbial syntrophy indicates the robustness of cross-feeding over cross-facilitation	Scientific Reports	4	2023	ASA, CAT	Boza, Gergely
244	Shaping farmers' beliefs, risk perception and adaptation response through Construct Level Theory in the southwest Iran	Scientific Reports	4	2023	ASA, CAT, YSSP	Yazdanpanah, Masoud; Zobeidi, Tahereh
245	Impacts for half of the world's mining areas are undocumented	Nature	4	2024	ASA, NODES	Maus, Victor
246	Rewiring the Domestic U.S. Rice Trade for Reducing Irrigation Impacts—Implications for the Food–Energy–Water Nexus	ACS Sustainable Chemistry and Engineering	3	2021	ASA, SYRR	Vora, Nemi
247	Application of Special Function Spaces to the Study of Nonlinear Integral Equations Arising in Equilibrium Spatial Logistic Dynamics	Doklady Mathematics	3	2021	ASA, CAT, EM, SYRR	Dieckmann, Ulf
248	Living with Landslides: Perceptions of Risk and Resilience in Far West Nepal	Journal of Integrated Disaster Risk Management	3	2021	ASA, SYRR, BNR, BEC, POPJUS, EQU	Martin , Juliette ; Khadka, Prakash; Linnerooth-Bayer, Joanne; Velev, Stefan; Liu, Wei
249	Mitigating Cognitive and Behavioural Biases During Pandemics Responses	Lecture Notes in Business Information Processing	3	2021	ASA, CAT	Ekenberg, Love; Komendantova, Nadejda; Danielson, Mats
250	Maximum Principle for an Optimal Control Problem with an Asymptotic Endpoint Constraint	Proceedings of the Steklov Institute of Mathematics	3	2021	ASA, EM	Aseev, Sergey
251	Environmental drivers of herring growth and how the perception shifts with time series length	Canadian Journal of Fisheries and Aquatic Sciences	3	2022	ASA, CAT, EM	Ernande, Bruno; Heino, Mikko
252	Towards a flourishing blue economy: Identifying obstacles and pathways for its sustainable development	Current Research in Environmental Sustainability	3	2022	ASA, SYRR	Fath, Brian
253	Robust Food–Energy–Water–Environmental Security Management: Stochastic Quasigradient Procedure for Linkage of Distributed Optimization Models under Asymmetric Information and Uncertainty	Cybernetics and Systems Analysis	3	2022	ASA, CAT, EM, BNR, IBF	Yermoliev, Yurii; Ermolieva, Tatiana; Havlík, Petr; Rovenskaya, Elena; Komendantova, Nadejda; Obersteiner, Michael

254	How can structural change contribute to concurrent sustainability policy targets on GDP, emissions, energy, and employment in China?	Energy	3	2022	ASA, SYRR, ECE, S3, TISS	Kharrazi, Ali; Ma, Tieju
255	The Effects of Selective Harvest on Japanese Spanish Mackerel (Scomberomorus niphonius) Phenotypic Evolution	Frontiers in Ecology and Evolution	3	2022	ASA, CAT, EM	Heino, Mikko
256	A Method for Estimating the Number of Infections From the Reported Number of Deaths	Frontiers in Public Health	3	2022	ASA, CAT, EM	Brännström, Åke
257	Why does community-based disaster risk reduction fail to learn from local knowledge? Experiences from Malawi	International Journal of Disaster Risk Reduction	3	2022	ASA, SYRR	Sakic Trogrlic, Robert
258	Infrastructural legacies and post-Soviet transformations in Northern Sakha (Yakutiya), Russia	Journal of Environmental Policy and Planning	3	2022	ASA, CAT	Povoroznyuk, Olga
259	Cycling and reciprocity in weighted food webs and economic networks	Journal of Industrial Ecology	3	2022	ASA, EM, SYRR	Iskrzynski, Mateusz; Janssen, Freek; Fath, Brian; Ruzzenenti, Franco
260	A machine learning approach to rank the determinants of banking crises over time and across countries	Journal of International Money and Finance	3	2022	ASA, EM	Catalano, Michele
261	Optimizing Crowdsourced Land Use and Land Cover Data Collection: A Two-Stage Approach	Land	3	2022	ASA, NODES, SI	Lesiv, Myroslava; See, Linda; Fritz, Steffen
262	Extreme Citizen Science Contributions to the Sustainable Development Goals: Challenges and Opportunities for a Human-Centred Design Approach	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	3	2022	ASA, NODES	Fraisl, Dilek; See, Linda
263	On the crossroad – renewable energy sources or oil shale? Understanding patterns of social attitudes in Jordan	OPEC Energy Review	3	2022	ASA, CAT	Komendantova, Nadejda
264	Containing the Risk of Phosphorus Pollution in Agricultural Watersheds	Sustainability (Switzerland)	3	2022	ASA, EM, BNR, IBF, YSSP	Wildemeersch, Matthias; Ermolieva, Tatiana; Yermoliev, Yurii; Rovenskaya, Elena; Obersteiner, Michael
265	Prediction of Tree Sapwood and Heartwood Profiles Using Pipe Model and Branch Thinning Theory	Tree physiology	3	2022	ASA, CAT, EM	Brännström, Åke
266	Development outcomes of land tenure formalization under customary and statutory land tenure systems in Tanzania: a multinomial endogenous switching regression approach	Agriculture and Food Security	3	2023	ASA, CAT	Löhr, Katharina
267	Secure robust carbon dioxide removal policy through credible certification	Communications Earth and Environment	3	2023	ASA, EM, ECE, IACC, TISS	Gidden, Matthew; Brutschin, Elina; Gasser, Thomas; Riahi, Keywan
268	How would sustainable transformations in the electricity sector of megacities impact employment levels? A case study of Beijing	Energy	3	2023	ASA, SYRR, ECE, S3, TISS	Kharrazi, Ali; Ma, Tieju

269	Can Gain Motivation Induce Indians to Adopt Electric Vehicles? Application of an Extended Theory of Planned Behavior to Map EV Adoption Intention	Energy Policy	3	2023	ASA, CAT, YSSP	Deka, Chayasmita; Komendantova, Nadejda
270	Have climate policies accelerated energy transitions? Historical evolution of electricity mix in the G7 and the EU compared to net-zero targets	Energy Research and Social Science	3	2023	ASA, CAT	Jewell, Jessica
271	Citizen science for monitoring the health and well-being related Sustainable Development Goals and the World Health Organization's Triple Billion Targets	Frontiers in Public Health	3	2023	ASA, NODES	Fraisl, Dilek; See, Linda
272	Regenerative economics at the service of islands: Assessing the socio-economic metabolism of Samothraki in Greece	Journal of Cleaner Production	3	2023	ASA, SYRR	Fath, Brian
273	Hydrochemical indices as a proxy for assessing land-use impacts on water resources: a sustainable management perspective and case study of Can Tho City, Vietnam	Natural Hazards	3	2023	ASA, SYRR	Kharrazi, Ali
274	Native diversity buffers against severity of non-native tree invasions	Nature	3	2023	ASA, NODES, BNR, AFE	Kraxner, Florian; Shchepashchenko, Dmitry; Shvidenko, Anatoly
275	Agricultural trade impacts global phosphorus use and partial productivity	Nature Food	3	2023	ASA, EM	Obersteiner, Michael; Mosnier, Aline
276	UN plastic treaty must mind the people: Citizen science can assist citizen involvement in plastic policymaking	One Earth	3	2023	ASA, NODES	Fraisl, Dilek
277	Risk justice: Boosting the contribution of risk management to sustainable development	Risk Analysis	3	2023	ASA, SYRR, POPJUS, EQU, YSSP	de Goër de Herve, Mathilde; Schinko, Thomas; Handmer, John
278	Global patterns of tree wood density	Global Change Biology	3	2024	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry
279	Tracking unaccounted greenhouse gas emissions due to the war in Ukraine since 2022	Science of the Total Environment	3	2024	ASA, EM, NODES	See, Linda; Jonas, Matthias; Yashchun, Orysia; Romanchuk, Zoriana
280	Determinants of ICT Innovations: Lessons Learned from Sweden and Sri Lanka	Administrative Sciences	2	2021	ASA, CAT	Ekenberg, Love
281	Extracting Information on Affective Computing Research from Data Analysis of Known Digital Platforms: Research into Emotional Artificial Intelligence	Digital	2	2021	ASA, CAT	Komendantova, Nadejda
282	Trade and Resource Sustainability with Asset Markets	Dynamic Games and Applications	2	2021	ASA, SYRR, POPJUS, EQU	Rezai, Armon
283	A model for power shortage minimization in electric power systems given constraints on controlled sections	Energy Reports	2	2021	ASA, CAT	Komendantova, Nadejda
284	Resilience of cities to external shocks: Analysis, modeling and economic impacts	Environment and Planning B: Urban Analytics and City Science	2	2021	ASA, NODES	See, Linda
285	Modelling stakeholder satisfaction for conflict resolution in wildlife management: a case of wolf population in Sweden	European Journal of Wildlife Research	2	2021	ASA, EM, SYRR	Zebrowski, Piotr; Fath, Brian; Rovenskaya, Elena

286	Restoring Nature at Lower Food Production Costs	Frontiers in Environmental Science	2	2021	ASA, EM, BNR, AFE, IBF	Folberth, Christian; Bundle, Sophie-Charlotte; Obersteiner, Michael
287	How are network centrality metrics related to interest rates in the Mexican secured and unsecured interbank markets?	Journal of Financial Stability	2	2021	ASA, SYRR	Tellez Leon, Elizabeth
288	Association between urbanicity and dementia in China: a population-based study	Journals of Gerontology - Series B Psychological Sciences and Social Sciences	2	2021	ASA, CAT	Luo, Yanan
289	The Day-to-Day Supply Responses of a Limited-Entry Mixed Fishery	Marine Resource Economics	2	2021	ASA, CAT, EM	Heino, Mikko
290	Why (some) abnormal problems are “normal”	Systems and Control Letters	2	2021	ASA, EM	Grass, Dieter
291	Multimorph Eco-Evolutionary Dynamics in Structured Populations	American Naturalist	2	2022	ASA	Sasaki, Akira
292	Prototype of social-ecological system’s resilience analysis using a dynamic index	Ecological Indicators	2	2022	ASA, SYRR, POPJUS, EQU, YSSP	Meirelles De Oliveira, Bruno; Fath, Brian; Liu, Wei
293	Ecological Network Analysis of State-Level Energy Consumption in Maryland, USA	Energies	2	2022	ASA, SYRR	Fath, Brian
294	Viewing the global health system as a complex adaptive system – implications for research and practice	F1000Research	2	2022	ASA, CAT, SYRR	Mechler, Reinhard; Komendantova, Nadejda
295	Size-selective harvesting affects the immunocompetence of guppies exposed to the parasite Gyrodactylus	Proceedings of the Royal Society B: Biological Sciences	2	2022	ASA, CAT, EM	Heino, Mikko
296	Sustainability implications of Rwanda’s Vision 2050 long-term development strategy	Sustainability Science	2	2022	ASA, CAT, EM	Perez Guzman, Katya
297	Lowland plant arrival in alpine ecosystems facilitates a decrease in soil carbon content under experimental climate warming	eLife	2	2022	ASA, EM	Richter, Andreas
298	Assessing urban carbon metabolism using network analysis across Chinese and European cities	Cleaner Production Letters	2	2023	ASA, CAT, EM, SYRR	Fath, Brian; Strelkovskii, Nikita; Wang, Saige
299	Multiple resilience dividends at the community level: A comparative study of disaster risk reduction interventions in different countries	Climate Risk Management	2	2023	ASA, SYRR	Laurien, Finn; Mechler, Reinhard
300	Participatory Modeling for Analyzing Interactions Between High-Priority Sustainable Development Goals to Promote Local Sustainability	Earth's Future	2	2023	ASA, SYRR, YSSP	Bandari, Reihaneh; Kharrazi, Ali; Sakic Trogrlic, Robert
301	Simulating dynamic fire regime and vegetation change in a warming Siberia	Fire Ecology	2	2023	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry; Shvidenko, Anatoly
302	The role of bots in spreading conspiracies: Case study of discourse about earthquakes on Twitter	International Journal of Disaster Risk Reduction	2	2023	ASA, CAT	Erokhin, Dmitry; Komendantova, Nadejda

303	Robust sensitivity analysis to uncertainties in environmental and socio-economic scenarios: A perspective from a global socio-ecological system model	Journal of Cleaner Production	2	2023	ASA, EM, ECE, S3	Eker, Sibel; Obersteiner, Michael
304	Optimal control of a global model of climate change with adaptation and mitigation	Mathematical Control and Related Fields	2	2023	ASA	Semmler, Willi
305	Aligning climate scenarios to emissions inventories shifts global benchmarks	Nature	2	2023	ASA, EM, BNR, IBF, ECE, IACC	Gidden, Matthew; Gasser, Thomas; Forsell, Nicklas; Janssens, Iris ; Nicholls, Zeb; Steinhauser, Jan; Riahi, Keywan
306	Building a community-based open harmonised reference data repository for global crop mapping	PLoS ONE	2	2023	ASA, NODES, SI	Laso Bayas, Juan Carlos; Karanam, Santosh; Fritz, Steffen
307	Comparison of different modern irrigation system adopters through socio-economic, innovation characteristics and social capital values	Regional Environmental Change	2	2023	ASA, CAT, YSSP	Yazdanpanah, Masoud; Zobeidi, Tahereh
308	Transformative adaptation through nature-based solutions: a comparative case study analysis in China, Italy, and Germany	Regional Environmental Change	2	2023	ASA, SYRR, BNR, BEC, POPJUS, EQU	Scolobig, Anna; Linnerooth-Bayer, Joanne; Martin , Juliette ; Deubelli-Hwang, Teresa; Liu, Wei
309	Revealing indirect risks in complex socioeconomic systems: A highly detailed multi-model analysis of flood events in Austria	Risk Analysis	2	2023	ASA, EM, SYRR	Poledna, Sebastian; Hochrainer-Stigler, Stefan; Reiter, Karina
310	Misinformation and Its Impact on Contested Policy Issues: The Example of Migration Discourses	Societies	2	2023	ASA, CAT	Komendantova, Nadejda; Erokhin, Dmitry
311	Institutional Trust and Cognitive Motivation toward Water Conservation in the Face of an Environmental Disaster	Sustainability (Switzerland)	2	2023	ASA, CAT	Arjomandi, Peyman; Yazdanpanah, Masoud; Komendantova, Nadejda
312	Must social performance ratings be idiosyncratic? An exploration of social performance ratings with predictive validity	Sustainability Accounting, Management and Policy Journal	2	2023	ASA, CAT	Danielson, Mats
313	Landscape Design for Improved Thermal Environment: An Optimized Tree Arrangement Design for Climate-Responsive Outdoor Spaces in Residential Buildings Complexes	Sustainable Cities and Society	2	2023	ASA, SYRR	Hyun, Jung Hee
314	A multi-objective spatial optimization of wetland for Sponge City in the plain, China	Ecological Engineering	2	2024	ASA, SYRR	Hyun, Jung Hee
315	Optimal Taxation with Endogenous Population Growth and the Risk of Environmental Disaster	Dynamic Modeling and Econometrics in Economics and Finance	1	2021	ASA, SYRR	Palokangas, Tapio
316	The Worth of Cardinal Information in MCDM – a Guide to Selecting Weight-Generating Functions	Lecture Notes in Business Information Processing	1	2021	ASA, CAT	Danielson, Mats; Ekenberg, Love
317	Chapter 3 Vulnerability Assessment of Digitized Socio-technological Systems via Entropy	Lecture Notes in Computer Science (including subseries Lecture Notes in	1	2021	ASA, CAT	Komendantova, Nadejda

		Artificial Intelligence and Lecture Notes in Bioinformatics)				
318	Tools for affective computations in the management of energy facilities, considering the emotional state of operators	Proceedings - ICOECS 2021: 2021 International Conference on Electrotechnical Complexes and Systems	1	2021	ASA, CAT	Komendantova, Nadejda
319	An introduction to the special issue	Urban Climate	1	2021	ASA, NODES	See, Linda
320	Functional convergence of continuous-time random walks with continuous paths	Communications in Contemporary Mathematics	1	2022	ASA, EM	Zebrowski, Piotr
321	Global oil reserve estimates and the implications for sustainability	Current Research in Environmental Sustainability	1	2022	ASA, SYRR	Fath, Brian
322	Application of a Generalized Fixed Point Principle to the Study of a System of Nonlinear Integral Equations Arising in the Population Dynamics Model	Differential Equations	1	2022	ASA, CAT, EM, SYRR	Dieckmann, Ulf
323	Participatory approach for assessing institutional resilience: a case study of crises in Austria	Environment, Development and Sustainability	1	2022	ASA, SYRR	Fath, Brian
324	Simulating the spatial distribution of pollutant loads from pig farming using an agent-based modeling approach	Environmental Science and Pollution Research	1	2022	ASA, NODES	See, Linda
325	The role of labor in a socio-ecological transition: combining post-Keynesian and ecological economics perspectives	European Journal of Economics and Economic Policies: Intervention	1	2022	ASA, SYRR, EQU, POPJUS	Rezai, Armon
326	Evidence-Based Methods for the Development of Computationally Supported Epidemic-Combating Policies	Frontiers in Artificial Intelligence and Applications	1	2022	ASA, CAT	Danielson, Mats; Ekenberg, Love; Komendantova, Nadejda
327	The Evolution of Microbial Facilitation: Sociogenesis, Symbiogenesis, and Transition in Individuality	Frontiers in Ecology and Evolution	1	2022	ASA, CAT	Boza, Gergely
328	Social cost of carbon: A revisit from a systems analysis perspective	Frontiers in Environmental Science	1	2022	ASA, EM, BNR, AFE	Khabarov, Nikolay; Smirnov, Alexey; Obersteiner, Michael
329	The Use of Big Data via 5G to Alleviate Symptoms of Acute Stress Disorder caused by Quarantine Measures	Frontiers in Psychology	1	2022	ASA, CAT	Komendantova, Nadejda
330	Pathfinder v1.0.1: a Bayesian-inferred simple carbon–climate model to explore climate change scenarios	Geoscientific Model Development	1	2022	ASA, EM, ECE, IACC	Bossy, Thomas; Gasser, Thomas
331	Coastal ecosystem services and climate change: Case study for integrated modeling and valuation	Global Ecology and Conservation	1	2022	ASA, SYRR, YSSP	Meirelles De Oliveira, Bruno; Fath, Brian

332	A Participatory MCDA Approach to Energy Transition Policy Formation	International Series in Operations Research and Management Science	1	2022	ASA, CAT	Danielson, Mats; Ekenberg, Love; Komendantova, Nadejda
333	On the matthew effect on individual investments in skills in arts, sports and science	Journal of Economic Behavior and Organization	1	2022	ASA, EM	Grass, Dieter
334	Tumor microenvironment as a metapopulation model: the effects of angiogenesis, emigration and treatment modalities	Journal of Theoretical Biology	1	2022	ASA, CAT, EM	Parvinen, Kalle
335	Refinement of Individual Tree Detection Results Obtained from Airborne Laser Scanning Data for a Mixed Natural Forest	Remote Sensing	1	2022	ASA, NODES	Milenkovic, Milutin
336	A national-scale land cover reference dataset from local crowdsourcing initiatives in Indonesia	Scientific Data	1	2022	ASA, NODES, BNR, AFE, SI	Hadi, Hadi; Yowargana, Ping; Sturn, Tobias; Karner, Mathias; Dürauer, Martina; See, Linda; Fritz, Steffen; Kraxner, Florian
337	BlazePose-Based Action Recognition with Feature Selection Using Stochastic Fractal Search Guided Whale Optimization	2023 International Conference on Control, Automation and Diagnosis, ICCAD 2023	1	2023	ASA, EM	Sandoval-Gastelum , Marcial
338	Wall-to-wall mapping of carbon loss within the Chornobyl Exclusion Zone after the 2020 catastrophic wildfire	Annals of Forest Science	1	2023	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry; Shvidenko, Anatoly; Kraxner, Florian
339	Social Trend Mining: Lead or Lag	Big Data and Cognitive Computing	1	2023	ASA, CAT	Hassani, Hossein; Komendantova, Nadejda; Rovenskaya, Elena; Yeganegi, Reza
340	The Contributions of Citizen Science to the United Nations Sustainable Development Goals and Other International Agreements and Frameworks	Citizen Science: Theory and Practice	1	2023	ASA, NODES	Fraisl, Dilek; See, Linda
341	Consequence CO2 footprint analysis of circular economy scenarios in cities	Cleaner Production Letters	1	2023	ASA, SYRR	Fath, Brian
342	Closing the 'operationalisation gap': Insights from systemic risk research to inform transformational adaptation and risk management	Climate Risk Management	1	2023	ASA, CAT, EM, SYRR, POPJUS, EQU	Hochrainer-Stigler, Stefan; Deubelli-Hwang, Teresa; Mechler, Reinhard; Dieckmann, Ulf; Laurien, Finn; Handmer, John
343	Optimal balancing of xylem efficiency and safety explains plant vulnerability to drought	Ecology Letters	1	2023	ASA, EM, BNR, AFE, BEC	Franklin, Oskar; Hofhansl, Florian; Joshi, Jaideep
344	An evolutionary explanation of female-biased sexual size dimorphism in North Sea plaice, Pleuronectes platessa L.	Ecology and Evolution	1	2023	ASA, CAT, EM, SYRR	Mollet, Fabian; Enberg, Katja; Dieckmann, Ulf
345	Digital platform of reliability management systems for operation of microgrids	Energy Reports	1	2023	ASA, CAT	Komendantova, Nadejda
346	Eroding resilience of deforestation interventions—evidence from Brazil's lost decade	Environmental Research Letters	1	2023	ASA, EM	Obersteiner, Michael
347	Historical diffusion of nuclear, wind and solar power in different national contexts: implications for climate mitigation pathways	Environmental Research Letters	1	2023	ASA, CAT	Jewell, Jessica

348	Supporting strategy selection in multiobjective decision problems under uncertainty and hidden requirements	European Journal of Operational Research	1	2023	ASA, EM, YSSP	Neuvonen, Lauri; Wildemeersch, Matthias
349	The hammer and the jab: Are COVID-19 lockdowns and vaccinations complements or substitutes?	European Journal of Operational Research	1	2023	ASA, EM, EF	Grass, Dieter; Feichtinger, Gustav; Kuhn, Michael; Fürnkranz-Prskawetz, Alexia; Sanchez-Romero, Miguel; Wrzaczek, Stefan
350	A Modelling System for Dead Wood Assessment in the Forests of Northern Eurasia	Forests	1	2023	ASA, NODES, BNR, AFE	Shvidenko, Anatoly; Kraxner, Florian; See, Linda; Shchepashchenko, Dmitry
351	GMO discussion on Twitter	GM Crops and Food	1	2023	ASA, CAT	Erokhin, Dmitry; Komendantova, Nadejda
352	Nature-based solutions are critical for putting Brazil on track towards net-zero emissions by 2050	Global Change Biology	1	2023	ASA, EM, BNR, IBF	Soterroni, Aline; Obersteiner, Michael; Havlík, Petr
353	Human appropriation of net primary production as driver of change in landscape-scale vertebrate richness	Global Ecology and Biogeography	1	2023	ASA, SYRR	Reiter, Karina
354	Systematic meta-analysis of research on AI tools to deal with misinformation on social media during natural and anthropogenic hazards and disasters	Humanities and Social Sciences Communications	1	2023	ASA, CAT	Vicari, Rosa; Komendantova, Nadejda
355	Collecting volunteered geographic information from the Global Navigation Satellite System (GNSS): experiences from the CAMALIOT project	International Journal of Digital Earth	1	2023	ASA, NODES	See, Linda; Sturn, Tobias; Karanam, Santosh; Georgieva, Ivelina; Fritz, Steffen; McCallum, Ian
356	22.05.17	International Journal of Disaster Risk Reduction	1	2023	ASA, CAT	Komendantova, Nadejda
357	Strengthening resilience in reconstruction after extreme events – Insights from flood affected communities in Germany	International Journal of Disaster Risk Reduction	1	2023	ASA, SYRR, POPJUS, EQU	Handmer, John
358	Going beyond carbon: An "Earth system impact" score to better capture corporate and investment impacts on the earth system	Journal of Cleaner Production	1	2023	ASA, NODES	Maus, Victor
359	Comparative Resilience Evaluation—Case Study for Six Cities in China, Europe, and the Americas	Land	1	2023	ASA, SYRR	Meirelles De Oliveira, Bruno; Fath, Brian
360	Stakeholder Perceptions of Landscape Justice in the Case of Atlantic Salmon Fishing in Northern Finland	Land	1	2023	ASA, CAT, SYRR	Landauer, Mia
361	Social Intelligence Mining: Unlocking Insights from X	Machine Learning and Knowledge Extraction	1	2023	ASA, CAT	Hassani, Hossein; Komendantova, Nadejda; Rovenskaya, Elena; Yeganegi, Reza
362	Pantropical distribution of short-rotation woody plantations: spatial probabilities under current and future climate	Mitigation and Adaptation Strategies for Global Change	1	2023	ASA, NODES, BNR, AFE, SI	Shchepashchenko, Dmitry; Lesiv, Myroslava; Fritz, Steffen
363	Optimization of Simulation Models and other Complex Problems with Stochastic Gradient Methods	Modern Optimization Methods for Decision Making	1	2023	ASA, CAT, EM	Gaivoronski, Alexei; Yermoliev, Yurii

		Under Risk and Uncertainty				
364	A framework for considering justice aspects in integrated wildfire risk management	Nature Climate Change	1	2023	ASA, SYRR, POPJUS, EQU	Schinko, Thomas; Handmer, John; Deubelli-Hwang, Teresa; Preinfalk, Eva; Linnerooth-Bayer, Joanne; Scolobig, Anna
365	Dynamic global-scale crop and irrigation monitoring	Nature Food	1	2023	ASA, NODES	See, Linda; Fritz, Steffen; Lesiv, Myroslava; Laso Bayas, Juan Carlos
366	How to fuel an energy transition with ecologically responsible mining	Proceedings of the National Academy of Sciences of the United States of America	1	2023	ASA, NODES, BNR, BEC	Maus, Victor; Visconti, Piero
367	The contributions of citizen science to SDG monitoring and reporting on marine plastics	Sustainability Science	1	2023	ASA, NODES, SI	Fraisl, Dilek; See, Linda; Laso Bayas, Juan Carlos; Fritz, Steffen; McCallum, Ian
368	Applicability of the Future State Maximization Paradigm to Agent-Based Modeling: A Case Study on the Emergence of Socially Sub-Optimal Mobility Behavior	Systems	1	2023	ASA, CAT, EM, YSSP	Plakolb, Simon; Strelkovskii, Nikita
369	Bridging farmers' non-cognitive and self-conscious emotional factors to cognitive determinants of climate change adaptation in southwest Iran	Climate and Development	1	2024	ASA, CAT, YSSP	Yazdanpanah, Masoud; Zobeidi, Tahereh
370	Automatic classification of land cover from LUCAS in-situ landscape photos using semantic segmentation and a Random Forest model	Environmental Modelling and Software	1	2024	ASA, NODES	See, Linda
371	Global patterns and environmental drivers of forest functional composition	Global Ecology and Biogeography	1	2024	ASA, NODES, BNR, AFE	Kraxner, Florian; Shchepashchenko, Dmitry
372	Quantifying community resilience to riverine hazards in Bangladesh	Global Environmental Change	1	2024	ASA, SYRR	Laurien, Finn; Mechler, Reinhard
373	Decreasing resilience of China's coupled nitrogen–phosphorus cycling network requires urgent action	Nature Food	1	2024	ASA, SYRR, ECE, S3, TISS	Yu, Yadong; Kharrazi, Ali; Fath, Brian; Zhu, Bing; Ma, Tieju
374	A global clustering of terrestrial food production systems	PLoS ONE	1	2024	ASA, EM, BNR, AFE, BEC	Jung, Martin; Folberth, Christian; Obersteiner, Michael
375	War drives forest fire risks and highlights the need for more ecologically-sound forest management in post-war Ukraine	Scientific Reports	1	2024	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry; Kraxner, Florian
376	Sequential action-based dynamic decision-support model for urban ecological planning	Sustainable Cities and Society	1	2024	ASA, SYRR	Hyun, Jung Hee
377	Supporting Climate Adaptation Measures in Small- to Medium-Sized Austrian Cities Using Climate Modelling	Advances in Science, Technology and Innovation	0	2021	ASA, NODES	See, Linda
378	Reactive Strategies: An Inch of Memory, a Mile of Equilibria	Games	0	2021	ASA, EM	Baklanov, Artem
379	Chapter 10 The Adequacy of Artificial Intelligence Tools to Combat Misinformation	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence	0	2021	ASA, CAT	Komendantova, Nadejda; Ekenberg, Love; Danielson, Mats

		and Lecture Notes in Bioinformatics)				
380	Building Mathematical Models for Multicriteria and Multiobjective Applications 2020	Mathematical Problems in Engineering	0	2021	ASA, CAT	Ekenberg, Love
381	Optimal Population Policy with Health Care and Lethal Pollution	Portuguese Economic Journal	0	2021	ASA, SYRR	Palokangas, Tapio
382	Принцип максимума для задачи оптимального управления с асимптотическим концевым ограничением [Maximum principle for an optimal control problem with an asymptotic endpoint constraint]	Trudy Instituta Matematiki i Mekhaniki UrO RAN	0	2021	ASA, EM	Aseev, Sergey
383	Artificial intelligence tools for analyzing emotionally colored information from customer reviews in the service sector		0	2021	ASA, CAT	Komendantova, Nadejda
384	COVID-19 European regional tracker		0	2021	ASA, EM	Naqvi, Asjad
385	EU – EAEU Common Economic Space		0	2021	ASA, CAT	Erokhin, Dmitry
386	Evaluating Current Research Status and Identifying Most Important Future Research Themes		0	2021	ASA, SYRR	Hochrainer-Stigler, Stefan
387	Geoeconomic Connectivity Trends in the Area from Lisbon to Vladivostok		0	2021	ASA, CAT	Erokhin, Dmitry; Rovenskaya, Elena
388	Probabilistic Risk Management in Project Portfolios		0	2021	ASA, CAT	Ekenberg, Love; Danielson, Mats
389	Regulation of the migration policy of the European union countries in the face of the COVID-19 pandemic		0	2021	ASA, CAT, EM	Strelkovskii, Nikita
390	Semi-structured information in the field of artificial intelligence and information security: processing results		0	2021	ASA, CAT	Komendantova, Nadejda
391	Smart City Puebla: measuring smartness		0	2021	ASA, CAT, EM	Perez Guzman, Katya
392	Solar Power as Climate Change Management Option in Sierra Leone: Drivers and Barriers for Deployment		0	2021	ASA, CAT	Komendantova, Nadejda
393	The characteristics of citizen science in a fishbowl		0	2021	ASA, NODES	Hager, Gerid
394	Προς ένα Οικο-λογικό Αντιμονοπωλιακό Δίκαιο (Towards Eco-Logical Antitrust) (in Greek)		0	2021	ASA	Rovenskaya, Elena
395	Технология создания систем мониторинга и прогноза состояния опасных явлений и объектов (на примере эпидемии COVID-19) [Technology for creating systems monitoring and forecasting the state of hazardous phenomena and objects (on example of an epidemic Covid-19)]		0	2021	ASA, CAT	Komendantova, Nadejda
396	Postfire dynamics of standing dead tree stock in northern boreal forests	BIO Web of Conferences	0	2022	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry
397	Quantifying memory and persistence in the atmosphere–land and ocean carbon system	Earth System Dynamics	0	2022	ASA, EM	Jonas, Matthias; Zebrowski, Piotr

398	Global natural projections	Empirica	0	2022	ASA, EM	Catalano, Michele
399	A Multi-Criteria Approach to Analysing E-Democracy Support Systems	Facebook Nation: Total Information Awareness: Third Edition	0	2022	ASA, CAT	Danielson, Mats; Ekenberg, Love; Mihai, Adriana
400	Editorial: Addressing the effects of COVID-19 on rural areas in low and middle income countries	Frontiers in Public Health	0	2022	ASA, CAT	Komendantova, Nadejda; Ekenberg, Love
401	Sustainability and long-term strategies in the modeling of biological processes	IFAC-PapersOnLine	0	2022	ASA, EM	Grass, Dieter
402	Comparing Cardinal and Ordinal Ranking in MCDM Methods	International Series in Operations Research and Management Science	0	2022	ASA, CAT	Danielson, Mats; Ekenberg, Love
403	Evaluating Multi-criteria Decisions Under Conditions of Strong Uncertainty	International Series in Operations Research and Management Science	0	2022	ASA, CAT	Danielson, Mats; Ekenberg, Love
404	How severe are the EBA macroeconomic scenarios for the Italian Economy? A joint probability approach	Journal of International Money and Finance	0	2022	ASA, EM	Catalano, Michele
405	Asymmetric Information in a Capital Accumulation Differential Game with Spillover and Learning Effects	Journal of Optimization Theory and Applications	0	2022	ASA, EM, EF	Feichtinger, Gustav; Wrzaczek, Stefan
406	Quantifying spatio-temporal variation in aquaculture production areas in Satkhira, Bangladesh using geospatial and social survey	PLoS ONE	0	2022	ASA, SYRR	Kharrazi, Ali
407	Risk-layering and optimal insurance uptake under ambiguity: With an application to farmers exposed to drought risk in Austria	Risk Analysis	0	2022	ASA, SYRR	Pflug, Georg; Hochrainer-Stigler, Stefan
408	Impacts of Various Connectivity Processes in Central Asia on Sustainable Development of Kyrgyzstan	Sustainability (Switzerland)	0	2022	ASA, CAT, EM	Komendantova, Nadejda; Rovenskaya, Elena; Strelkovskii, Nikita
409	Ordinary Differential Equations	Systems Biology Modelling and Analysis: Formal Bioinformatics Methods and Tools	0	2022	ASA, CAT, EM	Parvinen, Kalle
410	A Framework for COVID-19 Pandemic Intervention Modelling and Analysis for Policy Formation Support in Botswana		0	2022	ASA, CAT	Danielson, Mats; Komendantova, Nadejda; Mihai, Adriana
411	Agent-based modeling of social and economic impacts of migration under the government regulated employment [in Russian]		0	2022	ASA, CAT, EM	Rovenskaya, Elena; Strelkovskii, Nikita

412	Allocating Scarce Resources: Modeling to Support Food-Energy-Water Sustainability		0	2022	ASA	Rovenskaya, Elena
413	Application of deep learning algorithm for estimating stand volume in South Korea		0	2022	BNR, AFE, ASA, NODES	Shchepashchenko, Dmitry; Shvidenko, Anatoly
414	Artificial Intelligence, Machine Learning, and Intelligent Decision Support Systems: Iterative "Learning" SQG-based procedures for Distributed Models' Linkage.		0	2022	ASA, CAT, EM, BNR, IBF	Ermolieva, Tatiana; Yermoliev, Yurii; Havlík, Petr; Komendantova, Nadejda
415	COVID-19 and Optimal Lockdown Strategies: The Effect of New and More Virulent Strains		0	2022	ASA, EM, EF, POPJUS, SHAW	Grass, Dieter; Fürnkranz-Prskawetz, Alexia; Wrzaczek, Stefan
416	Challenges and Opportunities of Digital Cooperation in Eurasia		0	2022	ASA, CAT	Erokhin, Dmitry
417	Chapter 13 Renewable Energy: Political and Policy Analysis		0	2022	ASA, CAT	Komendantova, Nadejda
418	Chapter 7: National climate funds		0	2022	ASA	Gomez Echeverri, Luis
419	Climate change adaptation through robust land use planning: two-stage stochastic optimization for risk-informed decision making		0	2022	ASA, CAT, EM, BNR, AFE, IBF, WAT	Ermolieva, Tatiana; Havlík, Petr; Kahil, Taher; Balkovic, Juraj; Skalsky, Rastislav; Yermoliev, Yurii; Borodina, Oleksandra
420	Co-creating Policies on Societal Transformations as a Factor of Resilience of Modern Society		0	2022	ASA, CAT	Komendantova, Nadejda
421	Co-creating policies on societal transformations as a factor of resilience of modern society		0	2022	ASA, CAT	Komendantova, Nadejda
422	Decision Making Options for Managing Risk		0	2022	ASA, SYRR	Mechler, Reinhard
423	Early Warning Systems and Their Role in Disaster Risk Reduction		0	2022	ASA, SYRR	Sakic Trogrlic, Robert
424	Intelligent Risk Analysis using the example of the COVID-19 Epidemic		0	2022	ASA, CAT	Komendantova, Nadejda; Ekenberg, Love
425	Migration Processes in the European Union and Application of Simulation to study them [In Russian]		0	2022	ASA, CAT, EM	Strelkovskii, Nikita
426	Nature-Based Solutions in the Private Sector: Policy Opportunities for Sustainability in a Post-Pandemic World		0	2022	ASA, SYRR	Kharrazi, Ali
427	Optimal balancing of xylem efficiency and safety explains plant vulnerability to drought		0	2022	ASA, EM, BNR, AFE, BEC	Franklin, Oskar; Hofhansl, Florian; Joshi, Jaideep
428	Policy guidance and pitfalls aligning IPCC scenarios to national land emissions inventories		0	2022	ASA, EM, BNR, IBF, ECE, IACC	Gidden, Matthew; Gasser, Thomas; Forsell, Nicklas; Nicholls, Zeb; Steinhauser, Jan; Riahi, Keywan
429	Shadow prices and optimal cost in economic applications		0	2022	ASA, EM, BNR, AFE	Khabarov, Nikolay; Smirnov, Alexey; Obersteiner, Michael
430	Strategic DSS for robust energy production and storage investments and operation planning involving variable renewable energy sources: A two-stage stochastic optimization model s with stopping time and rolling horizon		0	2022	ASA, CAT, EM, BNR, IBF	Yermoliev, Yurii; Komendantova, Nadejda; Ermolieva, Tatiana
431	Summary for Policymakers		0	2022	ASA, SYRR	Mechler, Reinhard

432	The Apocalyptic Narrative		0	2022	ASA, CAT	Ekenberg, Love; Danielson, Mats
433	The Radical Complexity of Rewiring Supplier–Buyer Networks		0	2022	ASA, EM	Colon, Celian
434	The potential of citizen science to support local biodiversity sensitive farming systems: First insights from the FRAMEwork project. Landscape Management for Functional Biodiversity		0	2022	ASA, NODES	Hager, Gerid
435	ОЦЕНКА ЗАПАСОВ УГЛЕРОДА В ПОЧВАХ ЛЕСНЫХ ЭКОСИСТЕМ САХАЛИНСКОЙ ОБЛАСТИ [Estimation of carbon stock in forest soils of Sakhalin region]		0	2022	ASA, NODES, BNR, AFE	Mukhortova, Liudmila; Shchepashchenko, Dmitry
436	RECCAP2 Future Component: Consistency and Potential for Regional Assessment to Constrain Global Projections	AGU Advances	0	2023	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry; Shvidenko, Anatoly
437	Patterns of infringement, risk, and impact driven by coal mining permits in Indonesia	Ambio	0	2023	ASA, NODES	Maus, Victor
438	Citizen Science: What is in it for the Official Statistics Community?	Citizen Science: Theory and Practice	0	2023	ASA, NODES	Fraisl, Dilek; See, Linda
439	Beyond emissions trading to a negative carbon economy: a proposed carbon removal obligation and its implementation	Climate Policy	0	2023	ASA, EM, ECE, PM, TISS	Bednar, Johannes; Baklanov, Artem; Wagner, Fabian
440	A Novel Robust Meta-Model Framework for Predicting Crop Yield Probability Distributions Using Multisource Data	Cybernetics and Systems Analysis	0	2023	ASA, CAT, BNR, AFE, IBF, WAT	Havlík, Petr; Lessa Derci Augustynczik, Andrey; Boere, Esther; Frank, Stefan; Kahil, Taher; Balkovic, Juraj; Skalsky, Rastislav; Folberth, Christian; Komendantova, Nadejda
441	Variants of the Stochastic Sir Models and Vaccination Strategies	Cybernetics and Systems Analysis	0	2023	ASA, CAT	Bogdanov, Oleksandr
442	Applied systems analysis	Dictionary of Ecological Economics: Terms for the New Millennium	0	2023	ASA	Rovenskaya, Elena
443	Macroeconomic co-benefits of DRR investment: assessment using the Dynamic Model of Multi-hazard Mitigation CoBenefits (DYNAMMICs) model	Disaster Prevention and Management: An International Journal	0	2023	ASA, CAT, SYRR, BNR, WAT, POPJUS, EQU	Yokomatsu, Muneta; Mochizuki, Junko; Joseph, Julian; Burek, Peter; Kahil, Taher
444	Multi-criteria decision analysis for the planning of island microgrid system: A case study of Yongxing island, China	Energy	0	2023	ASA, SYRR, ECE, S3, TISS	Yu, Yadong; Kharrazi, Ali; Ma, Tieju
445	Unstable decoupling of CO2 emissions from sectoral economic growth calls for decarbonization policies based on multi-perspective accounting: a case study of Zhejiang, China	Environmental Science and Pollution Research	0	2023	ASA, SYRR	Kharrazi, Ali
446	Immunity-driven evolution of virulence and diversity in respiratory diseases	Evolution; international journal of organic evolution	0	2023	ASA, EM	Metz, Hans
447	Size-selective harvesting alters biological traits of marine medaka (Oryzias melastigma)	Fisheries Research	0	2023	ASA, CAT, EM	Heino, Mikko

448	Species identity and resource availability explain variation among above and below-ground functional traits in Himalayan temperate forests	Flora: Morphology, Distribution, Functional Ecology of Plants	0	2023	ASA, EM	Singh, Shipra
449	Aspects of Ranking Algorithms in Multi-Criteria Decision Support Systems	Frontiers in Artificial Intelligence and Applications	0	2023	ASA, CAT	Danielson, Mats; Ekenberg, Love
450	A risk-based decision framework for policy analysis of societal pandemic effects	Frontiers in Public Health	0	2023	ASA, CAT	Danielson, Mats; Ekenberg, Love; Komendantova, Nadejda; Mihai, Adriana
451	Investigating the Use of Street-Level Imagery and Deep Learning to Produce In-Situ Crop Type Information	Geographies	0	2023	ASA, EM, NODES	Orduña-Cabrera , Fernando; Sandoval-Gastelum , Marcial; McCallum, Ian; See, Linda; Fritz, Steffen; Karanam, Santosh; Sturn, Tobias; Javalera Rincón, Valeria
452	Understanding the Politics and Governance of Climate Change Loss and Damage	Global Environmental Politics	0	2023	ASA, SYRR	Calliari, Elisa
453	Towards a socially just flood risk management in developing countries	Handbook of Flood Risk Management in Developing Countries	0	2023	ASA, SYRR	Sakic Trogrlic, Robert
454	Inequality-constrained monetary policy in a financialized economy	Journal of Economic Behavior and Organization	0	2023	ASA, EM	Fierro, Luca
455	Quantifying a virtual water metabolic network of the Metropolitan District of Quito, Ecuador using ecological network methods	Journal of Industrial Ecology	0	2023	ASA, SYRR	Fath, Brian
456	Redistributive effects of pension reforms: who are the winners and losers?	Journal of Pension Economics and Finance	0	2023	ASA, EM, POPJUS, SHAW, EF	Sanchez-Romero, Miguel; Fürnkranz-Prskawetz, Alexia
457	Evolution of dispersal under spatio-temporal heterogeneity	Journal of Theoretical Biology	0	2023	ASA, CAT, EM	Parvinen, Kalle
458	Automatically Generated Weight Methods for Human and Machine Decision-Making	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	0	2023	ASA, CAT	Danielson, Mats; Ekenberg, Love
459	Semi-Supervised Learning Classifier for Misinformation Related to Earthquakes Prediction on Social Media	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	0	2023	ASA, CAT, YSSP	Elroy, Or; Yosipof, Abraham

460	Challenges of instruments that should tackle multi-hazard and multi-risk situations: an assessment of the recent reforms of the European Solidarity Fund and the Solidarity and Emergency Aid Reserve	Mitigation and Adaptation Strategies for Global Change	0	2023	ASA, SYRR	Hochrainer-Stigler, Stefan; Zhu, Qinhan; Reiter, Karina
461	Energy Production and Storage Investments and Operation Planning Involving Variable Renewable Energy Sources A Two-stage Stochastic Optimization Model with Rolling Time Horizon and Random Stopping Time	Modern Optimization Methods for Decision Making Under Risk and Uncertainty	0	2023	ASA, CAT, EM, BNR, IBF	Yermoliev, Yurii; Komendantova, Nadejda; Ermolieva, Tatiana
462	Linking Catastrophe Modeling and Stochastic Optimization Techniques for Integrated Catastrophe Risk Analysis and Management	Modern Optimization Methods for Decision Making Under Risk and Uncertainty	0	2023	ASA, CAT, EM, BNR, IBF	Ermolieva, Tatiana; Gaivoronski, Alexei; Yermoliev, Yurii; Komendantova, Nadejda
463	Inference of the distribution of fitness effects of mutations is affected by single nucleotide polymorphism filtering methods, sample size and population structure	Molecular Ecology Resources	0	2023	ASA, CAT, EM	Brännström, Åke
464	The importance of capturing management in forest restoration targets	Nature Sustainability	0	2023	NODES, BNR, AFE, BEC, IBF, ASA	Jung, Martin; Lesiv, Myroslava; Warren-Thomas, Eleanor ; Shchepashchenko, Dmitry; See, Linda; Fritz, Steffen
465	Minor variations in multicellular life cycles have major effects on adaptation	PLoS Computational Biology	0	2023	ASA, CAT, EM	Brännström, Åke
466	Weakening State Constraints in Optimal Control Problems	Proceedings of the Steklov Institute of Mathematics	0	2023	ASA, EM	Aseev, Sergey
467	Crowd-Driven Deep Learning Tracks Amazon Deforestation	Remote Sensing	0	2023	ASA, NODES, SI	McCallum, Ian; Fritz, Steffen; See, Linda
468	Quantification of Loss of Access to Critical Services during Floods in Greater Jakarta: Integrating Social, Geospatial, and Network Perspectives	Remote Sensing	0	2023	ASA, SYRR, YSSP	Kiparisov, Pavel; Pflug, Georg
469	Advancing urban infrastructure research for a carbon-neutral and sustainable future	Resources, Conservation and Recycling	0	2023	ASA, SYRR	Kharrazi, Ali
470	The Dangers of Romanticising Local Knowledge in the Context of Disaster Studies and Practice	Routledge Handbook on Cultural Heritage and Disaster Risk Management	0	2023	ASA, SYRR	Sakic Trogrlic, Robert
471	Dynamics and characteristics of misinformation related to earthquake predictions on Twitter	Scientific Reports	0	2023	ASA, CAT	Komendantova, Nadejda
472	Economic implications of autonomous adaptation of firms and households in a resource-rich coastal city	Scientific Reports	0	2023	ASA, SYRR, YSSP	Taberna, Alessandro; Hochrainer-Stigler, Stefan
473	Environmental Risks Analysis Using Satellite Data	Springer Handbooks	0	2023	ASA, SYRR	Kostyuchenko, Yuriy

474	Estimation of Carbon Stock in Forest Soils of Sakhalin Region	Springer Proceedings in Earth and Environmental Sciences	0	2023	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry
475	Development of Top-down and Bottom-up Methodology Using Risk Functions for Systems with Multiplicity of Solutions	Studies in Systems, Decision and Control	0	2023	ASA, CAT, EM	Yermoliev, Yurii
476	A note on the logical inconsistency of the Hotelling Rule: A Revisit from the System's Analysis Perspective		0	2023	ASA, EM, BNR, AFE	Khabarov, Nikolay; Smirnov, Alexey; Obersteiner, Michael
477	Agent-based modelling of flood disaster impact for agricultural community: a case study in Pampamga river basin, republic of the Philippines		0	2023	ASA, SYRR, POPJUS, EQU	Yokomatsu, Muneta
478	Application of Mineral Fertilizers in Forests with Respect to Forest Carbon Budget		0	2023	ASA, NODES, BNR, AFE	Shchepashchenko, Dmitry
479	Assessing the Limits of Nature-based Adaptation and Need for Transformational Management of Multiple Hazard Climate Risk		0	2023	ASA, SYRR	Hyun, Jung Hee
480	BinD: A Model of Growth, Climate Change, and Debt Sustainability		0	2023	ASA, EM	Naqvi, Asjad
481	Citizen Science and the Remote Sensing of Land Cover		0	2023	ASA, NODES	See, Linda
482	Competition for light can drive adverse species-composition shifts in the Amazon Forest under elevated CO2		0	2023	ASA, CAT, EM, SYRR, BNR, AFE, BEC	Joshi, Jaideep; Hofhansl, Florian; Singh, Shipra; Brännström, Åke; Franklin, Oskar; Dieckmann, Ulf
483	Connections between robust statistical estimation, robust decision making with two-stage stochastic optimization, and robust machine learning problems		0	2023	ASA, CAT, EM, BNR, AFE, IBF, WAT	Ermolieva, Tatiana; Yermoliev, Yurii; Havlík, Petr; Lessa Derci Augustynczik, Andrey; Komendantova, Nadejda; Kahil, Taher; Balkovic, Juraj; Skalsky, Rastislav; Folberth, Christian
484	Decoupling wastewater-related greenhouse gas emissions and water stress alleviation across 300 cities in China is challenging yet plausible by 2030		0	2023	ASA, SYRR	Kharrazi, Ali
485	Deriving targeted intervention packages of nature-based solutions for climate change adaptation and disaster risk reduction: A geospatial multi-criteria approach for building resilience in the Puna region, Peru		0	2023	ASA, SYRR	Higuera Roa, Oscar
486	Differential Fiscal Performances of Plausible Disaster Events: A Storyline Approach for the Caribbean and Central American Governments under CCRIF		0	2023	ASA, SYRR, POPJUS, EQU	Hochrainer-Stigler, Stefan; Zhu, Qinhan; Peisker, Jonas
487	Engaging the armenian diaspora to spur innovation in the agriculture sector		0	2023	ASA, CAT	Komendantova, Nadejda
488	Machine Learning-Based Exploitation of Crowdsourced GNSS Data for Atmospheric Studies		0	2023	ASA, NODES	See, Linda; Sturn, Tobias; McCallum, Ian
489	Prioritizing climate change adaptation options: Application of multi-criteria decision-making (MCDM) with stakeholder participation in water resources management		0	2023	ASA, SYRR	Hyun, Jung Hee

490	Reviews and syntheses: Abrupt ocean biogeochemical change under human-made climatic forcing – warming, acidification, and deoxygenation		0	2023	ASA, CAT, EM, SYRR	Dieckmann, Ulf; Joshi, Jaideep; Shchiptsova, Anna
491	Sociodemographic Disparities in Ambient Particulate Matter Exposure in Austria		0	2023	ASA, EM	Naqvi, Asjad
492	Topographical heterogeneity governs species distribution and regeneration potential by mediating soil attributes in Western Himalayan forests		0	2023	ASA, EM, BNR, AFE, BEC	Singh, Shipra; Hofhansl, Florian
493	What Does Loss and Damage Mean at the Country Level? A Global Mapping Through Nationally Determined Contributions		0	2023	ASA, SYRR	Calliari, Elisa
494	WorldCereal: a dynamic open-source system for global-scale, seasonal, and reproducible crop and irrigation mapping		0	2023	ASA, NODES	Lesiv, Myroslava; Laso Bayas, Juan Carlos; Fritz, Steffen
495	libpspm: A feature-rich numerical package for solving physiologically structured population models		0	2023	ASA, CAT, EM, SYRR	Joshi, Jaideep; Stefaniak, Elisa; Dieckmann, Ulf; Brännström, Åke
496	A Cloud-native Approach for Processing of Crowdsourced GNSS Observations and Machine Learning at Scale: A Case Study from the CAMALIOT Project	Advances in Space Research	0	2024	ASA, NODES, SI	Sturn, Tobias; Weinacker, Rudi; See, Linda; McCallum, Ian; Fritz, Steffen
497	Encouraging others to save water: Using definitions of the self to elucidate a social behavior in Florida, USA	Cleaner and Responsible Consumption	0	2024	ASA, CAT	Yazdanpanah, Masoud
498	Ecological determinants of Cope's rule and its inverse	Communications Biology	0	2024	ASA, CAT, EM, SYRR	Brännström, Åke; Dieckmann, Ulf
499	Risk-adjusted decision making can help protect food supply and farmer livelihoods in West Africa	Communications Earth and Environment	0	2024	ASA, EM	Wildemeersch, Matthias
500	Economic and labour market impacts of migration in Austria: an agent-based modelling approach	Comparative Migration Studies	0	2024	ASA, CAT, EM, POPJUS, EQU	Poledna, Sebastian; Strelkovskii, Nikita; Goujon, Anne; Linnerooth-Bayer, Joanne; Catalano, Michele; Rovenskaya, Elena
501	Vertical fit of water governing systems: A regional assessment	Current Research in Environmental Sustainability	0	2024	ASA, CAT	Arjomandi, Peyman; Komendantova, Nadejda
502	Substantial Differences in Crop Yield Sensitivities Between Models Call for Functionality-Based Model Evaluation	Earth's Future	0	2024	ASA, EM, BNR, AFE	Balkovic, Juraj; Folberth, Christian; Khabarov, Nikolay
503	The innovative role of cities in solving global problems with local solutions	Environment and Planning B: Urban Analytics and City Science	0	2024	ASA, NODES	See, Linda
504	Exploring the potential for nitrogen fertilizer use mitigation with bundles of management interventions	Environmental Research Letters	0	2024	ASA, EM, BNR, AFE, BEC	Folberth, Christian; Jung, Martin; Obersteiner, Michael
505	Exploring fishing impacts on the structure and functioning of the Yellow Sea ecosystem using an individual-based modeling approach	Journal of Marine Systems	0	2024	ASA, CAT, EM	Heino, Mikko

506	Application of a structured decision-making process in cryospheric hazard planning: Case study of Bering Glacier surges on local state planning in Alaska	Journal of Multi-Criteria Decision Analysis	0	2024	ASA, CAT	Danielson, Mats; Ekenberg, Love
507	Technology for Creating Systems for Monitoring and Predictive Modeling the State of Hazardous Phenomena and Objects (on the Example of the Covid-19 Epidemic)	Lecture Notes in Networks and Systems	0	2024	ASA, CAT	Komendantova, Nadejda; Ekenberg, Love
508	Soil warming increases the number of growing bacterial taxa but not their growth rates	Science Advances	0	2024	ASA, EM	Richter, Andreas
509	Introducing shared, electric, autonomous vehicles (SAEVs) in sub-urban zones: Simulating the case of Vienna	Transport Policy	0	2024	ASA, EM	Naqvi, Asjad
510	Beyond awareness: the persuasion stage of decision-making explains urban residents' compliance with landscape irrigation restrictions	Urban Water Journal	0	2024	ASA, CAT	Yazdanpanah, Masoud
511	An Ecological Perspective to Master the Complexities of the Digital Economy		0	2024	ASA, CAT, EM	Rovenskaya, Elena; Hathiari, Sarah; Boza, Gergely
512	Improving the representation of smallholder farmers' adaptive behaviour in agent-based models: Learning-by-doing and social learning		0	2024	ASA, CAT, EM, YSSP	Apetrei, Cristina; Strelkovskii, Nikita; Khabarov, Nikolay; Javalera Rincón, Valeria