

**Annual Results
Report for 2022**

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This is an internal report, shared with our core funders, the SEI Board and to support learning within SEI. It is produced annually and gives an overview of key achievements in relation to the goals and priorities in the SEI Strategy. It shares overlaps with the SEI Annual Report. The same Change Stories and many examples of key results appear in both reports. This report follows SEI's Results and Learning framework. It includes details of SEI's publications; policy engagement activities; work promoting gender equality and social equity; and examples of co-production, training and engagement with networks. It also includes details of how SEI is undertaking organizational strengthening, including how we stimulate organizational learning and assure quality across the institute.



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Stockholm Environment Institute is an international non-profit research and policy organization that tackles environment and development challenges. We connect science and decision-making to develop solutions for a sustainable future for all. Our approach is highly collaborative: stakeholder involvement is at the heart of our efforts to build capacity, strengthen institutions, and equip partners for the long term. Our work spans climate, water, air, and land-use issues, and integrates evidence and perspectives on governance, the economy, gender and human health. Across our eight centres in Europe, Asia, Africa and the Americas, we engage with policy processes, development action and business practice throughout the world.

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Executive summary

At SEI, we work toward three main outcomes: changing agendas, informing decisions and building capacity. We undertake scientific research and engage with policymakers, practitioners, and the private sector to promote sustainable development with a specific focus on three impact areas: reducing climate risk, promoting sustainable resource use and resilient ecosystems, and improving health and well-being. We work internationally and across levels of governance, connecting science and decision-making to develop solutions for a sustainable future for all.

In 2022, we continued to successfully deliver on this mandate. This Annual Results Report captures a selection of our most impactful work from last year. This summary aims to pinpoint specific results that speak to the pillars of Sweden's strategy for global development cooperation in the areas of environment, climate and biodiversity 2022–2026, which funds core support to SEI. The central strategic tenets we targeted include:

- **Increased water security through sustainable management of freshwater resources and freshwater ecosystems.**

SEI has developed new methods for assessing water stress and built capacities for more holistic and connected regional watershed management that promotes regional cooperation and includes the voices of Indigenous and vulnerable stakeholders.

Our work with partners and communities in Bolivia has resulted in the co-creation of three watershed master plans that properly reflect local needs (see Change Story “Water plans promote equity and empower partners” on page 15). Through supporting the development of the Lancang-Mekong Environmental Cooperation Strategy and Action Framework (2023–2027), we have enabled better cooperation between Cambodia, China, Lao PDR, Myanmar, Thailand and Viet Nam on water resources management and other shared environmental issues (see page 40).

We continue to develop existing and create additional tools for water planning. SEI's Water Evaluation and Planning (WEAP) tool has a new feature for calculating water stress at the sub-basin level that has enabled local actors in Algeria and Tunisia – previously reliant on more broad, country-level assessments – to take ownership of actions to ease water stress. The recently launched RAT-Mekong web application will assist the Mekong River Commission and member countries in their decisions and planning for drought and flood management in the Lower Mekong Basin (see page 43).

Work in SEI's Water Beyond Boundaries Initiative (see page 70) has built regional water planning capacities in Thailand, mainstreamed gender, social equity and poverty considerations into water planning in Colombia (see page 47) and co-produced a “serious game” approach with and for local partners that enabled them to engage diverse stakeholders in the development of actionable watershed management plans that deliver benefits for all (see page 48). Work on the integration of WEAP with SEI's Low Emissions Analysis Platform (LEAP) tool has enabled the investigation of water-energy-environment nexus in Central Asia (see page 67).

We have also developed new Memoranda of Understanding aimed at progressing Water-Energy-Food Nexus research in Latin America and enhancing capacities for water resources management in Pakistan that will build on our strong portfolio of work on integrated water management (see page 23).

- **Limited climate impact, including increased access to renewable energy and increased energy efficiency.**

Our work on energy sector development planning and sustainable, just transitions away from fossil fuels has informed decisions and changed agendas. Much of this work leverages SEI's LEAP tool (see page 42), and SEI's Integrated Climate & Development Planning Initiative (see page 66).

We are working with Estonia, Latvia, Lithuania and Finland towards decarbonization of the Regional Gas Market Coordination Group to end Russian natural gas dependency and achieve long-term domestic renewable gas production (see page 38). We have supported least-developed and middle-income countries to improve air quality and reduce greenhouse gas emissions through strengthened policies and energy sector development planning. Examples include our primary scientific research on emissions mitigation actions (see page 29); our coordination and co-development of the modelling behind the Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa summary report, which was launched at COP27 (see page 37); our support of countries to reduce short-lived climate pollutants including methane (see page 38); and our numerous capacity-building initiatives that have empowered countries to examine pathways to achieve national and regional energy, climate, and development targets, including in the Association of Southeast Asian Nations (see page 52) and Ethiopia (see page 66).

Through these efforts, we have highlighted synergies with and informed actions on development co-benefits. This has resulted in Nationally Determined Contributions in Cambodia and Côte d'Ivoire that, if implemented, will reduce premature deaths from air pollution (see pages 42–43). Through SEI's Carbon Lock-In Initiative, we are supporting the Colombian government to plan for a just transition from coal (see page 65).

- **More environmentally sustainable and inclusive cities and societies.**

We work with cities in Africa, Asia and Europe to improve infrastructure, reduce air pollution, enhance the health and well-being of residents, and increase their participation in planning processes.

Our work on reducing air pollution for the benefit of local people includes awareness raising, air quality monitoring and agenda-setting campaigns with Athletics Kenya (see Change Story "Athletics speeds action on climate and air pollution" on page 19) and communities in Nakuru, Kenya (see page 69). In Zambia and Uganda, we empowered city authorities to include the views of disadvantaged residents in transport-related decision-making processes, and produced detailed visual guidance that allows others to follow suit (see page 46). In Kenya, we used participatory mapping with residents to inform future investments in urban spaces that benefit the health and well-being of communities (see page 69).

We are also leveraging a new project to better understand the ramifications of disaster displacement and drivers of migration at the household level in informal settlements in Kenya, and connect this to regional platforms for political cooperation on migration between Africa and Europe (see page 38).

- **Sustainable production and consumption patterns, including the transition to sustainable food systems, reduced pollution and sustainable chemical and waste management.**

SEI has a diverse portfolio of work connected to sustainable production and consumption. In water and sanitation, we developed a framework for implementing integrated rural sanitation interventions that enhance agricultural production and environmental sustainability at the household and community levels (see page 40), expanded the capacity of and applied our

Resource Value Mapping and WASH Flows tools in Bolivia (see page 43 and Change Story “Water plans promote equity and empower partners” on page 15), and — through our Gridless Solutions Initiative — supported the piloting and development of scalable WASH technologies (see page 71).

Regarding greenhouse gas emissions, we continue to strengthen and leverage the Leadership Group for Industry Transition (LeadIT) Initiative to decarbonize heavy industry, which in 2022 included work that will inform the actions of the G20 and G7 (see pages 37 and 50). Furthermore, we supported private sector actors within the World Economic Forum’s Alliance for Clean Air, including IKEA and MAERSK (see page 36), and the Estonian public sector (see Change Story “Partnership helps the Estonian public sector assess and reduce its footprint” on page 21) to calculate and reduce their carbon footprints. We also helped bring more rigor, standardization and accountability to the net-zero carbon pledges made by corporations and other non-state actors (see page 38).

Regarding production and consumption, we partnered with the World Business Council for Sustainable Development (WBCSD) and the Stockholm+50 Secretariat to mobilize companies and stakeholders to increase sustainability in six key global value chains (see page 36), put food waste and circular economy on the agenda of the Think20 summit under Indonesia’s G20 Presidency (see page 40), and informed the sustainable development of the cassava bioeconomy in Colombia (see page 40). A new tool, Global Shipping Watch, supports efforts to decarbonize the shipping sector (see page 44).

- **Increased adaptability and resilience to climate change and natural disasters.**

In 2022, we continued to strengthen our climate change adaptation and disaster risk reduction work.

At COP27, our assessment of the principles and funding instruments that should underpin loss and damage finance contributed to the decision to establish a loss and damage fund and helped advance the issue of climate justice (see Change Story “Breakthrough decision on loss and damage draws on SEI research” on page 14). In the Philippines, we partnered with its human rights commission in a major inquiry that holds “carbon majors” to account for the impacts of climate change on the rights of Filipinos – and are now supporting its efforts to find durable solutions for communities displaced by disasters (see Change Story “Securing the human rights of disaster-hit communities in the Philippines” on page 17).

In Lusaka, Zambia, we have used “city learning labs” to bring stakeholders together to co-explore solutions to urban flooding that will guide city officials in developing Lusaka’s new integrated development plan (see page 48).

We produced and are working with stakeholders to implement the recommendations of flagship reports on transboundary climate risk in Sweden and the Nordic countries (see page 59), and a *Just Transition for Climate Adaptation*, which highlights the important role of adaptation action for large multinational corporations that aim to achieve a just transition (see page 35).

We have worked with partners to inform and advocate for child rights in relation to climate change, and to produce a framework and supporting materials that promote the integration of human rights and gender equality into disaster risk reduction work (see page 46).

- **Cleaner oceans and coasts, and sustainable use, management and restoration of marine resources, biodiversity and ecosystems.**
- **Improved protection, preservation and restoration of ecosystems and biodiversity, and improved conditions for sustainable management and use of land-based natural resources.**

SEI's work on biodiversity, which cuts across many of our projects, continues to expand and make an impact.

The new Global Environmental Impacts of Consumption (GEIC) indicator, adopted as part of the historic deal to protect nature that was struck at the 2022 UN Biodiversity Conference, is underpinned by SEI's established footprinting model, IOTA (see Change Story "UN takes up SEI tool to help countries meet targets for nature" on page 14). The indicator will help countries understand the environmental impacts of their consumption, and to make more targeted investments and effective policy.

SEI's Trase tool, which maps the international trade and financing of commodities that drive tropical deforestation, continues to resonate in multiple ways (see page 42). In 2022, the Trase team directly supported Germany, Belgium and France in their efforts to achieve deforestation-free supply chains. In France, this resulted in increased disclosure of commercial trade data, marking a crucial first step towards sector-wide transparency (see page 42).

SEI's Gridless Solutions Initiative was awarded a project from the Mistra Blue Economy program that will advance our work with multi-use marine solutions for energy and water provision, and position SEI among the frontrunners in the fast-developing field of research on "blue growth" (see page 72).

The examples highlighted here offer only a glimpse into SEI's work. They do not include details of our cross-cutting work on sustainable development (for example, with the SDG Synergies tool; see page 44), or how we influenced the agenda of the UN international meeting "Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity" (see page 39), including how we highlighted the role of global youth in achieving a sustainable future for all (see page 45).

Those details will be found throughout the Annual Results Report, demonstrating not only SEI's commitment to Sweden's strategy for global development cooperation, but to finding innovative ways to inform sustainable development and climate policy worldwide.

1. SEI in 2022: How did we do?

1.1 Leadership perspective

An introduction from the Executive Director

The year 2022 began on a hopeful note with the pandemic receding. Less than two months later, Russia invaded Ukraine, upending the world's economy, escalating geopolitical tensions, and unleashing a humanitarian crisis. High inflation rates, soaring food prices and rapidly escalating costs of fuel and energy combined to create a cost-of-living crisis, with the world's poor hit the hardest. Indeed, the upheavals of the pandemic and the war in Ukraine have sharply set back global efforts to reduce poverty and created additional hurdles for the global pursuit of sustainable development.

Grappling with complexity

Within the domain of environmental policy, current debates show how difficult it is to determine the merits of sustainability efforts in different sectors, for various products, through developing technologies, and across global supply chains. It is especially challenging to measure sometimes contradictory performance criteria on climate change, biodiversity and pollution – and to add to this calculus important considerations about gender, and the impacts on the poor and wider society.

Such assessments – whether for policies to address bioenergy and land use, or for investments into the next-generation power sources – should be based on science. But science itself increasingly reveals the complexities and ambiguities inherent in decision-making. Conclusions depend on who is looking at an issue, what aims one has in mind, and which point of view one holds.

Against this backdrop, SEI has an important role to play. Our value added lies in our ability to take a clear view of such real-world complexities – and to help find ways to deal with them. Our work requires balancing rigorous science with an understanding of context, perspectives and systemic interactions – including the potential synergies and the likely trade-offs between different sustainability and development dimensions. I firmly believe that our capacity to tackle complexity and avoid oversimplification makes us a credible and relevant knowledge partner today, and that this will continue to be the case in the future.

Staying on track in turbulent times

Despite these troubling and turbulent times, SEI has continued to progress in 2022, as evidenced by our growth, our outputs, and the changes we have brought about through our work. This annual results report captures key developments that took place within the Institute in 2022, and it highlights the key achievements that we helped to bring about in the wider world over the course of the year.

Among our many accomplishments in 2022, the Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa stands out as a key achievement.

Developed by African scientists in a three-year process, the assessment was coordinated by SEI in partnership with the African Union Commission (AUC), the UN Environment Programme (UNEP) and the Climate and Clean Air Coalition (CCAC). It shows how African leaders can act quickly across five key areas – transport, residential, energy, agriculture and waste – to fight climate change, prevent air pollution, protect human health, and advance development.

Another key initiative of note from 2022 is SEI's work to develop new partnerships and programmes in Eastern Europe and the Western Balkans, which now include Ukraine, Georgia, Moldova and Armenia. Led by a new team at HQ, this work serves to upgrade policy frameworks and processes to levels in line with the European Union's accession requirements, based on the best available current research. We plan to expand these efforts in the coming years.

Improving SEI's operations

The world of work continues to evolve as the result of the pandemic experience, and SEI is adapting accordingly. In 2022, colleagues around the world returned to the office, but in new ways. We began establishing new rules and practices for hybrid work, and repurposing office spaces for new modes of working.

As a relatively fast-growing research institute, SEI frequently carries out organizational reviews and upgrades. The 2021 reorganization of the HQ research teams and divisions is proving successful, as evidenced by the strong progress made by the new teams in generating outputs, creating new projects, and securing the funding to see their innovations through over the coming years. As we move into 2023, reviews are ongoing in the SEI US and SEI Latin America centres and in the communications department.

Both the growth of the Institute and the tenor of our times have motivated us to work even more actively with risk. We have enhanced our risk-management framework and established a global risk policy. Prioritized risks for 2022 included issues around fundraising, staff recruitment and retention, and political shifts affecting the sustainable development agenda. We have also ramped up our information technology (IT) security and established a new position to lead the Institute's efforts to ensure IT and data security.

Surveying the year ahead

As I look ahead in 2023, we are entering the year with a full agenda and project portfolio. We will be contributing expertise to both the UN High-level Political Forum on Sustainable Development (also known as the SDG Summit), which marks the mid-point in the implementation of the 2030 Agenda for Sustainable Development; and to the Indian G20 Presidency, leading up to the summit in New Delhi. We will be launching an upgraded, eco-conscious version of SEI's climate adaptation knowledge platform, weADAPT, which brings together adaptation practitioners from across the world to share experiences and learn from each other.

Finally, preparations will start for the next SEI Strategy, which will be operational from January 2025. Work begins with an external review of our current strategy, its results and value to partners and collaborators. I look forward to another stimulating and collaborative process with our colleagues and partners so that we can set a course to generate knowledge and spur actions to limit climate change and achieve the Sustainable Development Goals.

Måns Nilsson

1.2 SEI Strategy 2020–24: Knowledge for Action

“SEI Strategy 2020–24: Knowledge for Action” represents a new and more focused way for SEI to plan, measure and communicate our work and results. SEI works towards three main impact areas: reducing climate risk, promoting sustainable resource use and resilient ecosystems, and improving health and well-being. Under the thematic umbrella of the impact areas, we work towards 17 priorities for change (see Table 1). We achieve these priorities through three main types of outcomes:

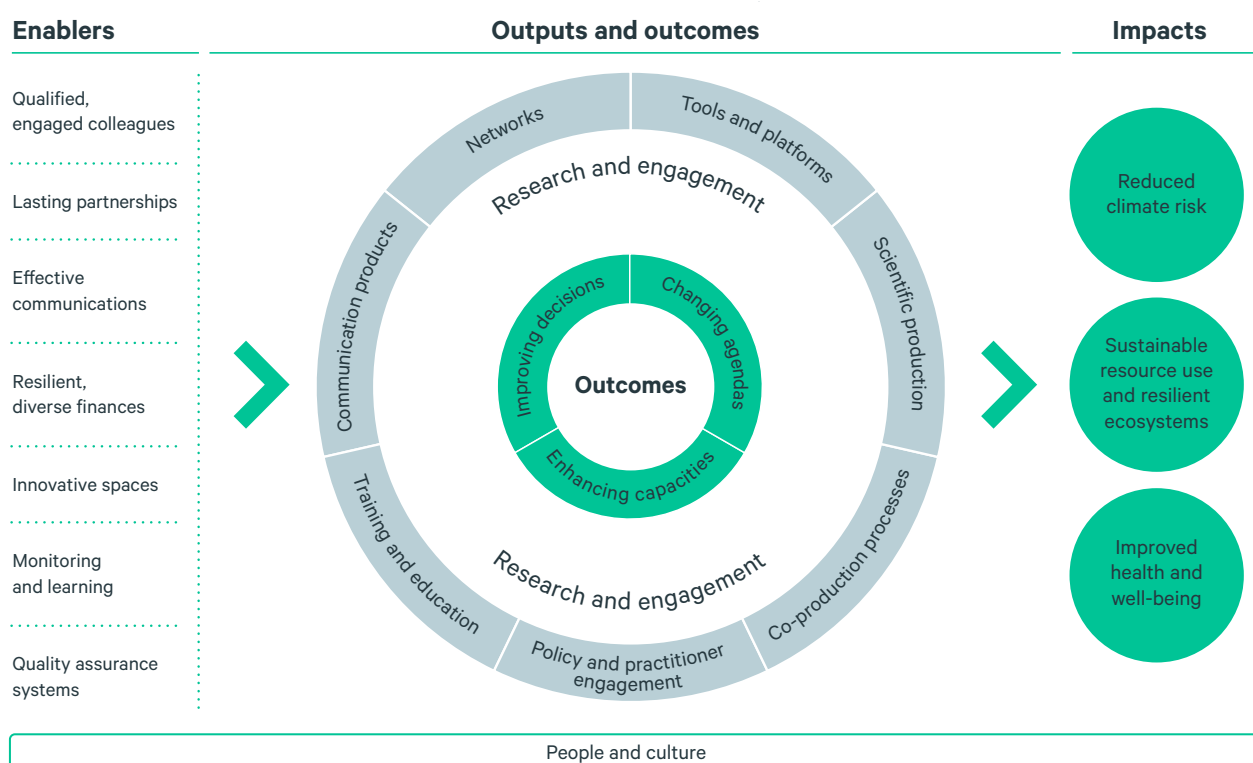
Changing agendas – where SEI’s work results in changes in formal and informal policy agendas and international agreements or treaties, and increases awareness and influences attitudes, perceptions and norms at different levels.

Enhancing capacities – where SEI’s work results in strengthened organizational capacity (e.g. to carry out planning and analysis); empowered stakeholders; new networks and coalitions; strengthened institutions; and improved, more holistic and inclusive decision-making or planning processes for different actors at different levels.

Improving decisions – where SEI’s work supports or changes decisions, decision-making processes, practices, strategies and planning among actors in public policy, finance, business and resource management.

This is the third year that we report according to the SEI 2020–24 Strategy and the ensuing Results and Learning Framework and Theory of Change (Figure 1). Our Results and Learning Framework is used for three interrelated purposes: to focus and prioritize work, to guide thematic and operational learning internally and with partners, and to establish accountability within our organization and for our donors and partners. By annually following up on our planned activities,

Figure 1. Our Theory of Change



and learning both from successes and setbacks, we hold ourselves accountable to our plans, and demonstrate to donors and stakeholders whether and how we have met our goals.

The rest of the report is organized as follows: **Section 2** presents six change stories that were selected to provide key examples of the ways in which SEI research and engagement have led to outcomes in the three targeted impact areas. **Section 3** provides a broader range of examples of the results of SEI activities. **Section 4** presents key institute developments and the results of work to strengthen our organizational enablers, including key achievements from our external communication products and our internal environmental policy. **Section 5** provides the results of SEI initiatives.

Table 1. Impact areas and priorities for change in the SEI Strategy 2020–24

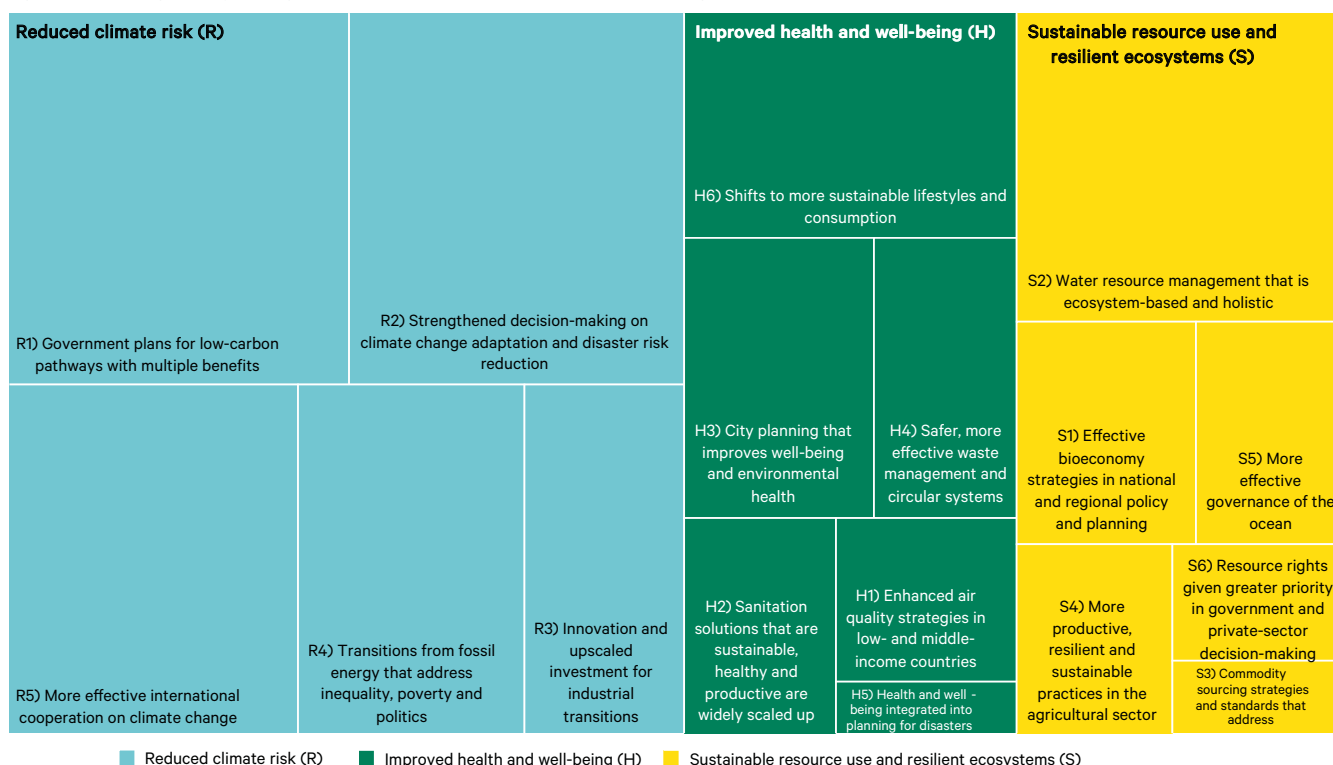
Impact areas	Priorities for change in 2020–24
Reduced climate risk (R)	R1. Government plans for low-carbon pathways with multiple benefits R2. Strengthened decision-making on climate change adaptation and disaster risk reduction R3. Innovation and upscaled investment for industrial transitions R4. Transitions from fossil energy that address inequality, poverty and political economy R5. More effective international cooperation on climate change
Sustainable resource use and resilient ecosystems (S)	S1. Effective bioeconomy strategies in national and regional policy and planning S2. Water resource management that is ecosystem-based and holistic S3. Commodity sourcing strategies and standards that address deforestation and biodiversity S4. More productive, resilient and sustainable practices in the agricultural sector S5. More effective governance of the oceans S6. Resource rights given greater priority in government and private-sector decision-making
Improved health and well-being (H)	H1. Enhanced air quality strategies in low- and middle-income countries H2. Sanitation solutions that are sustainable, healthy and productive are widely scaled up H3. City planning that improves well-being and environmental health H4. Safer, more effective waste management and circular systems H5. Health and well-being integrated into planning for disasters, migration and displacement H6. Shifts to more sustainable lifestyles and consumption

1.3 Our contribution to outcomes and impacts in the SEI Strategy 2020–24

With the launch of the 2020–24 strategy, we embarked on an effort to map SEI's ongoing research projects against our impact areas and priorities for change. The results of this mapping were presented in last year's Annual Results Report. In November 2022, each SEI centre conducted a mapping exercise in workshops designed to inform the 2023 workplan. Figure 2 summarizes the outcome of the mapping exercises, which identified 300 projects. The diagram gives an indication of the number of projects with a focus on a certain priority for change, and thus illustrates the thematic distribution of SEI's project portfolio. The mapping is not exhaustive (i.e. it does not include all SEI projects); it includes some duplicates across impact areas because several of our larger programmes make significant contributions to more than one impact area.

The overall balance of projects between the different impact areas in 2023 is similar to the balance reported in 2022. The proportion of projects primarily aimed at ecosystem-based and holistic water resource management has grown. Within Improved health and well-being there is a slight shift in focus towards sustainable lifestyles and consumption, a topic that closely connects with other priorities for change within this impact area.

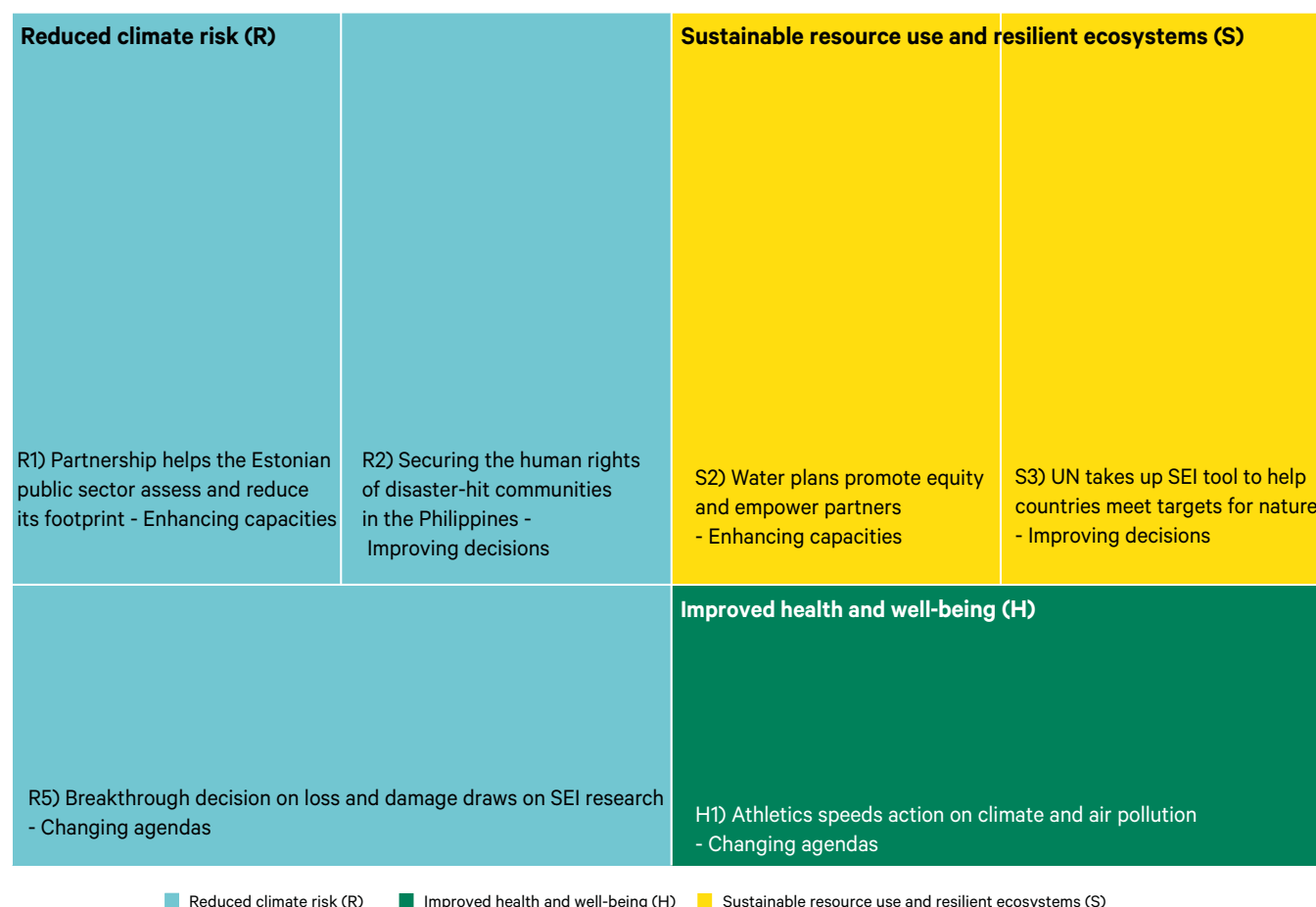
Figure 2. Mapping of projects against our impact areas and priorities for change in the 2023 Workplan.



2. Change stories

In this section, we present six highlights from SEI's portfolio of work. The stories give insight into some of our strongest contributions to societal change in environment and development in 2022. The change stories span our three impact areas and contribute towards different priorities for change, as indicated in Figure 3. The same six change stories feature in the SEI Annual Report 2022.

Figure 3. Mapping of change stories against our priorities for change and outcome areas.



The shorthand letter and number combination (indicated by R1-R5, S1-S6, and H1-6, as shown in Table 1) shows which impact area and priority for change each story addresses. We also indicate which main outcome area each change story addresses (improving decisions, changing agendas or enhancing capacities).

2.1 Breakthrough decision on loss and damage draws on SEI research

COP27 delivered a historic decision to establish a loss and damage fund for nations hard hit by climate change impacts. SEI's assessment of the principles and funding instruments that should underpin loss and damage finance contributed to the decision and helped to advance the issue of climate justice.

Strategy in action

Priority for change: More effective international cooperation on climate change

Type of outcome: Changing agendas

By focusing on the need for loss and damage finance rather than focusing on the politics of the issue, the research was able to chart routes forward that represented a compromise for developed and developing countries and to contribute to reaching consensus. The research provided a strong evidence base used by civil society and developing-country negotiators in their call for a loss and damage fund.

The impacts of climate change are escalating rapidly, with the most vulnerable communities around the world already losing their homes and livelihoods to floods, hurricanes and sea-level rise. To help enable their recovery, these communities urgently require financial support, which could range from US\$ 290 billion to 580 billion per year by 2030 for developing countries.

Within the UN system, however, developed countries have for the past 30 years blocked progress on providing finance to help compensate these losses and damages. This stalemate ended at the 27th Conference of the Parties (COP27) in November 2022, with the historic decision to create a fund to provide finance for loss and damage caused by climate change – a decision that UN Secretary – General António Guterres hailed as “an important step towards justice”.

Research, engagement, and opportunity

SEI research and outreach played a critical role in the process. A new SEI report published ahead of COP27 assessed how loss and damage finance could be operationalized. Led by SEI and seven partners in both the Global North and South, the research drew on interviews with key stakeholders and a literature review to identify the underlying principles that should guide the creation of a loss and damage fund, as well as how to design the fund so that these principles can be applied effectively. The research was accompanied by extensive outreach to partners and engagement with policymakers, negotiators, civil society, media and national governments – all of which helped break the historical deadlock on the issue and provide critical insights on how a loss and damage fund can be fair, feasible and effective.

Various factors converged to catalyse change. Pressure from civil society had been growing. Countries from the Global South had formed a tight coalition. Catastrophic examples of the misery inflicted by climate change, including recent floods in Pakistan and droughts in East Africa, were fresh in people's minds. And Scotland's leadership at COP26 in Glasgow played a part; as host, it took the symbolically important step of backing a new funding philosophy.

Laying groundwork for success

SEI took advantage of this support. The research was partly funded by the Scottish Government, which offered a platform for SEI to present its results at key political events in Edinburgh and Brussels in the run-up to COP27. Following these engagements the Scottish Government endorsed the principles and arrangements that we had advanced in our research in its [report](#) on its first loss and damage grant, intended to serve as a blueprint for future action on loss and damage. Scotland continued to play a vital role at COP27 by holding bilateral meetings on the issue with key countries that were crucial to reaching a decision but had previously been hard to reach.

In the run-up to COP27 the research team worked with negotiators from the Alliance of Small Island States and representatives of the Climate Vulnerable Forum. Because the engagement of developed-country actors was critical to success, the team also held a bilateral meeting with a representative of US Congresswoman Diana DeGette and conducted a workshop with the EU loss and damage negotiator.

“SEI’s report has been instrumental in putting climate justice principles at the heart of our discussions on how to implement global loss and damage funding. It offered in-depth and timely scrutiny of funding modalities and principles and highlighted common pitfalls in existing funding. We look forward to future iterations of this work and hope to continue our collaboration with them on practical action to address loss and damage.”

—Jemima Gordon-Duff, Deputy Director for International Climate Change, Scottish Government

Influence in official negotiations and on public debate

COP27 negotiations demonstrated that the loss and damage issue and our approach had gained traction. The G77+China – the largest developing-country negotiating group – called for a loss and damage fund that was aligned with the recommendations in the SEI report. For example, the group emphasized the need for the fund to be accessible, non-project-based, and grant-based – all principles identified in the report. Moreover, developed countries finally shifted their position and agreed to a loss and damage fund, which we believe was at least in part due to our assessment of finance gaps and pathways forward.

SEI’s research also built momentum on loss and damage finance in the public discourse. The report was cited in about 20 news articles, by both global outlets such as [Reuters](#) and national outlets in [India](#), [Bangladesh](#), [Germany](#), [France](#) and [Egypt](#). In particular, lead climate activist Vanessa Nakate quoted and backed the report’s approach in an [opinion piece](#) in *The Guardian* that issued a clear plea: “Start getting funds to those who need them most.” On Twitter, the report was promoted in a [video](#) by [UN Climate Summit News](#), an influential news aggregator for UN climate summits. At COP27, the report’s findings were presented at two official side events and at a pavilion event hosted by the Scottish Government.

What’s next? Supporting the design of the loss and damage fund

In 2023, as negotiators seek agreement on the details of the new fund, our work on principles and modalities for a loss and damage fund will only become more relevant. Given the political sensitivity and urgency around the topic, SEI can make an impact by grounding decision-making in evidence and rigorous analysis, and by engaging within UN processes set up to operationalize the fund. Further research is planned on how to design the new fund to account for local needs and priorities.

2.2 Water plans promote equity and empower partners

The Bolivia WATCH project delivers three watershed “master plans”, co-created with communities and partners to properly reflect local needs.

Each year, more than USD 13 billion in international aid goes to water projects. The vast majority is spent on infrastructure for safe drinking water, sanitation and hygiene (WASH).

Less often considered are the watersheds that supply the water running through such infrastructure, and the measures that must be taken to respond to changing conditions caused by climate, land-use, demographics and economic development.

In the [Bolivia WATCH](#) project, SEI set out to connect these areas – WASH and watersheds – with a focus on three watersheds in Bolivia, to ensure a reliable, equitable supply of clean water for all water users.

Equity of access

One of the central achievements of Bolivia WATCH in 2022 was the delivery of three watershed master plans for the Tupiza, Pampa Huari and the Choqueyapu (also known as La Paz) rivers. The plans were the result of a collaboration between SEI, the cities of Tupiza, Potosí and La Paz, key local stakeholders, and the partnership of the Swedish International Development Cooperation Agency (Sida) in Bolivia.

The master plans empower local authorities to take ownership of their water management and contribute to city planning. The goal is also to equalize water access in the river basins and reduce conflict, distributing water fairly and sustainably across communities, industrial sectors and ecosystems.

Strategy in action

Priority for change: *Water resource management that is ecosystem-based and holistic*

Type of outcome: *Enhancing capacities, improving decisions*

Co-design is an important plank of Bolivia WATCH because it empowers local authorities and stakeholders to make their own decisions, informed by science. The modelling and data provided by SEI tools such as WEAP, REVAMP and WASH Flows allow decision-makers to chart the way forward on water access and sanitation in their communities.

Bolivia WATCH turned local water planning from a top-down process to a collaboration among stakeholders to produce policies that consider both the health of the local ecosystem and a wide range of water users' needs. A diverse set of partners contributed to the planning process, allowing for a more democratic and comprehensive result.

“This work will be of great use for future planning in our municipality. The most important thing is that this instrument has been prepared jointly with all the actors involved, from the communities, municipal technicians, SEI experts and Bolivia WATCH technicians. This work will be included in our Territorial Development Plan and we can attest to the fact that it has been a great contribution.”

– Jesús Guzmán Ortega, Honourable Mayor of the Municipality of Tupiza

In the city of Tupiza, for example, 98% of residents have access to household water supply, while only 70% of residents in the surrounding rural communities can say the same. The rural-urban gap also occurs along gender lines: in the city, men and women have near-equal ability to pay for water, while in the rural communities, men have greater capacity to pay.

Bolivia WATCH sought to rectify these inequalities through the design of the master plans.

Plans empower local government

The work began in 2019, prompted by Sida's aim to support integrated water planning and sanitation in Bolivia. It incorporates SEI tools such as WEAP, REVAMP and WASH Flows to balance ecological, agricultural, municipal and sanitation needs.

Local technicians and communities worked alongside SEI to co-design the plans, which meant that water users' needs were adequately reflected. This approach is a critical feature of Bolivia WATCH and its equity efforts.

“For us as an institution and as authorities, it is very important to have this work as a planning instrument, for the management of our water resources of the Tupiza River,” said Jesús Guzmán Ortega, Honourable Mayor of the Municipality of Tupiza. “This work will be of great use for future planning in our municipality. The most important thing is that this instrument has been prepared jointly with all the actors involved, from the communities, municipal technicians, SEI experts and Bolivia WATCH technicians. This work will be included in our Territorial Development Plan, and we can attest to the fact that it has been a great contribution.”

Tool for decision-making

In March, the Bolivia WATCH team shared the findings of the report with municipal officials from Tupiza, Colcha K and Atocha, and with representatives from the Department of Potosí. More recently, the team delivered the Pampa-Huari plan and the delivered the Choqueyapu-La Paz plan.

“Now we have a diagnostic tool, with defined strategic lines. We even have a tool like the hydrological model thanks to the Stockholm Environment Institute,” said Gary Janco, technician of the Secretariat of Mother Earth at the Potosí department's government. This allows us to help our authorities make decisions regarding drinking water and sanitation, and make our goals come true, projecting the care of this Mother Earth from an efficient, rational and equitable use of water.”

New phase to support Bolivia's development plans

After the close of the project's first phase, Bolivia WATCH expects to continue through to 2026. The project will focus on aligning with Sida's five-year development cooperation strategy for Bolivia, and the next stage of the country's Pluri-National Water Resources Plan (PPRH, for its Spanish acronym) to guide its implementation towards greater impact on tackling poverty and protecting the environment.

The new phase will aim to build on the successes of the first phase, and position these within the proposed framework of the water resources plan. The focus will be on implementing the new Sida strategy in Bolivia, scaling up the achievements from the first phase, and generating new activities aligned with implementing the water resources plan.

2.3 Securing the human rights of disaster-hit communities in the Philippines

SEI partnered with the Philippines' human rights commission in a major inquiry that holds "carbon majors" to account for the impacts of climate change on the rights of Filipinos – and is now supporting its efforts to find durable solutions for communities displaced by disasters.

The Commission of Human Rights of the Philippines (CHRP) is an independent body established under the Philippine Constitution to monitor the government's commitment to international human rights treaties. The CHRP has a mandate to investigate all forms of human rights violations in the country.

In 2015, survivors of Typhoon Haiyan and other civil society groups petitioned the CHRP to establish an inquiry into the responsibility carried by 47 "carbon majors", such as Shell, BP and Chevron, for the impacts of climate change, and to establish how they might be held to legal account.

Strategy in action

Priority for change:

Strengthened decision-making on climate change adaptation and disaster risk reduction

Type of outcome: *Improving decisions, enhancing capacities*

In all actions to adapt to climate change there should be a focus on equity and inclusiveness, and on maintaining and delivering on the rights of the communities. SEI helps strengthen the efforts of disaster-affected communities for equitable resilience in the long-run.

Technical advice shapes groundbreaking inquiry

In response, the CHRP conducted the National Inquiry on Climate Change. Through a workshop hosted in Bangkok and organized by the Raoul Wallenberg Institute for Human Rights, SEI provided technical advice on the science of climate change and on key issues of climate justice to the Commission's legal team and consultants.

In 2022, the seven-year inquiry released its groundbreaking report, ruling that carbon majors "have the corporate responsibility to undertake human rights due diligence and provide remediation."

The Commission found that climate change impacts undermine the basic rights of citizens, including rights to life, health, food security, water and sanitation, livelihood, adequate housing, self-determination and development, equality and non-discrimination – as well as the right to a safe, clean, healthy and sustainable environment.

Holding polluters accountable

The report went further: in Philippine law, accountability now goes beyond the carbon majors to include businesses that are part of their value chains, for example in the financial sector. These businesses, along with carbon majors, may be compelled to undertake human rights due diligence and be held accountable for failure to remediate human rights abuses arising from their business operations.

According to the Center for International Climate Law, the inquiry "has created a roadmap and a resource for investigations and litigation everywhere." The Center said that the report had "immediate relevance" in courtrooms and that it would continue to be relevant for years to come.

New inquiry on rights of displaced people

Following the success of this inquiry, in 2022 CHRP launched its National Inquiry on the Human Rights Situation of Internally Displaced Persons (IDPs) in response to a lack of law and policy on the rights of displaced populations in current legal frameworks in the Philippines. Together, CHRP and SEI co-developed research on so-called "durable solutions" for people displaced by Typhoon Haiyan in Tacloban to document the state of their human rights almost a decade after the disaster.

A survey of over 300 displaced households found that there has been some progress on the status of living conditions of affected families, particularly now that they live in permanent housing units. However, some needs and human rights of displaced people remain unmet,

“Not only has this research helped to enrich knowledge on displacement data analyses, the results also contribute to the shaping of policies as durable solutions ... [The Commission of Human Rights of the Philippines] is grateful for SEI’s support in upholding [its] mandate”

—Reinna S. Bermudez, Chief of the Centre for Crisis, Conflict, and Humanitarian Protection, Commission on Human Rights of the Philippines

particularly on safety, security, and freedom of movement; adequate standard of living; employment and livelihoods; housing, land, and property; and participation in public affairs. Up to 30% of the respondents reported that their livelihoods had worsened, and 50% found water quality and access to be poor. Further, less than 40% of the households hold ownership documentation for their housing units, with many still insecure about their tenure rights and status.

Research shapes policy and “durable solutions”

According to Reinna S. Bermudez, Chief of the Centre for Crisis, Conflict, and Humanitarian Protection within the Commission on Human Rights of the Philippines, the partnership between SEI and CHRP has improved the Commission’s exercise of its mandate to protect and promote human rights by analysing evidence-based data from on-the-ground monitoring of the situation of the displaced families in the City of Tacloban.

She said, “Not only has this research helped to enrich knowledge on displacement data analyses, the results of the research also contribute to the shaping of policies as durable solutions. The research also helped in mainstreaming ‘presence as protection’ as the study opened opportunities for CHRP’s visibility and presence in the communities. CHRP, as a partner of SEI in this engagement, is grateful for SEI’s support in upholding the mandate of the CHRP as a main protection actor in situations of displacement.”

This use of evidence-based knowledge to support the mandate of CHRP in both these inquiries demonstrates its importance in decision-making more broadly, and specifically in supporting the fulfilment of human rights of disaster-affected communities.

2.4 UN takes up SEI tool to help countries meet targets for nature

A historic deal to protect nature that was struck at the 2022 UN Biodiversity Conference includes a new indicator, developed by SEI and partners, to help countries measure impacts of consumption.

Strategy in action

Priority for change: Commodity sourcing strategies and standards that address deforestation and biodiversity

Type of outcome: Improving decisions, enhancing capacities

The GEIC indicator, taken up by the UN Convention on Biodiversity, will help countries understand the environmental impacts of their consumption, and to make more targeted investments and effective policy.

Parties to the Convention on Biological Diversity (CBD) reached a landmark agreement at the UN Biodiversity Conference (COP15) to adopt an ambitious post-2020 global biodiversity framework (GBF). Alongside targets to protect and restore nature, the framework commits, by 2030, to reducing the global footprint of consumption in an equitable manner. To achieve this, countries need the means to measure the impacts of their consumption outside of their own borders.

Groundwork laid for results

Work on SEI’s established footprinting model, IOTA, underpins the new Global Environmental Impacts of Consumption (GEIC) indicator and opened the door for its inclusion by the CBD in Montreal.

IOTA is the outcome of years of development which, ahead of COP15, bore fruit through SEI’s partnership with the UK’s Joint Nature Conservation Committee and the UK Department for Environment, Food and Rural Affairs (Defra). The UK government used outputs from IOTA as the basis of a new experimental indicator – the GEIC indicator – to measure the impacts of the UK’s consumption overseas in support of its environment plans.

Timely uptake results from effective partnership

Progress against the new framework, which includes a range of targets, will need to be measured using a monitoring system that uses indicators. For Target 16, on encouraging and enabling sustainable consumption, no headline indicator had been selected.

In deliberations in the CBD system in the months ahead of the COP, negotiators identified a need for tools to measure the impacts of consumption on biodiversity. The delegates in the room from Defra put forward the new GEIC indicator as an option, based on their successful collaboration with the IOTA team.

What does it do?

Countries, government agencies and others can use the GEIC indicator to explore a range of environmental impacts of consumption, as well as for global analysis of various production and consumption activities.

Biodiversity's COP15 took the critical opportunity to set out a framework for addressing the biodiversity crisis, and the GEIC indicator can play a role by helping governments and stakeholders to understand how consumption drives impacts – for example on deforestation, species loss, and water use – and to create more effective policy responses.

Partnerships and next steps

Partnerships with [JNCC](#) and [Defra](#), [Trase](#) and the [GCRF Trade Hub](#) were critical to the outcome, alongside the work done at SEI over many years to develop the IOTA framework, demonstrating the value of long-term commitment in delivering effective outcomes. While the GEIC indicator is already a valuable tool for decision-makers, there is work to be done to improve and refine it.

Development is ongoing to increase the spatial resolution of results to allow more countries to use the indicator for assessing their impacts. The team is also looking to extend the coverage of the indicator beyond agricultural commodities to include mining, initially, as well as enhanced metrics for deforestation, biodiversity, water, metals and minerals. Beyond this, there is a need to further develop the methods to increase accuracy, and to integrate new datasets and approaches to keep building confidence in the results.

View the GEIC indicator interactive platform at: commodityfootprints.earth.

2.5 Athletics speeds action on climate and air pollution

SEI works with Kenya's athletics governing body to meet its climate commitments under a UN initiative on climate and sports to deliver results on air pollution in Kenya and beyond.

Strategy in action

Priority for change: Enhanced air quality strategies in low- and middle-income countries

Type of outcome: Changing agendas, enhancing capacities

SEI worked with Athletics Kenya to meet its commitments under the UNFCCC Sports for Climate Action Framework. The collaboration provided opportunities to spotlight air pollution and climate action at the top of the Kenyan government and in regional and international governance forums.

Kenya has a proud record in athletics, and in 2021 Athletics Kenya, the country's governing body for the sport, became the first of 214 member federations to join World Athletics as a signatory to the UN's Sports for Climate Action Framework (S4CA). The initiative urges sports groups to reduce their carbon emissions in line with the Paris Agreement.

This meant that Athletics Kenya needed to take action to meet these targets. In April 2022 it signed a Memorandum of Understanding with SEI to collaborate on action on climate change and air pollution.

Impact at different levels

SEI's role under the agreement is wide ranging, and has supported Athletics Kenya on multiple fronts: monitoring air quality in sports stadiums and facilities, conducting public awareness campaigns, providing training and educational material, and offering insights about how to contribute to change in global policy processes. Since the MoU was signed, the collaboration generated outcomes throughout 2022 at national, regional and international levels.

“Sport is one of the good ways to communicate environmental protection and climate change. Air quality is also important for athletes, and we will continue with the momentum that has already been set. More awareness activities will be organized with the expert knowledge of Athletics Kenya and partners SEI and UNEP.”

—Lamine Faty, Director General of Confederation of African Athletics (CAA)

At the national level, SEI worked with Athletics Kenya to implement the S4CA, and coordinated the body’s greenhouse gas emissions reporting for 2021–2022. SEI also ran a commemorative run in Nairobi in March to mark the 50th anniversary of the UN Environment Programme (UNEP).

Also in Kenya, SEI drew on its experience with monitoring air pollution to help install air quality sensors in seven stadiums and sports facilities. These sensors collect data on air pollution that can inform decision-making by sports organizations.

Regionally, Athletics Kenya and SEI influenced the Confederation of African Athletics (CAA) to make environment and climate change a high priority for other CAA federations, and the issue will be taken up at its annual congress scheduled for April 2023.

Globally, SEI has worked to raise awareness on the link between athletics and the environment, highlighting how action on air quality and climate can improve human health. Events in 2022 included a series of events at the UN Stockholm+50 conference in June, a webinar on the role of sport in the green transition, and a press conference on sports and environment at the African Ministerial Conference on Environment in September in Dakar, Senegal. Speakers included the Director of Climate Change in the Ministry of Environment and Sustainable Development in Senegal, the UNEP Regional Director for Africa, the Secretary General of the Confederation of African Athletics, the President of Athletics Kenya, and the President of Senegal Athletics Federation.

And in June, as a result of collaboration with Athletics Kenya and SEI, the Swedish Athletics Association became the fourth of 214 World Athletic member federations to become a signatory to the S4CA. At the UN level, all these activities contribute to the UN General Assembly Resolution 75/18 on Sports as an enabler for sustainable development.

Keys to success

The original catalyst for the results was the clear commitment and leadership shown by sports partners Athletics Kenya and World Athletics in embracing the S4CA Action Framework, which requires them to meet key climate actions and targets.

There was also a well-established working relationship among the three partners: Athletics Kenya, UNEP and SEI Africa. As part of the collaboration, UNEP directly funded SEI Africa, and purchased the air quality sensors that have been deployed in stadiums and sports facilities in Kenya and Senegal.

Political support from the Government of Kenya was also essential to both Athletics Kenya (through the Ministry of Sports) and to SEI Africa (through the Ministry of Environment). This support enabled engagement in official UN events such as the Stockholm+50 conference and COP27, as part of the official Kenyan government delegation.

Finally, diverse partnerships were vital, bringing together sports federations (Athletics Kenya, Confederation of African Athletics, Swedish Athletics, and World Athletics), UN agencies (UNEP, the World Health Organization, and the Secretariat of the UN Framework Convention on Climate Change), research and science bodies (SEI), as well as national governments and local authorities.

What next?

This work is expanding to involve all athletic federations in Africa through the Confederation of African Athletics, and to inform other sporting disciplines and larger sporting events in Africa. The focus over the next three years will be a campaign to highlight climate and air quality issues towards the 2026 Summer Youth Olympics, to be held in Dakar, Senegal. A first step towards this was the installation of an air quality sensor at the Abdoulaye Wade Stadium that will be the venue for the 2026 youth event.

2.6 Partnership helps the Estonian public sector assess and reduce its footprint

SEI developed methods, guidelines and tools to help the Estonian Government coherently assess its environmental and carbon footprint to achieve climate change mitigation goals.

Strategy in action

Priority for change: Government plans for low-carbon pathways with multiple benefits

Type of outcome: Improving decisions

SEI's work with the Estonian Government is enabling ministries to make coherent, unified assessments of their environmental and carbon footprints, and is set to expand to cover the whole public sector. The work helps public institutions prioritize better and more in-depth environmental management practices so that these institutions can become role models for many other actors and support societal change towards sustainability.

The whole of society needs to be involved in achieving ambitious national sustainability and climate goals, and it is vital that the public sector is bold and acts as a role model in leading the green transition. The Estonian Government is stepping up to the challenge with its aim to improve state-level environmental governance, but the first step is to understand and document the nature and scope of the required change.

While state institutions and the public sector had realized the need to assess their environmental and carbon footprints, there was no unified methodology or database with which to do this.

In response, SEI helped develop a methodological approach for the Estonian Government, and guidelines and tools, including an emissions factor database that enables organizations to assess their environmental and carbon footprint. As a result, Estonian public- and private-sector organizations can for the first time assess their footprint on a uniform basis.

Measurable progress

The assessment method last year enabled the Ministry of Defence and the Ministry of Interior to get a better overview of their electricity, heating, water and fuel consumption, and waste. These ministries are now able to track the impact of measures taken to reduce footprints. Furthermore, SEI has encouraged the ministries to integrate environmental goals into their internal strategies and planning processes, including action plans for reducing their footprint or developing climate plans.

The newest assessments demonstrate that, with the support of SEI, the ministries have already reduced their impact significantly. Results from last year's assessment showed that the carbon footprint of the Ministry of Defense was 26% lower in 2021 than in 2019. Waste generation per person decreased by 10%, and the share of separate collection increased from 38% to 47%. Water consumption per person also decreased by 18%.

Kadri Auväärt, Head of Environmental Policy and Spatial Planning at the Ministry of Defence, said, "Calculating the footprint helps us to see progress in moving towards goals and to maintain motivation through it – to see more clearly what is causing the greater burden behind the footprint and, based on this, to set the focus for finding solutions."

Auväärt also understands the need to develop and further refine the work. "The model and aggregate numbers are a good start, but in order to find ways to reduce the actual footprint expressed in numbers, we need to improve measurement and data collection and go into more detail to find where the reduction potential and economic impact are optimally balanced," he explained.

Trust, reliability and co-creation

The research involved developing a carbon footprint calculation methodology and an emissions factor database (i.e the rate at which given activities release greenhouse gases into the atmosphere), which is the first of its kind for Estonia. These tasks did present challenges, including making compromises to reach consensus on the methods and data used. To overcome this, the team co-created this database with stakeholders at roundtables and meetings, where data and inputs were gathered from representatives from companies, research, and public-

“We see that calculating the footprint helps us to notice progress in moving towards goals and to maintain motivation through it – to see more clearly what is causing the greater burden behind the footprint and, based on this, to set the focus for finding solutions.”

– Kadri Auväärt, Head of Environmental Policy and Spatial Planning at the Ministry of Defence

sector actors and institutions. This approach demonstrated the value of trust, reliability, and transparency to successful partnerships in state-level decision-making.

The novelty of the work stands out at both the regional and European levels because few countries have developed a country-specific emissions factor database. Because of the unified approach, the database is also valuable because it can help avoid greenwashing in reporting, which is a risk when there are many different methodologies or sources of data.

Looking ahead

The same methodology can be used for assessing the impacts of other state-level public authorities, and this work has already begun. In 2022, the Estonian Ministry of Culture presented a study that uses the assessment methodology to provide an overview of its footprint and to discover opportunities to reduce it. And other European countries, especially in Eastern Europe, have approached SEI Tallinn to consult on similar projects and share experience and expertise.

The ambition of the Estonian Government is that all ministries should start the work to assess their footprints to offer picture of the footprint of the entire public sector.

“The created model is a valuable tool for the field of governance. We can focus more precisely on the factors that reduce our environmental footprint, make smarter decisions in daily operations and make more environmentally friendly decisions in the long term,” said Tiina Uudeberg, Vice Chancellor for Defence Planning, Ministry of Defence.

The harmonized approach and emissions factor database can be used by both the public and private sectors. The work also contributes to the implementation of the EU environmental policy. It is a tool that companies and organizations can use to implement upcoming directives such as the corporate sustainability reporting directive (CSRD), which ensures that companies do more comprehensive sustainability reporting, and to make that information more accessible.

3. Research and Engagement

At SEI we strive to conduct high-quality research. This research informs our wider work, signals our scientific expertise, and serves as the basis for engaging with partners, stakeholders and decision- and policy-makers. In this section, we report on key quantitative indicators on scientific production, and we highlight key activities and results achieved over the past year.

The principle of effective and enduring partnerships is a fundamental pillar of the SEI Strategy 2020–24. It characterizes all our work, as illustrated by extensive co-authorship of scientific publications (Section 3.1), training of others (Section 3.7), and leadership and participation in alliances to set agendas and improve policies (Section 3.2). Our convening and partnering power is evidenced by our networks (Section 3.6), co-production activities (Section 3.5), and policy and practitioner engagement (Section 3.2).

Our partnering occurs among individual researchers, research teams, and at the institutional level. SEI continues to set up and maintain institutional partnerships, which primarily take the form of Memoranda of Understanding (MoUs) or memberships. Institutional academic partnerships are important for collaboration, and for access to regional expertise, innovation and learning. All SEI centres except two (SEI Tallinn and SEI Oxford) have one or several fully operational MoUs with national universities. SEI headquarters recently renewed its MoU with Stockholm University.

New Memoranda of Understanding developed in 2022

- **Athletics Kenya.** Signed in April 2022, this MoU between SEI Africa and Athletics Kenya facilitates joint research, capacity development, and policy engagement in areas examining the intersection of sports and the environment. The activities and outcomes from this partnership are covered in the change story, “Athletics speeds action on climate and air pollution” (Section 2).
- **Alliance for Water-Energy-Food Nexus research.** In 2022, SEI Latin America signed an MoU with Pennsylvania State University and three Colombian universities that formalized the launch of a Latin America Water-Energy-Food Nexus research alliance. The pilot focus of the alliance is Colombia, for which seed funding was secured from the US Embassy in Colombia and the Colombian Ministry of Science, Technology and Innovation. Seed grants in Argentina and Chile are planned for 2023. The network, which combines water and energy professionals and agriculture scientists, is supported by associations of producers of coffee, cacao, and palm oil.
- **Pakistan Water and Power Development Authority (WAPDA).** SEI US is working with the authority to further the development of basic scientific and technological research and educational programmes. Together we are devising a training programme for WAPDA engineers and scientists on issues related to climate change, robust decision-making, and integrated water-resources management. Our training efforts will also examine ways to value water using SEI’s Water Evaluation and Planning (WEAP) software to analyse the impacts of climate change, and to examine the effects of various policy and adaptation options on water resources, agricultural production, poverty, gender, social classes, and lifestyles.
- **Wildlife Conservation Society.** SEI US is working with the society to develop a capacity-building programme and to undertake projects of mutual interest in the fields of water, environment, climate change, biodiversity, and sustainability.

3.1 Scientific publications

Science provides the foundation for SEI to engage in the critical global issues that we seek to solve, and to inform sound policy recommendations. Our research is validated by the scientific community through peer review. These peer-reviewed publications play an important role in demonstrating our credibility, objectivity and depth of expertise.

To achieve a wide range of goals and reach targeted audiences, SEI researchers publish in different types of literatures, including: i) external peer-reviewed journal articles, ii) external reports produced with partners, and iii) internal peer-reviewed publications in our own SEI series (reports, working papers, fact sheets and briefs).

SCIENTIFIC CONTRIBUTIONS TO THE SIXTH ASSESSMENT REPORT CYCLE OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

Reports from the Intergovernmental Panel on Climate Change (IPCC) assess the scientific literature and set the climate policy agenda for governments. They form the globally recognized authority on climate change. SEI researchers contributed to several chapters of the Working Group II report on climate change impacts, adaptation and vulnerability. SEI researchers served as a review editor of Chapter 17, Decision-making options for managing risk; as a contributing author to Chapter 16, Key risks across sectors and regions; and as a chapter scientist for Chapter 18, Climate resilient development pathways. SEI's contributions included insights on:

- climate change-related adaptation options, focusing on vulnerable groups and enabling environments (Chapter 8: Poverty, livelihoods and sustainable development),
- climate finance, using SEI's Aid Atlas tool (Chapter 9: Africa),
- transboundary climate risk (Chapter 13: Europe; Chapter 16: Key risks across sectors and regions),
- decision-making options for managing risk (Chapter 17: Decision-making options for managing risk), and
- adaptation and the SDGs (Chapter 18: Climate resilient development pathways).

SEI contributed a three-page box on inter-regional flows of risks and responses to risks to Chapter 16, drawing on SEI research. The box informed a key finding of the report and was presented in statement B.5.3 in the Summary for Policymakers.

In addition to these direct contributions, SEI experts wrote perspectives on [SEI.org](https://www.sei.org) that offered key reflections on both the [Working Group II report](#) on climate change impacts, adaptation and vulnerability; and the [Working Group III report](#) on the mitigation of climate change.

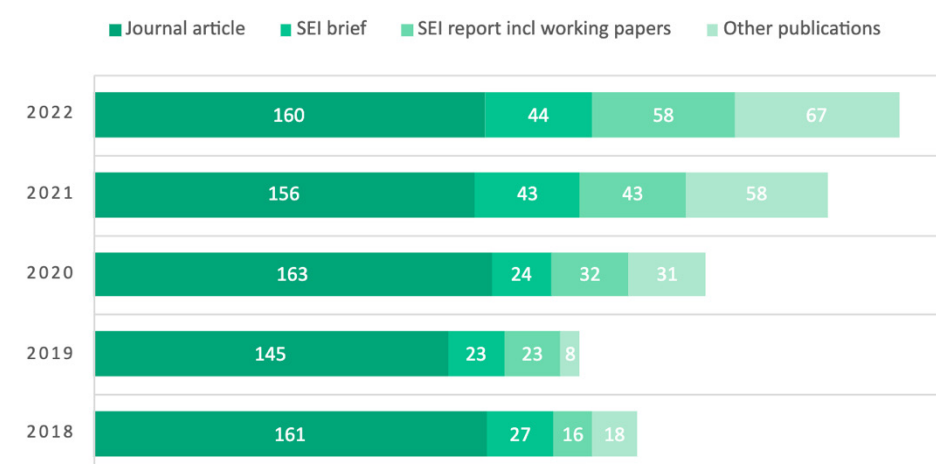
An SEI researcher is also one of the authors of the IPCC Sixth Assessment Cycle Synthesis report (due for release in March 2023); the researcher will help integrate knowledge from the IPCC Special Report on Climate Change and Land.

Continuing to increase the number of scientific publications

In 2022 the number of SEI-authored publications increased for all types of publications compared to previous years (see Figure 4). The number of journal articles slightly increased to 160 peer-reviewed articles (as measured by a merged list from Web of Science Core Collection and Scopus), with four papers in top-tier journals (Nature Sustainability, Science Advances, and two in Science). For the third year running, we increased the number of external reports and SEI publications, including briefs, reports and working papers. These include two major reports and 12 SEI-authored background papers aimed at informing dialogue at the high-level UN meeting, *Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity*, held in June.

This increase in publications reflects a combination of successful projects and a larger SEI research staff, expanding our ability to deliver high-quality research across pertinent and emerging topic areas.

Figure 4. SEI-authored outputs for the last five years.



Scientific publications that address SEI's key impact areas and priorities for change

In 2022, SEI continued to deliver high-quality scientific research addressing diverse issues that reflect all our target impact areas and priorities for change. As can be seen in Figure 5, we continue to strongly focus on climate change, which is a common thread connecting much of our work. Our publications reflect our focus on the Global South, with individual articles focused on countries including Bolivia, Brazil, Colombia, the Democratic Republic of Congo, Fiji, India, Kenya, the Philippines, Thailand, Uganda and Zambia. As in 2021, our work on systematic review and synthesis research continues to yield important contributions to this area.

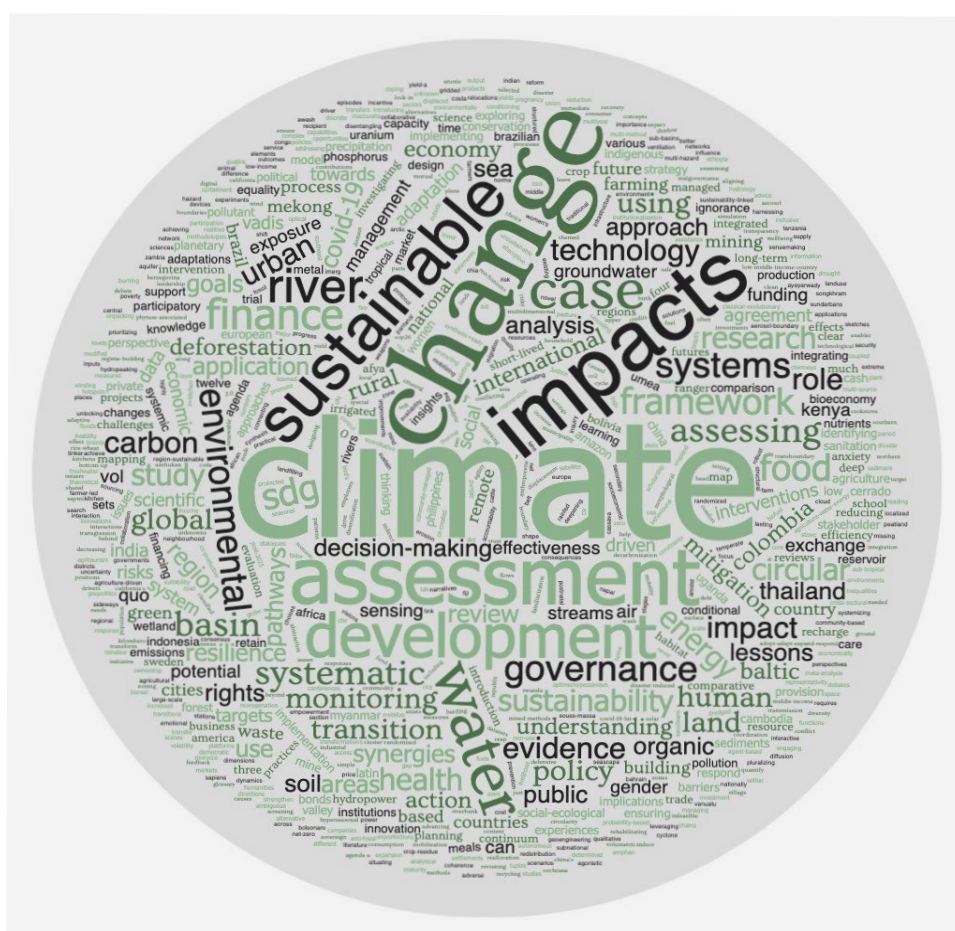
2022 was a strong year for work on the Sustainable Development Goals (SDGs), with several published articles. These aimed to help advance SDG implementation by enhancing understanding of potential trade-offs between different SDGs, and by connecting the SDGs with human health. While justice and equality are woven through SEI's work in general, notably in 2022 SEI published articles that put a distinct lens on human rights and social equality by examining how these issues interact with policy and practice.

Key topics covered in our scientific publications in 2022 include:

- **Reduced climate risk:** climate finance; technology transfer; transboundary risk; just transitions from fossil energy; and climate impacts on water and land systems and society, including trade, human health and disaster displacement.

- **Sustainable resource use and resilient ecosystems:** the bioeconomy; circular economy approaches; sustainable agritourism; the water-energy-food nexus; freshwater planetary boundaries; carbon exchange and nutrient cycling; land-use issues, including deforestation lock-in; and power and participation, particularly of women and marginalized communities, in the water and agricultural sectors.
- **Improved health and well-being:** often closely connected with our other outcome areas, our recently published work on air quality explored impacts and solutions at household, urban and national scales; our work on sanitation highlighted gender issues and the need for increased participation and circular-management approaches.

Figure 5. This word cloud shows the most frequently mentioned words in the titles of SEI's scientific publications published in 2022 (based on Web of Science data).



Publications of note

The following 10 journal articles provide examples of high-impact publications by SEI. The articles were selected to reflect our breadth of expertise and scientific and policy impact. The selections were also based on the number of citations, Altmetric attention score, policy impact (assessed using Overton), and impact factor of the related journal.

Exploring a cash transfer intervention for retaining women in maternal healthcare in Kenya

This article reports the results of a mixed-methods evaluation of the Afya conditional cash transfer (CCT) intervention, aimed at retaining women throughout the continuum of maternal healthcare. The Afya project was carried out in Siaya County, Kenya. Initially, the intervention was acceptable to healthcare staff, especially with respect to improvements in attaining targets for antenatal care visits.

However, significant delays linked to the card-reader system negatively affected the programme.

Dickin, S., Vanhuyse, F., Stirrup, O., **Liera, C.,** Copas, A., Odhiambo, A., Palmer, T., Haghparast-Bidgoli, H., Batura, N., Mwaki, A., and Skordis, J. (2022). Implementation of the Afya conditional cash transfer intervention to retain women in the continuum of care: A mixed-methods process evaluation. *BMJ Open*, 12(9), e060748. <https://doi.org/10.1136/bmjopen-2022-060748>

● **Revealing that humanity has exceeded a planetary boundary related to environmental pollutants, including plastics**

This paper assesses for the first time how the Earth's stability is affected by the synthetic chemicals and other "novel entities" flooding the environment. It concludes that humanity has exceeded a planetary boundary for environmental pollutants, including plastics. The research fills an important gap in analysis of the nine "planetary boundaries" identified by researchers in 2009. Previously, the boundary for novel entities had been unquantified. This new research advances the discussion on this boundary.

Global production and consumption of novel entities is expected to grow. Roughly 80% of all plastics ever produced remain in the environment, and predictions indicate that plastic pollution will also rise despite huge efforts in many countries to reduce waste.

Thus far (as of 25 January 2023), this article has received 32 citations in 22 documents from policy organizations and governments. Citations have been made by the Center for International Environmental Law; the Council of the European Union; the UN Environment Programme; and the governments of Finland, Denmark, Sweden, Germany and the UK.

Persson, L., Carney Almroth, B. M., Collins, C. D., Cornell, S., de Wit, C. A., Diamond, M. L., Fantke, P., Hassellöv, M., MacLeod, M., Ryberg, M. W., Søgaard Jørgensen, P., Villarrubia-Gómez, P., Wang, Z. and Hauschild, M. Z. (2022). Outside the Safe Operating Space of the Planetary Boundary for Novel Entities. *Environmental Science & Technology*, 56(3), 1510–1521. <http://doi.org/10.1021/acs.est.1c04158>

● **Shedding light on how agriculture drives deforestation**

Developing effective policy responses to deforestation requires a clear understanding of how agriculture drives the crisis. To address this need, this article synthesizes the best available pantropical evidence to inform how exactly agriculture drives deforestation. Although agriculture was the highest driver of tropical deforestation between 2011 to 2015 (at 90 to 99%), only 45 to 65% of deforested land became productive agriculture within a few years. Therefore, ending deforestation likely requires combining measures to create deforestation-free supply chains with landscape governance interventions.

This article was cited in the UN Environment Programme's Emissions Gap Report (and its pre-report), and the Consultative Group on International Agricultural Research report on drivers of deforestation.

Pendrill, F., **Gardner, T. A.,** Meyfroidt, P., Persson, U. M., Adams, J., Azevedo, T., **Bastos Lima, M. G.,** Baumann, M., Curtis, P. G., De Sy, V., Garrett, R., **Godar, J.,** Dow Goldman, E., Hansen, M. C., Heilmayr, R., Herold, M., Kuemmerle, T., **Lathuillière, M. J., Ribeiro, V.,** Tyukavina, A., Weisse, M. J. and **West, C.** (2022). Disentangling the numbers behind agriculture-driven tropical deforestation. *Science* 377, abm9267. <https://doi.org/10.1126/science.abm9267>

● **Taking stock of the political impact of the Sustainable Development Goals**

This paper provides a summary of what institutional impact the Sustainable Development Goals (SDGs) have had since their adoption in 2015. The authors presented an analysis of over 3000 scientific studies on the SDGs published between 2016 and 2021. Their findings suggest that the goals have had some political impact on institutions and policies, from local to global, mainly on sustainable development discourse. More profound impact, from legislative action to changing resource allocation, remains rare.

This article was cited by the Swedish government agency Naturvårdsverket, the Publications Office of the European Union and the European Parliamentary Research Service.

Biermann, F., Hickmann, T., Sénit, CA., Beisheim, M., Bernstein, S., Chasek, P., Grob, L., Kim, R. E., Kotzé, L. J., **Nilsson, M.**, Ordóñez Llanos, A., Okereke, C., Pradhan, P., Raven, R., Sun, Y., Vijge, M. J., van Vuuren, D. and Wicke, B. Scientific evidence on the political impact of the Sustainable Development Goals. *Nature Sustainability Journal* (2022). <https://doi.org/10.1038/s41893-022-00909-5>

● Examining how informal patronage affects adaptation finance

International financial support for climate adaptation is expected to double by 2025. However, concern is growing that such support is failing to benefit those most vulnerable to negative climate impacts. Qualitative studies have demonstrated how entrenched forms of inequality, such as patronage, can enable elite capture of international resources and prevent benefits from reaching relatively vulnerable households within communities. This study contributes to the literature on power in adaptation and climate finance by quantitatively analysing the distribution of a UN Adaptation Fund project in the Alaotra-Mangoro region of Madagascar.

Using a multi-level model to analyze 599 household surveys, the authors compare the political connectivity of beneficiary and non-beneficiary households.

Browne, K. and Razafiarimanana, C. (2022). Adaptation finance failing to reach the most vulnerable: A multi-level model of household political power in Madagascar. *PLOS Climate*. <https://doi.org/10.1371/journal.pclm.0000050>

● Investigating the demand-side aspects of a just low-carbon transition

The low-carbon transition requires policies and behaviour changes that affect people's consumption habits. However, the impacts of the transition are likely to be experienced unevenly by consumers. Failing to account for these differences imperils the prospects of a just transition. This paper investigates the demand-side aspects of a just low-carbon transition, with a focus on the transport and food sectors in Sweden. It combines ecological footprint analysis and sociodemographic and geographic analysis with an assessment of the distributional impacts of low-carbon transition policies from the perspectives of wealth, access, and health.

The study finds variations in the size of the carbon footprints linked with higher or lower income levels and with higher or lower population densities. About 40% of the Swedish population appears to be at higher risk from the adverse impacts related to policies that aim to advance a low-carbon transition; these people are at greater risk because they depend heavily on cars, and/or they are less able to afford the increased prices of carbon-intensive goods that are expected to result from these policies.

Overall, the paper highlights the need for targeted, well-planned policies for emissions reductions and transitional assistance to support a fair low-carbon transition for all.

Dawkins, E., Strambo, C., Xylia, M., Grah, R., Gong, J., Axelsson, K. and Maltais, A. (2023). *Who is most at risk of losing out from low-carbon transition in the food and transport sectors in Sweden? Equity considerations from a consumption perspective*. *Energy Research & Social Science*, 95:102881. <https://doi.org/10.1016/j.erss.2022.102881>

● Connecting water access with multidimensional poverty in Bolivia

In developing countries – where economic expansion often depends on extractive activities such as agriculture and mining – water quantity and quality considerations need to be examined in tandem with GDP growth and poverty-reduction efforts. This study analyses water access and poverty linkages in Bolivia's Tupiza River basin using the Multidimensional Poverty Analysis (MDPA) framework, and it

assesses how watershed policy can work to reduce poverty and inequality. The poverty dimensions considered in this study are based on the MDPA framework proposed by the Swedish International Development Cooperation Agency (Sida). This framework guided a survey design and further development of multidimensional poverty indicators. Researchers performed spatial analysis to identify communities with concentrations of the poorest households. Establishing the relationship between water access and the multidimensional poverty of households can support policy-making and water-planning efforts, and, at the same time, consider links to inequalities in the Tupiza watershed.

Espinoza, S., **Forni, L.**, Lavado, A., Olivera, M., Tapia, C., Vega, B., Balderrama, M., and **Escobar, M.** (2022). Connecting water access with multidimensional poverty: the case of Tupiza River Basin in Bolivia. *Water*, 14(17):2691. <https://doi.org/10.3390/w14172691>

● Evaluating the impacts of including short-lived climate pollutants and air-pollutant mitigation within Nationally Determined Contributions

Limiting global temperature increases to 1.5°C requires substantial reductions in short-lived climate pollutants (SLCPs), including methane, black carbon and hydrofluorocarbons, and co-emitted air pollutants. This study evaluates the inclusion of the mitigation of SLCPs and air pollutants within Nationally Determined Contributions (NDCs) that were submitted between 2015 and 2022.

Malley, C. S., Lefèvre, E. N., **Kuylensstierna, J. C. I.**, Haeussling, S., Howard, I. C., and Borgford-Parnell, N. (2022). Integration of Short-Lived Climate Pollutant and air pollutant mitigation in nationally determined contributions. *Climate Policy*, 1–13. <https://doi.org/10.1080/14693062.2022.2125928>

● Quantifying emissions for prioritizing mitigation measures in Togo and Grand Lomé

In Togo's updated NDC, submitted in 2021, the government acknowledged the importance of achieving international climate change mitigation targets in ways that improve air quality and achieve health benefits for Togo's citizens. The aim of this work is to evaluate priority mitigation measures in an integrated assessment of emissions of air pollutants, short-lived climate pollutants and greenhouse gases to identify the effectiveness of such measures to simultaneously reduce air pollution and Togo's contribution to climate change.

The mitigation assessment quantifies emissions for Togo and Grand Lomé from all major source sectors (energy, industrial processes and product use, agriculture, and waste) for the years between 2010 and 2018. This results in a baseline projection to 2030 and for mitigation scenarios evaluating 10 mitigation measures.

Agbossou, A., Fontodji, J. K., Ayassou, K., Tchegueni, S., Segla, K. N., Adjonou, K., Bokovi, Y., Ajayon, A. L., Polo-Akpisso, A., **Kuylensstierna, J. C. I.**, **Malley, C. S.**, **Michalopoulou, E.** and **Slater, J.** (2022). Integrated climate change and air pollution mitigation assessment for Togo. *Science of The Total Environment*, 844, 157107. <http://doi.org/10.1016/j.scitotenv.2022.157107>

● Assessing the impacts of climate change on global food trade networks

Countries' reliance on global food trade networks implies that regionally different climate change impacts on crop yields will spill across borders. This redistribution constitutes a significant challenge for climate adaptation planning and may affect how countries take cooperative action. This paper investigates the long-term (2070–2099) potential impacts of climate change on global food trade networks of three key crops: wheat, rice and maize. The authors propose a simple network model to project how climate change impacts on crop yields may be translated into changes in trade.

Hedlund, J., **Carlsen, H.**, **Croft, S.**, **West, C.**, Bodin, Ö., Stokeld, E., Jägermeyr, J., and Müller, C. 2022. Impacts of climate change on global food trade networks. *Environmental Research Letters* 17 124040. <https://doi.org/10.1088/1748-9326/aca68b>

Scientific impact — citations

We use the number of citations to monitor our impact in the scientific community. These come from the Web of Science Core Collection and Scopus databases, which compile data primarily on peer-reviewed journal articles and, to a lesser extent, on other publication categories such as book chapters and conference proceedings. The number of citations acknowledging SEI's research in other scientific articles (excluding self-citations) continues to show a sustained high level of uptake. Citation data from the Web of Science Core Collection indicate that 14 757 scientific articles cited SEI research in 2022, indicating a very slight decline (of roughly 3%) in comparison to 2021 (14 811 citations were recorded in January 2022). By contrast, a comparison with the database Scopus, which includes more social science journals, shows a higher number of citations: by this measure 17 144 articles cited SEI research during 2022, an 8% increase from 2021.

The average number of citations of all SEI scientific publications published so far (excluding self-citations) was 61.8, according to Web of Science. The average number of citations per scientific publication reported in the most recent five-year period (2018-2022) was 19 according to the Web of Science and 22 according to Scopus. This is an improvement on the previous five-year period (2014–2018), which saw average numbers of citations of 14 (Web of Science) and 17 (Scopus). Annexes 1 and 2 list the 10 most-cited SEI-authored, peer-reviewed journal articles published in the last five years, according to Web of Science and Scopus data.

Another indicator of our scientific impact is whether our research is published in high-impact journals. In 2022, we published four articles and commentaries in high-impact journals, including *Nature Sustainability* (1),¹ *Science* (2),² and *Science Advances* (1).³ Although slightly lower than the seven articles published in high-impact journals in 2021, publishing two journal articles – Reducing adverse impacts of Amazon hydropower expansion and How trade policy can support the climate agenda – in *Science* is a significant achievement.

More accessible scientific publications

We focus on making our scientific work accessible to different audiences. To reach these audiences we translate findings of our scientific publications into policy briefs and other outputs such as podcasts (see Section 4.4). We seek to publish more of our peer-reviewed journal articles as open-access publications to ensure easier access for institutions and partners, particularly those in developing countries and without institutional affiliations. In 2022, the share of our peer-reviewed scientific articles published with open access was 71% according to Web of Science and 68% according to Scopus. As shown in Table 2, this is a slight decrease compared to 2021 and 2020.

Table 2: Share of SEI peer-reviewed scientific articles published with open access.

Year	2019	2020	2021	2022
Share of articles published with open access according to Web of Science	67%	74%	76%	71%
Share of articles published with open access according to Scopus	66%	72%	76%	68%

1 Biermann, F., Hickmann, T., Sénit, C.A., Beisheim, M., Bernstein, S., Chasek, P., Grob, L., Kim, R. E., Kotzé, L. J., Nilsson, M., Ordóñez Llanos, A., Okereke, C., Pradhan, P., Raven, R., Sun, Y., Vijge, M. J., van Vuuren, D. and Wicke, B. *Scientific evidence on the political impact of the Sustainable Development Goals*. *Nature Sustainability Journal* (2022). <https://doi.org/10.1038/s41893-022-00909-5>

2 Jakob, M., Afionis, S., Åhman, M., Antoci, A., Arens, M., Ascensão, F., van Asselt, H., Baumert, N., Borghesi, S., Brunel, C., Caron, J., Cosbey, A., Droege, S., Evans, A., Iannucci, G., Jiborn, M., Kander, A., Kulionis, V., Levinson, A., ... Willner, S. (2022). *How trade policy can support the climate agenda*. *Science* 376(6600) Pendrill, F., Gardner, T.A., Meyfroidt, P., Persson, U.M., Adams, J., Azevedo, T., Bastos Lima, M. G., Baumann, M., Curtis, P. G., De Sy, V., Garrett, R., Godar, J., Dow Goldman, E., Hansen, M. C., Heilmayr, R., Herold, M., Kuemmerle, T., Lathuillière, M. J., Ribeiro, V., Tyukavina, A., Weisse, M. J. and West, C. (2022). *Disentangling the numbers behind agriculture-driven tropical deforestation*. *Science* 377, abm9267. <https://doi.org/10.1126/science.abm9267>

3 Ermgassen, E. K. H. J., Bastos Lima, M. G., Bellfield, H., Dontenville, A., Gardner, T., Godar, J., Heilmayr, R., Indenbaum, R., dos Reis, T. N. P., Ribeiro, V., Abu, I., Szantoi, Z. and Meyfroidt, P. (2022). *Addressing indirect sourcing in zero deforestation commodity supply chains*. *Science Advances*, 8(17), eabn3132. <http://doi.org/10.1126/sciadv.abn3132>

SEI's own publication series has always been accessible. These publications are written and designed for a wider audience than those reached by journal articles. Such publications help make science understandable to non-academic audiences, although language remains a barrier in some cases. We continue to address this by translating pertinent publications into relevant languages. In 2022, 18 SEI publications were published in relevant regional languages, including Portuguese, Spanish, Swedish and Thai. Through these efforts, we continue to work towards our goal of making scientific research more accessible and relevant for intended users.

We concluded an internal learning project on Open Science in 2021 and made guidance available to SEI researchers. We have not opted to enter agreements with publishers for waived open access fees, due to high cost for a comparatively small institution. In 2023, we will consider developing an SEI publication strategy and offering more concrete guidance for researchers to expand access to our peer-reviewed journal articles; for example, we may consider pairing such articles with openly accessible SEI policy briefs.

Increasing uptake of SEI's work through policy reports and social media

One way in which we monitor our policy impact and societal relevance is by measuring citations and mentions of SEI-authored scientific publications in policy documents and traditional and social media. Since 2020, we have used Overton and Altmetric for this purpose. While tools such as Overton are useful for assessing uptake of our work, it is important to note that the most high-level and potentially influential policy documents (e.g. government bills, legislation, court cases, speeches) typically do not cite any sources, and thus such impact is not captured through these tools.

Peer-reviewed scientific publications

Figure 6 shows the number of citations of SEI-authored, peer-reviewed journal articles by policy organizations to date (intergovernmental organizations, government agencies, and think tanks) and the location of those policy organizations. These citations arise from 4909 documents from 65 countries, from 465 different organizations, including within 52 national governments. This continues the positive trend noted in last year's Annual Results Report, which showed that citations of all SEI journal articles increased from 2767 citations in 2020 to 3849 in 2021. This increase occurred in citations from all types of policy entities: local governments, national government ministries, think tanks, research centres and intergovernmental organizations.

Our journal articles continue to be most frequently cited by international government organizations (such as the United Nations and World Bank), which account for 27% of all citations, and by European institutions, which account for 10.6%.

Since 2020 we have used Altmetric to better monitor the citations and mentions of our scientific publications on social media, blogs, news articles, Wikipedia pages and public-policy documents. Beyond covering a wider range of sources than academic databases, Altmetric also measures digital "attention" (such as mentions on Twitter and Facebook) immediately after publication, rather than with the time lag required for citations to accrue. General analysis of SEI's scientific publications shows that much of SEI's attention in these fields comes from social media (86%), followed by news and blogs (9%), and policy documents. News mentions of our publications more than doubled in 2022 (1155 mentions) compared to 2021 (488 mentions). These mentions stem from 451 different news outlets distributed globally, including in Bangladesh, Brazil, China, Colombia, India, Malaysia, the Philippines, Singapore, the United Arab Emirates, Uruguay and Zimbabwe. Mentions in Wikipedia also doubled, increasing the exposure of SEI's work to the global public.

Figure 7 shows SEI's top 10 scientific publications according to attention scores, with three of the top five publications seeing significant uptake in news outlets. The top-cited article, *Outside the Safe Operating Space of the Planetary Boundary for Novel Entities*, is amongst the three highest-scoring publications in SEI's history.

Figure 6a. Number of citations of SEI-authored, peer-reviewed journal articles by policy organization. Only journal articles published between 1994 and 2022 are included. Produced using data from Web of Science and Overton. Note that only the 25 organizations with the highest number of citations are shown.

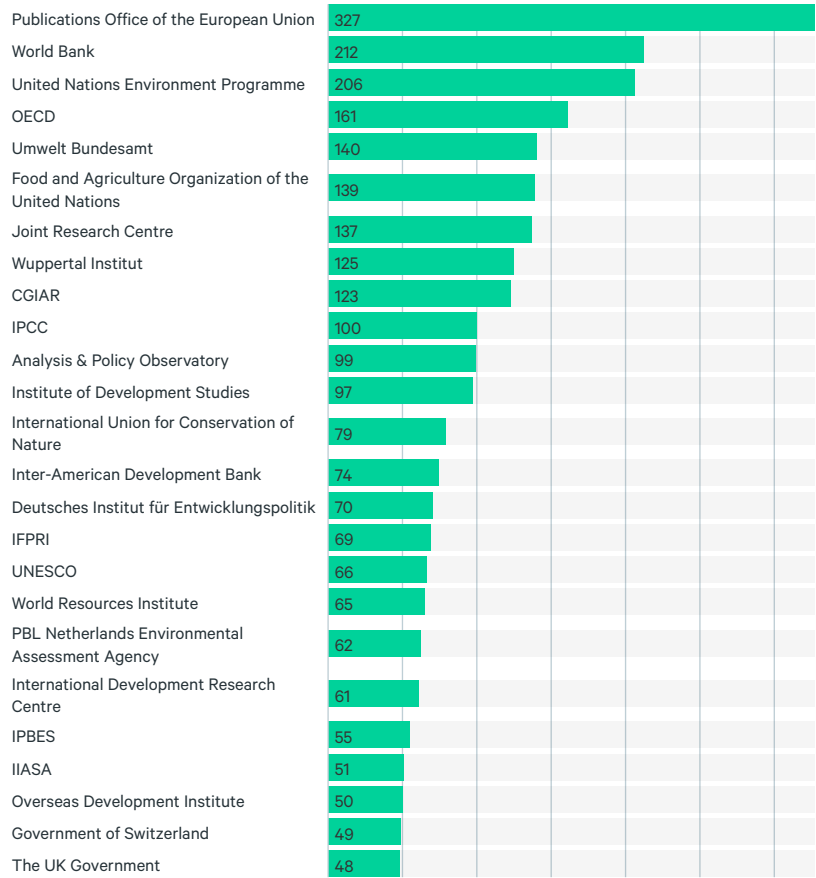


Figure 6b: World map showing the location and number (represented by the size of the circle) of policy documents citing SEI's scientific publications. Produced using data from Overton.

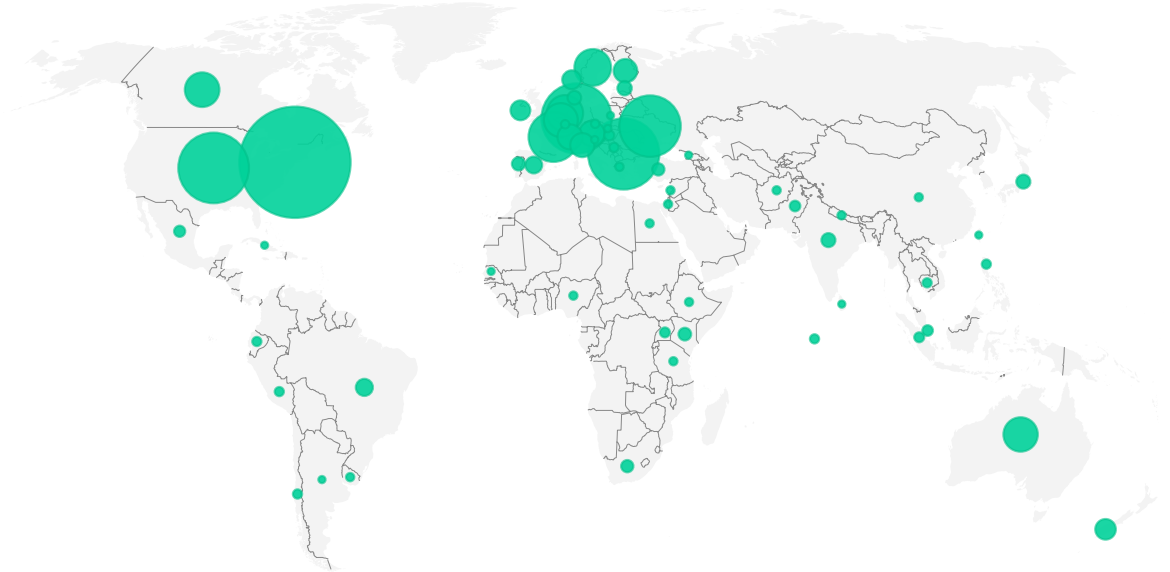
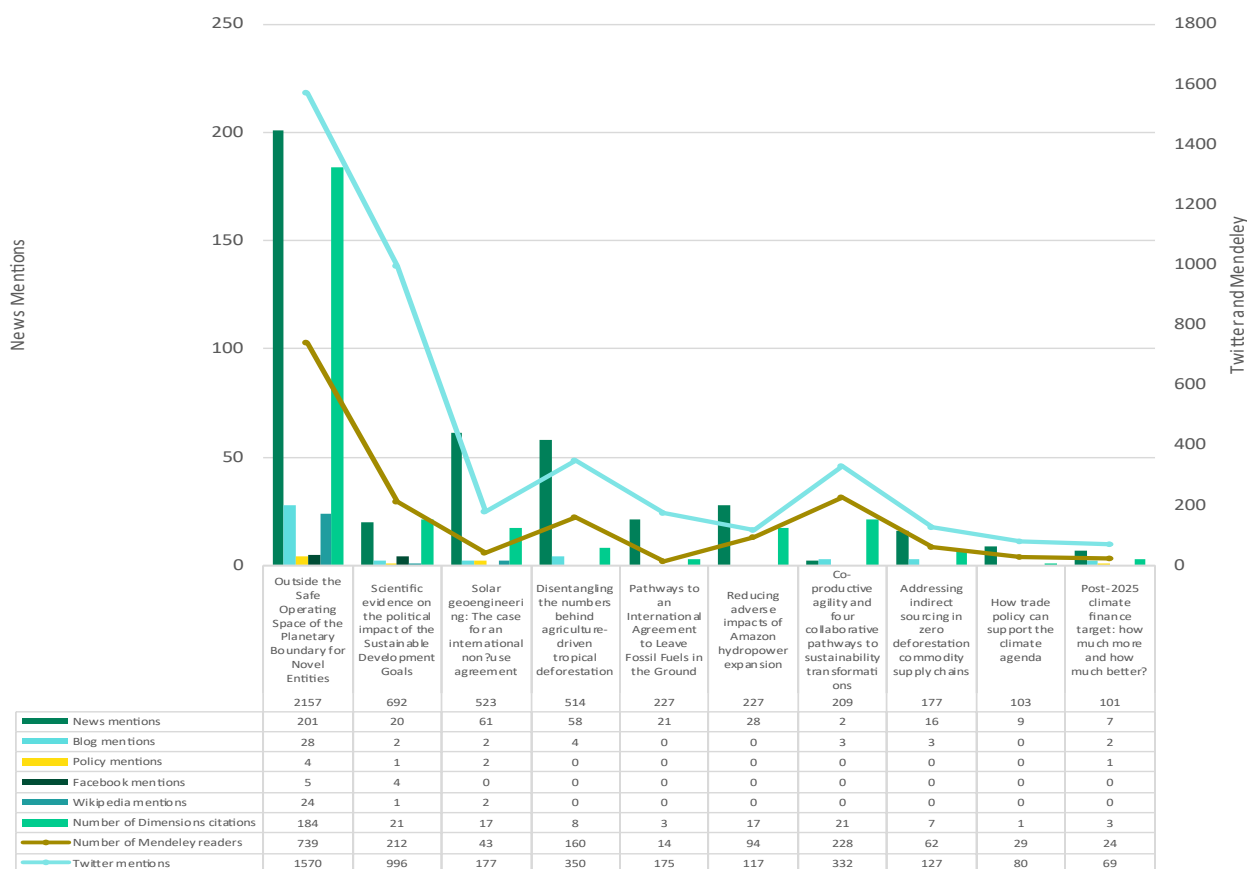


Figure 7. Top 10 SEI-authored journal articles with the highest Altmetric scores during 2022. Data downloaded 25 January 2023. “Dimensions citations” capture mentions in grants, publications, citations, clinical trials and patents.



Although there is some correlation between citations in the scientific literature and the Altmetric attention score, seven of SEI's top-cited scientific publications according to Web of Science and Scopus do not appear in SEI's top 10 journal articles with the highest Altmetric scores. In 2023, we will review how we can ensure that more SEI journal articles and other publications generate more attention on social media and other media, to ensure access, awareness and, ultimately, impact.

SEI-branded publications

SEI's own branded publications published since 2008 (749 publications analysed in Overton) have been cited in 871 policy documents from 202 organizations distributed across 37 countries (Figure 8).⁴ As for our scientific publications, SEI's working papers, briefs and other publications are most frequently cited by European institutions and international government organizations such as the United Nations and World Bank. Topics of particular interest for policy are similar to those reported last year, such as the water-energy-food nexus, various aspects of climate policy (carbon offsetting, fossil fuel supply policies, climate finance), and SEI's early cutting-edge work on the assessment of transnational climate impacts and the pursuit of a just and equitable transition away from fossil fuels.

Scientific publications that expand the global reach and accessibility of SEI's work

Co-production and co-authorship of scientific publications with regional partners and institutions is important for ensuring the relevance and legitimacy of our research to those regions and for increasing the recognition of regional partners and their expertise on the global stage.

⁴ Coverage of SEI publications prior to 2008 is low, hence, these publications have been removed from this analysis. These results are indicative only as not all SEI-authored publications are correctly attributed in Overton's database.

Figure 8. Number of citations of **SEI-branded publications** published since 2008, by policy organization (coverage of SEI publications prior to 2008 is low; hence, these publications have been excluded from this analysis). Produced using data from Overton. Note that only the 20 organizations with the highest number of citations are shown.



Table 3 shows the regions in which our co-publisher institutions are located. Most of our academic collaborations take place with European institutions. However, collaborations with institutions from Asia, Africa and South America are increasing considerably, with co-authors in 2022 including University of Lomé in Togo, Beijing Normal University in China, *Universidade de Cuiabá* in Brazil, University of Dar es Salaam in Tanzania and Chulalongkorn University in Thailand.

Table 3. The home regions of the organizations with which SEI most frequently co-published in the period 2018–2022, according to the Web of Science Core Collection.

Home region of organization	Sum of occurrences 2018–2022	Share (%) 2018–2022	Sum of occurrences 2013–2017	Share (%) 2013–2017	Factor of increase [counts] 2018–2022 over 2013–2017
Africa	234	9.2%	52	4.5%	3.5
Asia	291	11.4%	87	7.6%	2.3
Europe	1455	57.1%	750	65.4%	0.9
North America	345	13.5%	168	14.6%	1.1
Oceania	109	4.3%	48	4.2%	1.3
South America	113	4.4%	42	3.7%	1.7

The organizations with which SEI co-published most frequently over the last five years are (in decreasing order) are University of Johannesburg, Utrecht University, University of Oxford, Stockholm University, University of British Columbia, University of York and the Swedish University of Agricultural Sciences.

Noteworthy SEI-branded reports and other publications in 2022

SEI published several landmark reports in 2022. The publications below provide an insight into the diversity and relevance of this work for changing agendas in sustainable development.

Stockholm+50: Unlocking a Better Future. SEI co-led this flagship scientific report for the UN international meeting “Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity”. The report, which integrated key areas of work and findings from across the Institute, sought to provide a novel and comprehensive account of sustainable development 50 years after the 1972 conference (see Section 3.2).

Operationalizing finance for loss and damage: from principles to modalities. This report catalyzed action on loss and damage and generated high media interest ahead of COP27 (see Section 2).

Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa. This report built upon years of SEI work on air quality and climate change in the Africa region (see Section 3.2).

Financing the Just Transition: Powering Asia’s Sustainable Energy Future. This report provides new data on Asia’s readiness not only to shift from fossil fuels to renewables, but also to ensure that the adverse social and environmental impacts of this transition are mitigated, and that the outcomes are just for all (see Section 4.4).

Just Transition for Climate Adaptation. Released by UN Global Compact, this SEI-authored brief introduces the concept of a just transition and explains how it links to climate adaptation. It makes actionable recommendations for businesses to achieve a fair and inclusive journey to a net-zero and resilient future.

10 New Insights in Climate Science 2022. The report is launched at the UN Climate Conference (COP) every year and received by the Executive Secretary of the UN Framework Convention on Climate Change and the COP Presidency. SEI contributed an insight on the development of sustainable finance and its promises and pitfalls.

A just transition in the meat sector: why, who, and how? This report sets out routes towards a just transition in the meat sector. It focuses on domestic meat markets in the Global North, maps out key stakeholders, and identifies guiding principles for a just transition away from large-scale meat production and consumption.

State of gender equality and climate change in the Association of Southeast Asian Nations (ASEAN). Prepared in collaboration with the ASEAN Committee on Women, the ASEAN Secretariat, the UN Environment Programme and UN Women, this flagship report provides a gender-based analysis of climate mitigation and adaptation in the 10 ASEAN member states.

3.2 Policy and practitioner engagement

SEI tackles complex, interconnected environment and development challenges. These are issues that demand holistic responses. As a result, SEI takes a systems perspective and engages with actors at all levels of governance and across all relevant public and private sectors, including industry, trade, water, health, agriculture and energy.

At the national level, we continue our long-standing engagement with ministries, departments and agencies for the environment, energy, water resources, foreign affairs, science, and industry. This work takes place in more than 20 countries in Africa, Asia, Eastern Europe and North and South America. At the regional level, we continue to deepen engagement with key political and economic cooperation bodies such as the Association of Southeast Asian Nations, the African Union Commission, the East Africa Community, the Nordic Council, and the European Union and its institutions; we also work with regional UN bodies such as the UN Economic and Social Commission for Asia and the Pacific and Economic Commission for Latin America and the Caribbean. At the global level, we are strengthening our engagement with the UN Environment Programme, UN Development Programme, UN Office for Disaster Risk Reduction, and UN Department of Economic and Social Affairs. We increasingly engage with non-state actors such as the World Business Council for Sustainable Development; the World Economic Forum and its corporate Alliance for Clean Air; private sector associations such as the First Movers Coalition; and directly with businesses to accelerate a green industry transition.

While we remain focused on our long-term objectives, we respond to emerging challenges and partner needs; as a prime example, in the wake of the Russian invasion of Ukraine, we co-explored (with Estonia, Latvia, Lithuania and Finland) possible pathways to decarbonization that reduce reliance on Russian gas.

Here we share some highlights of our work and achievements in 2022. These examples illustrate how we operate as a global organization, collaborating across centres and using the diverse skills and extensive experience of staff to deliver effective solutions.

SPOTLIGHT ON PRIVATE-SECTOR ENGAGEMENT

Stockholm+50: driving action in six key global value chains

SEI partnered with the World Business Council for Sustainable Development (WBCSD) and the Stockholm+50 Secretariat to mobilize companies and stakeholders to increase sustainability in six key global value chains: mobility, electronics, the built environment, fashion and textiles, food and agriculture, and travel and tourism. The *Stockholm Synthesis Report* provides concrete recommendations for improving these global value chains based on input from over 70 stakeholders across 34 businesses and organizations. It was launched at the UN General Assembly in September and will form the basis for continued collaboration between SEI and the WBCSD in 2023. This process provided the foundation for the *Stockholm Action Agenda: Transforming Global Value Chains* report at the 2022 Stockholm+50 conference. The agenda proposed actions that can propel companies and critical value chains onto net-zero and zero-pollution pathways. These recommendations are reflected in the official *Stockholm+50 Report*, and in the *Presidents' Final Remarks* to conference attendees.

Advancing efforts to quantify air-pollution emissions in private-sector value chains

Working with the Climate and Clean Air Coalition and Inter IKEA Group, SEI developed a *guide for companies* to quantify pollutant emissions along their value chains. This guide outlines how companies can identify their major air-pollutant sources and quantify these emissions. The guide was officially launched at COP27 and is being used by 10 companies within the Alliance for Clean Air of the World Economic Forum, including

IKEA, Siemens, MAERSK, Mahindra Group and Google. IKEA and MAERSK have used the guide to calculate their emissions, and, for the first time, they will report these emissions in their next corporate social responsibility reports.

Transforming industries' thinking in developed and rapidly developing countries

SEI is Secretariat for the Leadership Group for Industry Transition (LeadIT) initiative, launched by India and Sweden in September 2019. Through LeadIT, we continued to work closely with foundational industries to develop ways to scale up industry transitions tailored to each sector and country, focusing on supporting those in need of assistance. The 18 LeadIT countries account for over half of the world's economy. In 2022, LeadIT strengthened its agenda-setting role. We:

- collaborated with The Energy and Resources Institute (TERI), India's Ministry of Environment, Forest and Climate Change, and the Strategic Partnership for the Implementation of Paris Agreement (SPIPA) to organize workshops for the cement and steel sectors in New Delhi. The workshops produced recommendations for decarbonizing the Indian cement and steel sectors that will be advanced during India's G20 presidency.
- partnered with the World Economic Forum to host the Industry Transition Dialogue (ITD), which gathered CEOs and ministers from LeadIT member countries and companies. The ITD was attended by key partners, including the First Movers Coalition, and was addressed by several high-ranking ministers including Dr. Rania Al Mashat (Minister of International Cooperation, Egypt), Selwin Charles Hart (Special Adviser to the UN Secretary-General on Climate Action and Just Transition) and John Kerry (US Special Presidential Envoy for Climate). The event introduced two new LeadIT country members, South Africa and Japan, the latter of which will assume the G7 Presidency in 2023.
- supported TERI and UN Industrial Development Organization's report on hard-to-abate industry sectors. The report explores ways that the G20 can enable the rapid development and commercialization of environmentally innovative technologies. The report will be used by the G20 Energy Transition Working Group.

"LeadIT is best placed to take on the role of coordinating financial alignment and has already shown it can identify good examples and put actionable measures for innovation and finance."

—Graham Stuart, Minister for Climate, UK

Acting on climate change

● An Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa

The *Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa* was developed by African scientists in 2022, following a three-year process coordinated by SEI and the African Union Commission, the UN Environment Programme (UNEP) and the Climate and Clean Air Coalition. The report shows how African leaders can act quickly across five key areas – transport, residential, energy, agriculture and waste – to fight climate change, prevent air pollution, protect human health and advance development. In 2022, at the 18th African Ministerial Conference on the Environment, African ministers declared their support of the Assessment results and urged African countries to implement its recommended measures as continent-wide effort to achieve clean air.

The Assessment is built upon national-scale, continent-wide modeling of Africa's greenhouse gas, short-lived climate pollutants and air pollution emissions using SEI's Low Emission Analysis Platform (LEAP) model. SEI developed the modeling of the energy, agricultural and waste sectors closely with African stakeholders through a series of workshops, providing the basis for extensive modeling of climate and health impacts by SEI and the Assessment team.

● **Supporting countries to address short-lived climate pollutants**

Working in partnership with the Climate and Clean Air Coalition (CCAC) and individual countries, SEI is playing a central role in supporting countries to respond to the [Global Methane Pledge](#). Countries signing the pledge agree to voluntarily contribute to a global methane emissions reduction of at least 30% below 2020 levels by 2030.

SEI has contributed to CCAC's Methane Roadmap Action Programme, which includes the development of the methodology, resources and training for national planners. These materials will be launched in 2023.

In Kenya, SEI worked with the Climate Change Directorate within the Ministry of Environment, Climate Change and Forestry to finalize a draft National Action Plan for Short-lived Climate Pollutants. The Director of the Climate Change Directorate presented the plan at the Global Methane, Climate and Clean Air Forum in Washington, D.C. It will be presented to the Cabinet Secretary for Environment & Forestry in early 2023 for formal adoption.

● **Facilitating decarbonization in the Baltic states and Finland**

SEI is working with Estonia, Latvia, Lithuania and Finland to explore how to decarbonize the Regional Gas Market Coordination Group. Efforts to end Russian natural gas dependency and achieve long-term domestic renewable gas production have acquired new urgency in the wake of Russia's invasion of Ukraine.

To devise immediate and long-term solutions to reach regional energy independency, SEI assembled national stakeholders, including gas infrastructure operators, and representatives of energy authorities, gas associations and national energy ministries. These meetings drew on recommendations informed by SEI's LEAP and Next Energy Modeling system for Optimization (NEMO) tools, which we used to explore the potential production and use of renewable or clean gases (such as hydrogen and biomethane) in the existing multi-country gas system and to examine the related socioeconomic effects.

Through this work, we are helping the Estonian Ministry of Economic Affairs and Communications design, develop and implement reforms necessary to achieve a fully climate-neutral gas market over the next three decades. The work sets the stage to develop an action plan in 2023 to phase out natural gas use by 2050.

This is a new application of SEI's LEAP tool and has helped prime the tool for future gas-specific studies. For more insights on LEAP see Section 3.3.

● **Strengthening non-state actions to achieve net-zero goals**

SEI is bringing more rigor, standardization and accountability to the net-zero pledges made by corporations and other non-state actors. SEI serves as an expert advisor with the UN Race to Zero campaign, the Science-Based Targets initiative, the Voluntary Carbon Markets Integrity Initiative and the Integrity Council for the Voluntary Carbon Market. Through this engagement, we advocate for guardrails on the unregulated role of [carbon offsetting](#) and emphasize the importance of viewing net-zero targets as a global rather than individual goal (see a related [TED Talk](#) and [perspective](#)). We have guided the development of high-integrity carbon credit standards, advised on the updating of UN Race to Zero criteria and provided input to the UN High-level Expert Group. The group's final recommendations reflect SEI's input.

● **Exploring connections between climate, environment and human mobility in Africa**

Although connections have been drawn between climate change and human mobility on a global scale, a deep empirical understanding of what drives mobility at the household level is lacking. SEI is addressing this gap through a new seed and innovation project, *Disaster displacement in cities: vulnerability factors and implications for local policymaking (A case study of Naivasha, Kenya)*, which will strengthen the evidence on climate-induced displacement and migration in urban settings.

In 2022 we engaged with key actors and processes, including the [Khartoum Process](#) (a platform for political cooperation among the countries along the migration route between the Horn of Africa and Europe) and [Rabat Process](#) (The Euro-African Dialogue on Migration and Development). This has set the stage for feeding the results of our work into these processes.

Advancing the global sustainable development agenda

● Stockholm+50: influencing the agenda for the future

Our institute is named after the 1972 Stockholm Conference. The follow-up UN international meeting “Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity”, held in Stockholm in June 2022, sought to reflect on progress made and set the agenda for the future. The meeting gathered over 4000 people from nearly 150 countries, including several heads of state and more than 60 ministers. SEI contributed scientific evidence to the meeting, helped shape the framing of leadership dialogues and discussions, informed discussion on critical sustainability challenges, and contributed recommendations that have reached the agenda of the United Nations.

Centre stage was the *Stockholm+50: Unlocking a Better Future* report. The report, which SEI co-wrote with the Swedish Council of Energy, Environment and Water, advanced the discussion on how to unlock change. Developed in consultation with the UN Environment Programme (UNEP) and the Swedish Government, the report identified broad shifts that must occur, underlined structural barriers that must be overcome, and made 52 related recommendations. This report was complemented by a summary for policymakers; a youth report by young researchers from SEI and the Council on Energy, Environment and Water presenting a vision for a sustainable future; 12 SEI-authored background papers providing deep dives into key topics; a promotional film; and a highly accessible and visual report website (www.stockholm50.report).

In the run-up to the conference, SEI also collaborated with Future Earth, the International Science Council and UNEP to compose and launch an open letter from scientific organizations and individual scientists. *A letter to fellow citizens of Earth* was presented at a pre-conference session at Stockholm University, and was referenced in Nature in its June-edition editorial, which asks, “[The sustainability movement is 50. Why are world leaders ignoring it?](#)”

These publications paved the way for SEI’s high visibility in events, meetings and the media, both ahead of and during the UN high-level meeting. At the request of Sweden’s Ministry for the Environment, SEI Communications Director Robert Watt was also seconded to the conference core team to support the preparations and negotiations leading up to the conference.

The outcomes of the meeting, the *Stockholm+50 Agenda Recommendations and Actions for Renewal and Trust*, include several overlaps with recommendations from SEI’s *Unlocking a Better Future* report, including calls for system-wide changes to our economic system and high-impact sectors, and placing human well-being at the center of a healthy planet and prosperity for all. These outcomes are now incorporated in associated UN processes, including the upcoming SDG Summit 2023 and the implementation of Our Common Agenda.

● Developing Bosnia and Herzegovina’s first environmental strategy and action plan

At the request of the Embassy of Sweden in Bosnia and Herzegovina (BiH), SEI has successfully supported the country to develop a national Environmental Strategy and Action Plan. Three years in the making, the BiH plan sets out concrete steps to address challenges, strengthen the environmental frameworks, and move towards undertaking the legal and procedural alignments needed for EU membership. The plan also recognizes participatory challenges and proposes several goals and measures to improve public participation over the next decade. It emphasizes the participation of citizens in decision-making by using public consultations and awareness-raising campaigns. It also includes specific measures to increase the participation of disadvantaged groups, such as women and Roma, who are underrepresented in BiH policy-making circles.

“The SEI team, which was entrusted with the preparation of strategic documents in BiH, was entirely committed to the implementation of project activities and logistic support to this project. Together with the BiH expert team for thematic areas covered in the [National Environmental Strategy and Action Plan], the SEI team is responsible for the successful implementation of this important project.”

— Ljiljana Stanisljevic, representative of the Ministry of Spatial Planning, Civil Engineering and Ecology of Republika Srpska.

“The G20 should push forward with the highest priority an agenda for making agriculture and food systems sustainable and climate resilient. In support of such an agenda, the G20 should promote the circular economy, reduce food loss and waste, and establish a framework for sustainable production and consumption decisions and make more resources available for research and development to facilitate innovation.”

— T20 Communiqué 2022 (p.15)

● Putting food waste and circular economy on the global agenda

The SEI-authored policy brief, *Food waste minimization and circularity for optimizing urban food system resilience*, prepared as part of the Think20 (T20) summit under Indonesia's G20 Presidency, proposes the integration of both the circularity of food systems and behavioural insights into the food waste dialogue. It articulates the waste-absorption potential of urban and peri-urban farming systems at a city-regional scale. The policy recommendations made in the brief were adopted in the T20 Communiqué shared with world-leading thinkers, policymakers and experts ahead of the T20 Summit 2022, which aims to deliver policy options for adoption by the G20 leaders. This brief also resulted in SEI's invitation join the Meetings of Agricultural Chief Scientists of G20 States' (MACS-20) Food Loss and Waste workshop, organized by the Thünen Institute and Indonesian Ministry of Agriculture. SEI's engagement with MACS-20 is highlighted in the [MACS-G20 annual report](#) (Section 3.2.4, page 25).

● Planning for water security

“Clean and Green” smallholder agriculture in West Africa

SEI has developed “[Clean and Green](#)”, a framework for implementing integrated rural sanitation interventions that both reduce exposure to pathogens, and allow for the reuse of nutrients, organic matter and water from human and animal waste. The framework is designed to enhance agricultural production and environmental sustainability at the household and community levels.

In collaboration with WaterAid, Clean and Green was piloted in three open-defecation-free villages in Burkina Faso in early 2022 as an action-research component of a larger rural sanitation programme financed by The Swedish International Development Cooperation Agency (Sida). Farmers have responded positively, with those involved in field trials of sorghum production reporting strong improvement in yields where sanitized urine was applied as a top dresser (fertilizer). These trials involve cross-sector collaborations, including with the NGO Agro-Action, which leads farmer field schools, and the National Environmental and Agricultural Research Institute (INERA), which supervises students for specific studies. Evidence generated from the pilot project will inform further advocacy and upscaling.

UNICEF has shown interest in adapting and piloting the framework in Bolivia to improve sanitary and environmental conditions in 19 communities in the Cochabamba region. SEI and UNICEF [gave a joint presentation](#) on this work in the 2022 LatinoSan conference.

Guiding environmental cooperation in Lancang-Mekong region

SEI has supported the development of the Lancang-Mekong Environmental Cooperation (LMEC) Strategy and Action Framework (2023–2027). The strategy and framework provide an opportunity for Cambodia, China, Lao PDR, Myanmar, Thailand and Viet Nam to cooperate on water resources management, environmental protection as well as economic and social development in the face of increasing climate risks. SEI facilitated the stakeholder-consultation process and identified the context-specific environmental challenges in the areas of: i) climate change, ii) biodiversity and ecosystems, iii) air pollution, iv) water pollution, and v) solid waste pollution. SEI also provided recommendations on capacity-building and knowledge-sharing in the LMEC region. SEI reviewed and contributed comments to two initial drafts of the LMEC Strategy. See Section 3.3 for further work on water security using SEI's tools.

● Sustainable food systems

Developing the cassava value chain in Colombia

In 2021, SEI identified cassava as an important biological resource for Colombia. An SEI working paper, *La red de valor de la yuca y su potencial en la bioeconomía de Colombia* (*The cassava value network and its potential in the bioeconomy of Colombia*), showed that cassava will not reach its potential if low levels of productivity in primary production in Colombia persist. The paper, which made recommendations about ways to sustainably develop the cassava value chain, has since been used as a guideline for government agencies and research centres such as the Colombian Agricultural Research Corporation (AGROSAVIA), and the Colombian Ministry of Agriculture

and Rural Development, and Ministry of Science, Technology and Innovation. The paper's recommendations – such as accounting for impacts on water resources and prioritizing technical assistance to small producers – have been used to support decision-making and new policies. It has influenced the design of a national plan to promote the industrial cassava value chain in Colombia, particularly in the Caribbean region, from seed production to chain management.

As a result of the work, AGROSAVIA has recognized SEI as a key actor in the bioeconomy field, and has invited SEI to participate in and guide discussions and working groups on the implementation of this policy. This work has also promoted relations between SEI and key private-sector actors, including *Almidones de Sucre*, and led to a collaboration with relevant research centres, universities, and enterprises. This foundation will help us deepen our role in informing decision-making on the bioeconomy at national and subnational levels and supporting the development of more sustainable business strategies.

3.3 Digital tools and platforms

SEI's diverse array of tools plays an increasingly important role in our efforts to bridge science, policy and practice. Developed with and for stakeholders, these innovations allow users of all kinds to harness data and apply research findings to address real-world problems. They help decision-makers and practitioners better understand a wide range of complex issues. And they support researchers' investigations that advance SEI's agendas. The resulting knowledge is used to formulate policy, inform planning, and prioritize actions that promote sustainable and equitable development.

Within SEI, we continue to leverage our existing tools in new ways, and to develop new connections among our tools to provide more powerful insights for our stakeholders and partners. Here we highlight key achievements and developments of SEI tools, with a spotlight on Trase.

“Commissioned by and in collaboration with GIZ, Trase produced significant new analysis showing – in unprecedented breadth and detail – how Germany's import and consumption of agricultural commodities is linked to tropical deforestation. The resulting report successfully puts numerous disparate datasets in context with one another to demonstrate their significance for trade and environmental policy. This analysis will inform ongoing dialogue with producer countries and contribute to supporting risk assessments that importers in Germany will have to carry out as part of their due diligence requirements.”

— Katja Albrecht, GIZ (Germany's development agency)

TRASE: TACKLING DEFORESTATION THROUGH SUPPLY-CHAIN TRANSPARENCY

Launched by SEI and Global Canopy in 2015, **Trase** uses publicly available data to map the international trade and financing of commodities – including soy, beef and palm oil – that drive tropical deforestation. This mapping provides insights that help companies, investors and governments address tropical deforestation. Trase has illuminated connections between trade and deforestation in South America, Côte d'Ivoire, Indonesia, Europe, the US and China. The tool is widely recognized in European policy circles for playing a key role in establishing the strategic case for developing due diligence legislation on the sources of commodities. Data, analyses and intelligence provided by Trase continue to support compliance with such legislation, informing high-profile assessments, and generating media coverage on progress towards achieving deforestation commitments. Last year, Trase and Trase data were used and cited in more than 50 third-party publications and more than 350 media articles urging actions on ending deforestation-linked trade. As one example, the advocacy agency Majority Action used Trase data to file a shareholder resolution against Bunge Limited – one of the world's largest soy traders – concerning its failure to address deforestation in its supply chains.

Here we highlight Trase's key achievements of 2022.

Supporting action to achieve deforestation-free supply chains

In 2022, the SEI Trase team delivered in-depth assessments of Belgium and Germany's deforestation footprints. These are arguably two of the most detailed national deforestation risk studies yet conducted for any EU country. The risk assessments are essential for meeting international commitments such as those of the Amsterdam

“Trase, with the collaboration of the European Forest Institute, has done a very important job of compiling and processing data from the main tropical countries producing soybeans (and other products at risk of deforestation), making it possible today to estimate the risk of deforestation for most soybean imports in France.”

— France’s Ministry of Ecological Transition

Declarations Partnership (ADP), with which the Trase team is also working to highlight both opportunities to strengthen EU regulation and expand its coverage.

Supporting France’s plan to increase transparency on deforestation

In 2022, Trase worked with the French government’s Ministry of Ecological Transition to create a public, interactive risk assessment dashboard that increases supply chain transparency and encourages companies to reduce deforestation risk from soy imports. The dashboard supports France’s efforts to end imports of agricultural commodities (such as beef, cocoa, palm oil, rubber and soy) that contribute to deforestation and climate change by 2030. This work has led to several important outcomes:

- The Ministry of Ecological Transition now better understands the data requirements for assessing imported deforestation risk. As a result, it has successfully lobbied for legal changes to access French customs data.
- Trase work led France’s SYNACOMEX trader alliance (which includes major commodity traders LDC, Cargill, and Bunge) to disclose commercial trade data to the French government and Trase for the first time. This disclosure marks a crucial first step towards sector-wide transparency.

Putting information into the hands of shoppers in Brazil

Trase helped develop and build upon the strengths of the “do Pasto ao Prato” app that puts information about the origin and impact of beef products into the hands of shoppers in Brazil. Users can also use the app to help improve transparency in the livestock sector by recording where the product was sold. These data are:

- revealing how products with high socio-environmental impacts propagate along supply chains within a major domestic economy,
- providing a public resource for academics, civil society, journalists, and government officials to monitor the effectiveness of Corporate Social Responsibility (CSR) commitments by companies in the sector, and
- increasing accountability, incentivizing stronger and more transparent corporate social responsibility efforts by meatpacking companies and retailers.

Further examples of SEI tool development and use

● Mitigating emissions and avoiding premature deaths with the Low Emissions Analysis Platform

Over recent years, SEI has expanded the capabilities of its signature Low Emissions Analysis Platform (LEAP) by developing complementary tools. These include the Integrated Benefits Calculator (LEAP-IBC) to assess air quality and climate co-benefits, the Epidemic-Macroeconomic Model (Epi-Macro) to develop pandemic-adjusted economic baselines for sustainable development planning, and the Next Energy Modeling system for Optimization (NEMO), which puts powerful optimization features within reach of users who are not full-time modelers. Today the LEAP web community has more than 57 000 members in 200 countries. LEAP has been used by at least 61 countries to help develop their Nationally Determined Contributions.

In January 2022, Cambodia’s Ministry of Environment launched its first Clean Air Plan. SEI supported the plan’s development, which used LEAP-IBC to identify and evaluate the air-pollutant-emission reductions resulting from key mitigation measures in high-priority sectors.

Should Cambodia's Clean Air Plan be fully implemented, 900 premature deaths could be avoided annually, demonstrating the local health benefits of this plan. The plan's launch was covered extensively in local media.

In April 2022, Côte d'Ivoire submitted its NDC update. For six years, SEI has supported Côte d'Ivoire to develop a LEAP dataset capable of both assessing air pollution and greenhouse gas mitigation, and quantifying the local health benefits of incorporating air-pollution-reduction measures into its enhanced NDC. By implementing 38 mitigation actions, the country expects to prevent more than 7000 premature deaths per year. In doing so, Côte d'Ivoire has become one of the few countries to quantitatively state the health benefits of climate action, while providing a strong case for accelerating NDC implementation.

● Towards sustainable water planning & use

Assessing water stress with SEI's Water Evaluation and Planning tool (WEAP)

Though progress towards Sustainable Development Goal (SDG) 6.4.2 on water stress has largely been assessed at the country level, SEI developed a new WEAP feature that calculates water stress at the sub-basin level. The feature allows users of WEAP to gain better insights into the spatial and temporal aspects of water stress. It is intended to increase local ownership and participation in evaluating and developing strategies to ease stress on water resources. In 2022, we delivered an online training course on the use of WEAP for SDG 6.4.2 with water resource managers and researchers in Algeria and Tunisia; the course focused on using WEAP to calculate water stress in the sub-basins of the Medjerda River. Participants helped us refine our pilot training modules to produce a comprehensive training package in French, English and Spanish.

"This tool is very important for the Mekong River Commission and the member countries to support reservoir data and information for flood and drought management in the Mekong Region."

— Dr. Winai Wangpimool, Senior Officer, Department of Water Resources, Ministry of Natural Resources and Environment, Thailand and Formal Director of the MRC Technical Support Division

Connecting water planning and Resource Value Mapping (REVAMP)

Resource Value Mapping (REVAMP) is a decision-support tool for rapidly estimating the resource recovery potential from organic waste streams: sewage sludge, faecal sludge and other organic solid waste. REVAMP calculates the potential amount of recovered product, its energy and nutrient contents, and revenue potential in different scenarios. In 2022, SEI linked the REVAMP tool to WEAP. We conducted two pilot projects in watersheds as part of the Bolivia WATCH programme (see Section 2), using REVAMP in capacity-development activities for researchers and sanitation practitioners in Bolivia.

Examining the impact of WASH interventions with WASH Flows

WASH Flows estimates how water, sanitation and hygiene (WASH) interventions at the household level can influence water quality and quantity at community and basin scales. The tool was initially designed to analyse and generate data for the Bolivia WATCH programme (see Section 2). In 2022, we tested the potential for WASH Flows to serve as a standalone tool for use by technicians, researchers and operators in Bolivia. Participants in a user-experience workshop in La Paz provided key feedback for refinement of the tool. The event also piqued interest in its use.

Facilitating collaborative action with the Reservoir Assessment Tool for Lower Mekong Basin (RAT-Mekong)

Launched in 2022, RAT-Mekong is a web application for forecasting hydrologic impacts and operating patterns of existing and planned reservoirs in the Lower Mekong Region. It provides near-real-time reservoir monitoring information through the SERVIR-SEA Project. The tool was developed with the support of the Asian Disaster Preparedness Center and the Mekong River Commission (MRC). The tool will assist the MRC and member countries (Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam) in their decisions and planning for drought and flood management in the Lower Mekong Basin. It will help them develop indicators for two key strategy documents: the MRC Drought Management Strategy 2020–2025 and Flood Management and Mitigation Strategy 2021–2030. Development of the tool has prompted China to share pertinent data with MRC member countries.

● **Situating health in the 2030 Agenda with SDG Synergies**

SDG Synergies allows users to investigate the strength and nature of interactions between the Sustainable Development Goals (SDGs). To date, over 100 organizations have requested access to the tool. In 2022, we focused on using the tool to support subnational-level implementation of the SDGs, and on the specific sectors of finance and health. Our policy brief, Situating Health Within the 2030 Agenda—A Practical Application of the Sustainable Development Goals Synergies Approach (published by Public Health Reviews), uses two examples that demonstrate the tool helps overcome present challenges, and shows that it can be applied to situate health within the 2030 Agenda. Collaborating with researchers at the *Karolinska Institutet*, we also used the SDG Synergies tool to analyse SDG interactions related specifically to child health in Cambodia. The findings (published in Communications Medicine) highlight important synergies and trade-offs vital for accelerating the improvement of child health and achieving the SDGs. The *Karolinska Institutet* is using SDG Synergies in Somalia, Uganda and the Democratic Republic of Congo, where they aim to help develop the capacity of fragile states to achieve the SDGs. Our work using the tool feeds into SEI's engagement in preparing the Global Sustainable Development Report 2023.

● **Addressing subnational-level gender gaps with the GEM Platform**

In 2022, SEI launched the Gender Equality Monitoring (GEM) Platform for the Lower Mekong Region online. Targeted at policymakers, researchers, development practitioners and gender advocates, the GEM Platform aims to promote gender equality by improving access to sex disaggregated data and empowering users to examine and track changes in subnational-level gender gaps. It visualizes subnational gender gaps in various areas such as education, health, employment, access to information, intra-household decision-making and political participation. It also examines any gaps that relate to the Gender Inequality Index (GII), developed by the UN Development Programme as a composite measure to quantify the loss of achievement within a country due to gender inequality. The tool thus provides starting points to further explore the causes and more complex dynamics of gender inequality. It can also track the performance of national and sub-national interventions aimed at promoting gender equality.

● **Exploring gaps and flows in finance for climate and development with Aid Atlas**

SEI's Aid Atlas allows users to easily explore where development aid comes from, where it goes, and how it is used. In 2022, SEI used Aid Atlas in multiple SEI publications and peer-reviewed articles related to climate finance, including a brief on multilateral adaptation finance for systemic resilience, a peer-reviewed article on the role of development assistance in implementing the Paris Agreement, and input to the Africa chapter of the Working Group II contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. It also informs key work by other organizations. It was used by the International Institute for Sustainable Development in its 2022 study on shifting international public finance away from fossil fuels, by the UN Environment Programme in its Adaptation Gap Report 2022, and by the UN Food and Agriculture Organization (FAO) and SEI in a publication on investing in water. The publications citing Aid Atlas cover a range of climate and development topics, showcasing the versatility of the tool.

● **Monitoring emissions from global maritime shipping with Global Shipping Watch**

Around 80% of the world's trade is carried by sea, resulting in nearly 3% of the world's greenhouse gas emissions – more than the aviation sector. Launched in 2022, the open-access Global Shipping Watch platform matches detailed cargo records and the movements and operations of vessels to find out what a given cargo ship carries, which companies own the cargo, and thus which commodities and products are linked to shipping emissions on specific routes. This data is essential for bringing accountability and transparency to global maritime shipping and international supply chains, and supporting efforts to decarbonize the shipping sector. The pilot version of the tool currently includes data on all the maritime exports and imports of the US, representing about one-sixth of world trade in goods, as well as the exports of countries such as Brazil, Chile, Ghana, Indonesia and Peru in 2019. The ambition is to increase the geographic and time range of the platform to include most global maritime trade.

THE IMPACT OF OUR TOOLS: HOW KNOWLEDGE SHARING THROUGH WEADAPT LED TO ACTION

We strive to more fully understand how our tools are used by stakeholders and make an impact in the wider world. weADAPT – SEI’s global platform for knowledge sharing on climate change adaptation and related issues – offers one example of this effort. In 2022, the weADAPT team surveyed and interviewed users to learn what the platform does well and how it can improve. The findings were used to produce an [online interactive map](#) that shows how weADAPT content is being used – and how it can be used – to increase the resilience of people and places to the impacts of climate change. The map gives a glimpse of the many influences of weADAPT materials on a vast range of climate change-related avenues. It shows that these materials help guide approaches, decisions, policies, outreach and educational efforts throughout the Global South at all scales and in diverse sectors. This work is being used to inform a new Theory of Change and associated monitoring, evaluation, and learning processes for the platform, which marked its 15th year of operation in 2022.

3.4 Addressing issues on gender equality, social equity and poverty alleviation

SEI’s work seeks to address issues that are particularly important for gender equality, social equity and poverty alleviation (GESEP) – issues that are understood in terms of participation in decision-making, disproportionate impacts, and access to and control over assets and knowledge. These issues are deeply intertwined with efforts to limit climate change, address environmental degradation and foster sustainable development for all.

Here we highlight examples of how SEI is putting gender equality, social equity and poverty alleviation onto policy-making agendas, and increasing the participation of marginalized groups in decision-making and planning processes. We showcase key examples of our efforts to build the capacity of our partners to integrate such considerations into their own work. (Note: results of related work through the Gender Equality, Social Equity and Poverty (GESEP) Initiative and the Initiative on Water Beyond Boundaries are detailed in Section 5.)

STOCKHOLM+50: CHARTING A YOUTH VISION FOR A JUST AND SUSTAINABLE FUTURE

The better world envisioned 50 years ago with the launch of the Stockholm Declaration has not yet come to pass. Thus, it will be up to today’s youth to address the challenges posed by the development failures on the environment that previous generations have not tackled.

To inform the UN international meeting marking the 50th anniversary of the Stockholm Declaration, early-career researchers in SEI, with their peers at the Council on Energy, Environment and Water coordinated and wrote the report, [Charting a Youth Vision for a Just and Sustainable Future](#). Drawing on findings from a global survey of 1050 young people (18–30 years old) from 89 countries, the report articulates a vision among young people for a shared future, and suggests consultative processes and policies to engage their generation in national and international action. The report formed the backbone of the op-ed *What the climate crisis needs: the world’s youth*, published by Thomson Reuters Foundation News, highlighting actions governments can take to harness the energy, ideas and agency of the world’s youth.

The report successfully drove these issues onto the agenda of the Stockholm+50 meeting. The UN Environment Programme highlighted that the meeting had helped renew engagement with multiple stakeholders, particularly youth. In their recommendations for accelerating action towards a healthy planet the Presidents' [Final Remarks to the Stockholm+50 Plenary](#) highlighted the need to “Recognize intergenerational responsibility as a cornerstone of sound policy-making” and to support the critical role of young people in environmental action.

● **Supporting Asia-Pacific girls' fight for the future**

SEI has documented and showcased how girls and young women in the Asia-Pacific region are leading climate movements, using digital platforms and social media, and advocating for climate justice and social inclusion. The work, which forms a chapter in Plan International's report [The 2022 Asia-Pacific Girls' Report: Their Fight for the Future](#), shows that while young, female climate advocates have the capacity, agency and power to lead the climate change movement, they still face barriers: gender and age discrimination, and societal reluctance to acknowledge girls and young women as change agents.

Plan International has used SEI's findings and recommendations in its wider climate- and environmental rights-related advocacy work. Such work includes efforts to help inform the development by the UN Committee on the Rights of the Child of General Comment (No. 26) on Children's Rights and the Environment with a Special Focus on Climate Change. The inputs for the comment will underpin UN guidance both on how children's rights are impacted by the environmental crisis and on what actions governments must take to uphold these rights.

● **Integrating human rights and equality into disaster risk reduction work**

As part of the [Building Resilience through Inclusive and Climate-adaptive Disaster Risk Reduction in Asia-Pacific \(BRDR\)](#) programme, SEI has collaborated with the Asian Disaster Preparedness Center, the Raoul Wallenberg Institute of Human Rights and Humanitarian Law, and the Swedish Civil Contingencies Agency to integrate human rights and gender equality in partner work. A key contribution is the development of the [Framework for Integrating Rights and Equality \(FIRE\)](#), and a [brief](#) demonstrating its application in the context of risk assessment, risk-sensitive and climate-adaptive land-use planning, and emergency preparedness for disaster response. The FIRE approach is a guiding framework for decision-makers at national, subnational and local levels to use in the development and implementation of laws, policies, procedures and practices related to disaster risk reduction. The paper, [FIRE: A framework for integrating human rights and gender equality in disaster risk reduction and climate change adaptation](#), explains how it can be used at multiple levels of governance by state and non-state actors.

● **Promoting equitable mobility in Africa through creative methods**

SEI undertook extensive work (through the UN Environment Programme's [Share the Road Programme](#)) that culminated in the COP27 launch of the SEI guidance document, [Using Creative Participatory Approaches for Inclusive Climate Resilient Transport in Africa: Guidelines for Practitioners](#). The document provides easy-to-use, visual guides on selected creative methods that can be used to incorporate disadvantaged groups into transportation-related decision-making processes, and offers step-by-step guidance on how and when to use these methods. The document is designed to be used by planners and NGOs across Africa.

SEI coupled the launch of the report with hands-on training on these approaches. For example, in Lusaka, Zambia, the Zambia Road Safety Trust used the guide to run pop-up creative activities to gain insights on both the impact of a major road junction on the mobility of disadvantaged groups and the implications for walking and cycling. Activities included artworks, streetscape models, digital storytelling and photography. This work led to the introduction of six privately funded, three-dimensional pedestrian crossings (“zebra” crossings) near schools; as a result of these efforts, vehicle speeds at these locations fell by around 20%, reducing risks to pedestrians.

● Mainstreaming GESEP in water planning

All SEI's water sector work integrates measures to address gender equality, social equity and poverty (GESp) issues. These efforts are having an impact, as illustrated by work undertaken through the Water Beyond Boundaries Initiative (see Section 5) and the Bolivia WATCH programme (see Section 2). These projects have conducted research to better integrate gender and social equality in model-based water resources management. They have also created mechanisms to bring narratives of women and marginalized populations into watershed management.

For example, in 2022, SEI's water research team presented new members of Colombia's Campoalegre Watershed Council with narratives of Indigenous People and smallholders, many of them women; these narratives powerfully illustrated how current policies that determine land use and water access in the Campoalegre watershed marginalize small-scale coffee farmers and Indigenous People, pushing them further into poverty. As a result of the Initiative's work, the area's water planning dialogues and processes for the first time included marginalized groups such as the Indigenous Peoples of the Suratena and Altomira – many of whom lack basic household water access and sanitation. The work also led to a concept note, developed with local partners and based on the serious games approach, to produce a local watershed management plan that results in more equitable water access. (The serious games approach is described in Section 3.5.)

● Short highlights: Building capacity of our partners

In Asia, SEI is collaborating with the **Australian Centre for International Agricultural Research** to develop its Gender Equality and Social Inclusion Strategy (2022–2027). The centre is Australia's national partnership broker and funding agency for agricultural research for development, and it has informed policy and practice in climate, fisheries, forestry, and water in more than 36 countries. The centre's strategy will guide efforts to incorporate gender equality and social inclusion into its extensive portfolio of research and capacity-building investments. This should lead to greater gender and social equity, equality and empowerment outcomes.

SEI has been providing guidance on gender integration to the **national case-study teams** involved in the project, "The impact of air pollution on the world of work for women and youth in East and Southeast Asia." SEI's guidance has allowed the project to better understand the differential impacts from air pollution on women and men in informal employment, an area that has received scant previous research attention.

We have coached the recipients of SEI's Strategic Collaborative Fund (SCF2) programme about ways to organize inclusive events that integrate gender equality and human rights at all stages. SEI co-organized a webinar introducing basic concepts and tools available for integrating gender and human rights into activities. This was followed by tailored support to each consortium based on existing capacities and specific needs to foster meaningful participation and multistakeholder collaboration. As a result, grantees had a better understanding of gender and human rights issues, and they were better equipped to integrate these issues into their own event planning.

3.5 Co-production processes

We at SEI put stakeholders at the center of our work. We deliver outputs and support that are context-specific, decision-orientated and tailored for the intended audience. This approach makes SEI well-placed to support stakeholders in their decision-making and actions for more sustainable and equitable development. We continue to strengthen this aspect of our work using co-production processes to collaboratively generate knowledge and outputs with our partners.

This deep collaboration serves many purposes. It heightens mutual understanding, builds relationships and engenders trust – both between SEI and stakeholders and among different stakeholder groups. The enhanced sense of ownership over the process and outputs, and the associated agency that emerges, also increases the likelihood of uptake of a given project's results. Together, these aspects help generate positive outcomes in the longer term.

Below are selected highlights of co-production processes in 2022.

“The formulation phase of the Campoalegre River Basin [water-management plan] overlapped with the Covid-19 pandemic. Despite that, the formulation completely changed the way we approach different issues and guaranteed the participation of every person that represents each sector of the community. Through an interactive and virtual strategy, we were able to participate and provide alternative solutions to multiple problems and needs from the point of view, knowledge and criteria of each participant. The serious game constituted an innovative and creative strategy that facilitated and accelerated participation processes and made it possible to deal with comprehensive problems and requests between sectors compared to face-to-face workshops in previous diagnostic phases...where that was not achieved.”

— José Vicente Villegas, president of the Campoalegre basin council

● Supporting water planning in Colombia through serious games

SEI has developed and used serious games to help authorities in Colombia co-produce a water-management plan (locally known as a POMCA) for the Campoalegre watershed. In collaboration with local partners, SEI designed a strategy for engaging all stakeholders to validate previously identified problems, co-produce the management plan, define the institutional commitments and create a financial plan for each of the water management actions that would ultimately be included in the plan. Previous efforts had not delivered positive outcomes for all relevant water management actors. To change this, we designed and integrated a serious game into the stakeholder workshops. Serious games bring several advantages: they drive stakeholder participation, engage a broad range of stakeholders and can be used online – a necessity given the pandemic restrictions that were in place locally at the time.

The serious game engaged players in the management of a simulated watershed and allowed them to see how their decisions played out for different stakeholders. Playing the game helped the basin councillors and other participants to understand the key water-management dynamics in the watershed and contribute their knowledge and perspective to the evaluation of specific actions. The game illuminated existing and potential conflicts and promoted dialogue among stakeholders, allowing them to understand each other's objectives and needs, even when it was not possible to meet in person. This proved vital in building enthusiasm and commitment to the plan that ultimately emerged from the process.

The Ministry of Environment and Sustainable Development (*Minambiente*) was impressed enough with the outcomes in the Campoalegre River basin to request that SEI lead similar co-production of a serious gaming tool for the Chinchiná River basin, where local actors had previously struggled to come together develop a water-management plan. The aspiration of the follow-on activities with *Minambiente* is that serious games can become an engine to develop plans and translate these plans into on-the-ground water management improvements in Colombian river basins.

This work is part of SEI's Water Beyond Boundaries Initiative (described in Section 5).

● Co-designing pathways to reduce flood risk in Lusaka, Zambia

SEI worked with partners to design two Learning Labs that brought diverse stakeholders together to co-explore solutions for peri-urban areas of Lusaka, Zambia, that address flooding and increase resilience to the impacts of climate change. Lusaka is one of Africa's fastest-growing cities, with 70% of residents living in informal settlements. Poor drainage and ineffective waste management are resulting in severe localized flooding and serious health risks, including cholera outbreaks.

“[The Learning Lab processes have] done well to zero in on the issue of urban floods and how climate change pressures are making it worse. The people of Lusaka have continually experienced floods in various parts of the city. While the problem is widespread, the most-affected people remain to be those in informal settlements such as George and Kanyama where climate change challenges interact with poor infrastructure, poor quality housing and poorly managed solid waste.”

– Lusaka Mayor Chilando Chitangala

The labs brought together stakeholders from city and civil society organizations, academia, and meteorological services, including climate and social scientists; Lusaka Mayor Chilando Chitangala attended the second session, demonstrating the city government’s commitment to address climate risks. The labs were designed to unite participants to:

- enhance their collective understanding of a complex issue,
- interrogate all the evidence available – including new information regarding informal settlements that emerged from surveys, interviews, climate and flood data analysis, and
- harness the collective expertise and knowledge of all participants to collaboratively map climate-resilient development pathways for the city.

The labs used interactive exercises, games, presentations, and discussions on key challenges to build rapport between participants and support rich and open discussion on the impacts of flooding and the complexities of addressing flood risks in the city. A novel feature was the use of candid cartoon graphics, both for supporting discussions and for capturing and reflecting on participants’ lived experiences of the impacts of flooding.

The participants identified barriers to resilience, built a shared understanding of how flooding impacts different communities, and identified several solutions to address flooding. The labs enabled co-exploration of information to guide city officials in developing Lusaka’s new integrated development plan. They also demonstrated that – under the projected impacts of climate change – flooding will be an ongoing issue even if current drainage plans are implemented, highlighting the need for more holistic, long-term and potentially radical solutions. This knowledge will be taken forward for Lusaka’s climate resilience planning in 2023.

● Using the Agenda 2030 Compass to integrate the Sustainable Development Goals into strategic planning

SEI has advanced work on the Agenda 2030 Compass to establish an inclusive, co-creation-based process that helps stakeholders integrate the Sustainable Development Goals (SDGs) into strategic planning. It allows users to evaluate policies by assessing direct and indirect effects on the SDGs, helping them to avoid unintended consequences and leverage synergies. The compass combines use of a “Context Mapper” software tool that identifies the potential for positive or negative interactions among SDGs in a particular context, and a “Strategy Analyser”, a workshop-based co-creation process and toolbox to analyse the implications of a planned intervention on the SDGs within that context. This process can be used to analyse a single strategy in a single context, several alternative strategies in a single context, or a single strategy across several contexts. In 2022, the Agenda 2030 Compass has been successfully tested in public and private sectors, in case studies exploring the societal benefits of new products, housing development, and local and regional development strategies in Sweden and in India. In 2023, we plan to scale up this work to apply it to new contexts.

3.6 Networks

Network-building helps drive our desired outcomes. It informs our work, yields new connections, and deepens our work's impact. These networks exist at all levels, from global to local. They take different forms: some are communities connected by a common goal, while others are large, formal networks with centralized funding. They cut across disciplines and topics, and engage a diverse array of actors.

Here we highlight select networks – some long-standing and some new – that we cultivated in 2022.

PROGRESSING SUPPLY-SIDE FOSSIL FUEL RESEARCH AND POLICY

In 2022, SEI hosted the third in-person International Conference on Fossil Fuel Supply and Climate Policy. Initiated by SEI in 2016, these conferences and a virtual forum in 2020 have explored the intersection of fossil fuel supply and climate policy. These have sparked new ideas, research and connections among finance specialists, industry representatives, international organizations, civil society organizations, and academic researchers. These conferences' legacy continues to grow. As well as fuelling the networks and research underpinning key reports such as the Production Gap Report and those of the Intergovernmental Panel on Climate Change, and generating valuable media opportunities for discussing supply-side policy, they have informed policy innovation. These efforts include a proposal for an international Fossil Fuel Non-Proliferation Treaty that was presented and first vetted at the 2016 conference, published in the conference-related issue of *Climate Policy* in 2019 and endorsed by 101 Nobel laureates in 2021. In 2022, the treaty gained further visibility and support, including from Pacific nations, the European Parliament, the Vatican and the World Health Organization.

● Enhancing the visibility of our SDG Synergies work through the UN DESA Sustainable Water and Energy Solutions Network

In 2022, SEI joined the multi-stakeholder Sustainable Water and Energy Solutions Network. Established by the United Nations Department of Economic and Social Affairs (UN DESA), the network plays an important role in sharing relevant best practices, experiences and quality data; strengthening capacities for managing water-energy linkages; mobilizing and scaling up multi-stakeholder action; and enhancing advocacy to help countries implement SDGs 6 (clean water and sanitation) and 7 (affordable and clean energy). Our participation in this network increases the visibility of our work and expertise. At COP27 we spoke at a UN DESA side event. In December, we presented SEI's SDG Synergies tool and method to 41 UN Member States at the Virtual Knowledge Exchange on Approaches and Tools for the 2023 Voluntary National Reviews, hosted by UN DESA during the United Nations High-level Political Forum on Sustainable Development. UN DESA has invited an SEI researcher to be lead author of the 2023 World Public Sector Report.

● LeadIT

SEI serves as Secretariat for the public-private Leadership Group for Industry Transition (LeadIT) initiative, which was launched by India and Sweden in September 2019. Working alongside partners including the World Economic Forum, the Climate Investment Fund, the Organisation for Economic Co-operation and Development (OECD), and the United Nations Industrial Development Organization (UNIDO), and industry leaders such as SSAB, HeidelbergCement, Scania, and Skanska, SEI is changing the agendas of investment decisions and charting the roadmap for sustainable industry transition. In 2022, this includes collaborating with LeadIT member companies to showcase decarbonization technologies and business plans to achieve

near-net zero emissions ahead of the Stockholm+50 meeting, and hosting key discussions on how to implement and catalyse industry transitions, including at Stockholm+50, the LeadIT Summit and COP27.

More examples of LeadIT's work in 2022 can be found in Section 3.2.

● SUMERNET

The Sustainable Mekong Research Network (SUMERNET) unites research and policy partners working on sustainable development in Cambodia, China, Lao PDR, Myanmar, Thailand and Viet Nam. The network focuses on water insecurity and delivering quality research on sustainable development, poverty alleviation, gender and social equity. Since its establishment in 2005, SEI has been the acting Secretariat. Today the membership has grown to 530 network members.

By leveraging the credibility and legitimacy SUMERNET has accumulated over time, a major new initiative was established in 2022 with substantial support from Australia's Department of Foreign Affairs and Trade through its Mekong-Australia Water, Energy and Climate Change programme. This initiative is known as the Mekong Thought Leadership and Think Tanks programme, a multi-year programme implemented by SEI with participation by several universities in Australia and partners in the Mekong region. The intent of the programme is to ensure that water, energy, climate research and policy interfaces in the Mekong region are robust and more inclusive so that more effective and equitable policies respond to the needs of vulnerable groups.

● Promoting universal coverage of clean water and sanitation

SEI is an active member of Sanitation and Water for All (SWA), a global partnership hosted by the UN that aims to achieve universal coverage of water, sanitation, and hygiene by monitoring and achieving Sustainable Development Goal 6 (SDG 6) targets. For the last three years, we have co-lead the Research and Learning constituency of SWA, which offers scientific, technical, and policy expertise to prioritize actions, advance research, and create evidence in the Water, Sanitation and Hygiene (WASH) field. In 2022, SEI coordinated and contributed to the development of a briefing note on the links between WASH and climate change for the Sector Ministers' Meeting. Hosted by the Government of Indonesia, the high-level meeting convened for the first time ministers of water, sanitation, and hygiene, along with their counterparts responsible for climate, environment, health, and the economy. The [briefing note](#) highlighted the latest research evidence on climate change, resilience, and WASH, and included SEI's work on sanitation gaps in climate policy. It informed preparatory processes for the Sector Ministers' Meeting and supported evidence-based follow-up actions after the meeting.

● Think2030

SEI has deepened its engagement with [Think Sustainable Europe](#), a network of sustainability think tanks. The first and only established European network of think tanks on sustainability issues, the group now includes 14 members from 13 EU member states. Think Sustainable Europe is the idea generator behind [Think2030](#), an evidence-based, non-partisan platform of leading policy experts from European think tanks, civil society, the private sector and local authorities. SEI has engaged actively with the network's strategic management, working groups, and informal meetings with European Commission representatives. SEI has agreed to host the next in the Think2030 series of EU sustainability policy conferences in Stockholm on 20 April 2023.

3.7 Training and education

SEI conducts training to share insights, transfer expertise, build the capacity of our partners, and enhance the uptake of our research and tools. These sessions also help us learn more about our partners' and stakeholders' needs. Our approach focuses on delivering activities such as workshops and peer-to-peer mentoring sessions that are tailored to the needs of participants. These activities foster the mutual exchange of ideas, and they help empower partners and stakeholders to take their work forward. Here we highlight three examples of training activities SEI delivered in 2022.

"We enjoyed the fruitful dialogue between all the officials and representatives from...Egypt [and its] Ministry of Environment, Ministry of Finance and Ministry of Planning and Economic Development."

– the Swedish Embassy in Cairo

"ACE has achieved a huge milestone by performing 100% of the modeling [for the latest ASEAN Energy Outlook] in-house, cementing ACE's status as an ASEAN energy think tank and further embodying the spirit 'from ASEAN, by ASEAN, to ASEAN.'"

– Nuki Agya Utama, Executive Director of the ASEAN Centre for Energy (ACE)

● Training on sustainable finance, climate finance and the circular economy in Egypt

SEI organized a two-day executive training programme on sustainable finance, climate finance and the circular economy for 25 representatives of three key Egyptian Government ministries: the Ministry of Environment, the Ministry of Finance, and the Ministry of Planning and Economic Development. The programme was undertaken in close collaboration with the Embassy of Sweden (which also hosted the event) in Cairo, the Swedish Ministry for Foreign Affairs, and the Egyptian Ministry of Foreign Affairs. A team representing SEI and the Stockholm School of Economics presented the most recent developments on key issues in preparation for the UN Climate Conference (COP27) in Sharm El Sheikh. SEI addressed fundamental issues regarding climate finance, the COP27 process, the circular economy, sustainable finance and green bonds. The sessions addressed challenges faced by the emerging sustainable finance sector and included a discussion on "crowding in" private finance for the Sustainable Development Goals.

● Building capacity within the Association of Southeast Asian Nations (ASEAN)

The ASEAN Energy Outlook examines pathways to achieve current national and regional energy and climate targets. Prior to 2022, the reports that underpinned the publication were developed primarily by institutions in the Global North for the ASEAN Centre for Energy (ACE). Now, with support from SEI, the centre has built an internal team that develops its own Energy Outlook and conducts all of its own modeling work. SEI researchers provided in-depth training on the use of SEI's Low Emissions Analysis Platform (LEAP) and Next Energy Modeling system for Optimization (NEMO) tools, which are used to model and examine the results of different energy scenarios. These have enabled the assessment of ASEAN measures for energy resilience. An eight-person ASEAN technical research team worked on the models for several months. We supported them throughout this period, working with them both remotely and in person (during two one-week visits to the ACE offices). We helped with specific tasks, provided tailored training and offered regular feedback. SEI also helped the team to craft key messages and review drafts of the report.

In parallel with these efforts, we ran a "training of trainers" for the ACE team, which engages with ministries in each of the 10 ASEAN member countries. This training focused on techniques that could be used to teach LEAP and NEMO. Two members of the ACE team have since conducted two independent LEAP workshops.

● Increasing journalists' understanding of the impacts of air pollution in Africa

In February 2022, SEI and the UN Environment Programme (UNEP) Regional Office for Africa partnered with the African Group on Atmospheric Sciences (ANGA) to undertake a three-day science training on air quality issues. The event targeted both anglophone and francophone journalists who cover environmental issues across Africa. The training was designed to help increase the quality of reporting on environmental issues by providing key journalists with accurate scientific information on the state of air quality in Africa and up-to-date information on the harms to human health caused by air pollution. The training was also intended to enhance collaboration between scientists and journalists by helping participating scientists to better understand how members of the media work. A senior editor with Royal Media Services, the largest media company in Kenya, participated in the training. Participants included 20 journalists and 10 scientists from East, Central and West Africa.

4. Organizational enablers

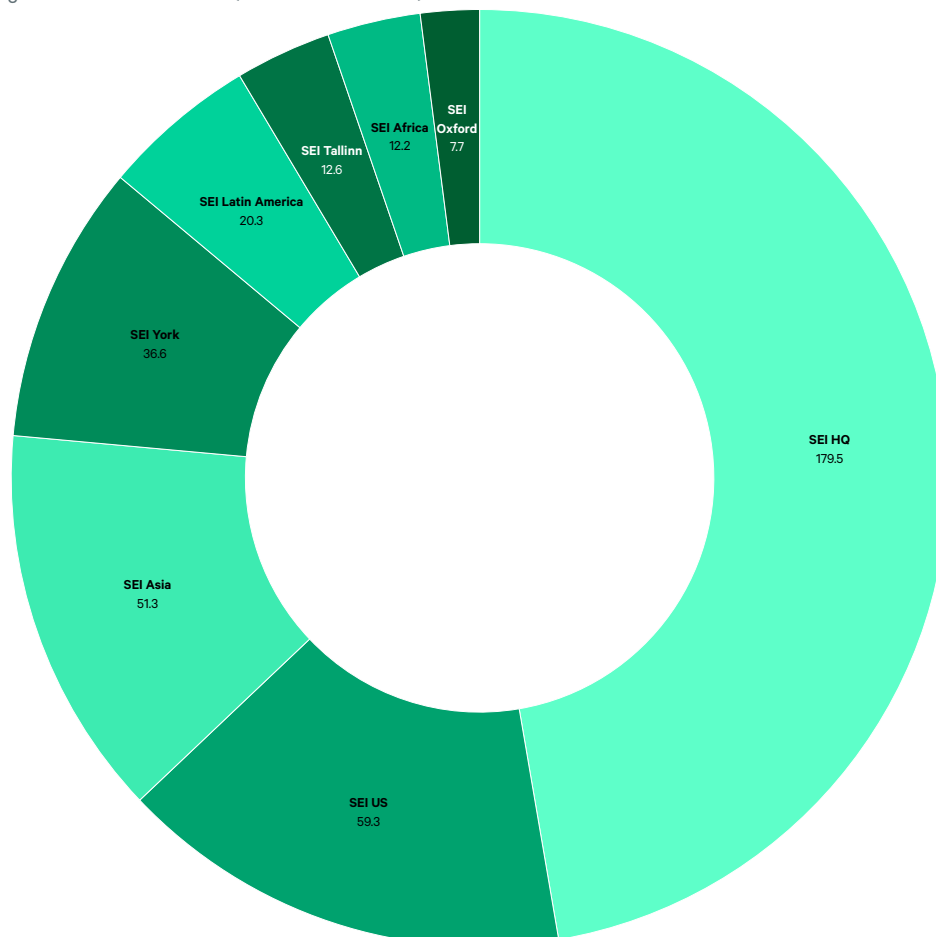
4.1 Resilient and diverse finances

Our Swedish core funding base reflects our mission in the field of environment and development, with one core pillar from environment and the other from development cooperation. This base enables us to ensure quality and sound governance of the institute, to invest strategically, and to develop and maintain a diverse and robust funding portfolio. This portfolio spans national research councils, EU bodies, international organizations and foundations, government agencies, universities, institutes, and NGOs.

We strive to build a strong, resilient, and diverse funding base for SEI operations by focusing on securing our core grants while also seeking diversified programmatic and project-level funds; ensuring quality in delivery; providing proposal coordination and quality assurance; and developing lasting and strategic partnerships with funders that align with our goals.

The annual core funding from the Swedish Government and the five-year agreement for core support from Sida enables SEI to maintain high levels of professionalism, accountability and effectiveness. It also enables SEI to invest in strategic research and policy engagements where the institute can be part of agenda-setting, capacity development and decision support. Further, it also enables SEI to adapt programmes to respond to emerging challenges around the world. The core funding streams represent approximately 25% of the Institute's total funding.

Figure 9. Research volume (shares of total 2022)



In 2022, the government core support was SEK 34 million, of which SEK 9 million was dedicated to co-funding and 2 million to the Secretariat of the Leadership Group for Industry Transition (LeadIT). Co-funding enables SEI to carry out research programmes that require matching funds.

Across the first three years of the current strategy period, the total income of SEI has increased by approximately 25%. With a stable annual funding level from core funding streams, this reflects a greater diversification of funding. The total number of small and mid-size funding sources has increased across the period, and there are a number of new larger funding sources in the pipeline.

A majority of the funding is project income from research council grants and international collaboration projects. The 10 largest funding sources are shown in Figure 10. The funding from the 10 largest funders accounts for 68% of the total funding.

Figure 10. SEI's 10 largest funding sources during 2022



4.2 Qualified and engaged colleagues

In 2022 SEI's human resources (HR) agenda sought to address the consequences of the global pandemic, which continues to impact businesses and organizations worldwide. We provided additional support to employees in numerous ways: by enhancing line management; establishing a sustainable and productive hybrid working environment; continuing to offer all employees free use of a mindfulness application (Headspace); and setting up an expansion of the security and medical services provided by International SOS services to include individual counselling sessions.

The SEI People Agenda is the global framework for all activities that address HR needs throughout the Institute. In 2022, we continued to undertake cooperative work Institute-wide through the SEI HR Network, which represents all SEI centres. The People Agenda is embedded in all Centre workplans, including the annual processes for People Reviews; these review processes focus on global succession planning, and contribute to the global “Retain Report” on employee retention and turnover. In 2022 SEI delivered on key targets for the Operational

Programme to address various aspects of organizational leadership, including modules on feedback, competence development, and work environment responsibilities (conducted in many centres), and on the finalization of the first Executive Leadership Programme for SEI's global management. Both programmes are based on the SEI Leadership Model.

The biannual global Employee Survey was conducted in 2022, this time incorporating a new set of questions around employee safety and well-being to address the ramifications of the pandemic for work and the work environment. The results and outputs were presented and discussed with the global management team, all centres, and all Centre management teams. The process included developing and following up on action plans to address areas for further improvement in each Centre. The annual results related to the SEI Equity, Gender and Diversity policy were presented to all employees in a joint global meeting. In addition, a gender review of the HQ employee survey results was conducted and presented.

We started to implement a performance evaluation system that complies with the European Union's General Data Protection Regulation (GDPR). We rolled out the system (Comaea) in SEI Asia and made a decision to continue the rollout in SEI Tallinn and SEI Oxford. In SEI Latin America, we implemented some reforms to ensure that there is representation from across Latin America in the Centre. These reforms should make it easier for SEI Latin America to attract applications from qualified candidates who are not Colombian citizens, and to complete the contracting process for those who are not Colombian citizens to accept our employment offers.

The fourth consecutive Global Mentorship Programme attracted participation from all our centres – supporting cross-Centre collaboration, learning and on-the-job development within SEI. We also continued to host numerous internships and supervise PhD students across our centres. Finally, we organized two global induction sessions for all newly recruited employees with participation from the Executive Team.

4.3 Effective Communications

SEI's aim is to communicate in ways that help bring greater attention to our work, set international agendas, and change the status quo to address climate change and sustainable development. In 2022, we continued to implement and refine our global media strategy to achieve our aims. We continued to increase our engagement with the media and to fine tune how we use new and established social media tools to engage our audience.

Here we highlight how we used our strategy in 2022. This work closely intertwined with our focus on developing communications products that enhance the accessibility and impact of our work (see Section 4.4).

Global media strategy

Our global media strategy aims to make our media outreach more selective, effective and impactful. Our goals are to become a key voice and source in regional and international media within our impact areas, achieve a more balanced global outreach, build a global media team, and ensure a mix of trained spokespersons.

Strengthening our engagement with the media

During 2022, we strengthened our engagement with traditional media by conducting media briefings, publishing press releases, giving scientific background talks, and reaching out to reporters with new reports and insights to inform their coverage. Globally, we produced 35 press releases (24 in English, 6 in Swedish, 5 in Estonian) and 13 media advisories (8 in English, 4 in Swedish, 1 in Spanish). This helped us reach more countries: our media coverage expanded its geographic reach – spanning 93 countries in 2022 compared to 76 countries in 2021. In 2022, as in 2021, 58% of this coverage was in Northern Europe, North America and Western Europe.

Table 4: SEI's media coverage

Area	2022	2021	2020	2019	2018
Media potential reach (cumulative throughout the year)	6.9 billion	18.4 - 19.1 billion	9 billion	7.9 billion	903 million
Media exposure (total number of articles citing SEI)	2400	5400 - 6300	2900	3800	1400
mSCORE (indicator of successful media exposure)	39	42	40	40	32

Source: Meltwater. Note: In preparing data for 2022, Meltwater conducted a new search for 2021, using a new database. The different databases used generated different figures. In the hyphenated figures for 2021 shown in the table, the first figure shows the results from the new search, and the second figure shows the results previously generated and reported in the SEI Annual Report for 2021.

We have continued to build our internal global media team and enhance the capacities of research staff to engage in outreach activities. Bespoke training has increased SEI's publication of op-eds in outside media outlets – allowing SEI researchers to directly express key points in ways that reach wider audiences. We have also strengthened our media work in Estonia and Eastern Europe by conducting briefings and reaching out to targeted journalists with “exclusives”.

We measure and benchmark the success of our outreach by calculating our media reach and exposure. One measure that we use in this process is our mSCORE, which quantifies the media space SEI captured compared to other climate and sustainable development organizations¹ (Table 4). SEI's mSCORE decreased from 42 in 2021 to 39 in 2022, indicating a small decline in SEI's “share of voice” compared to the shares of peer organizations. However, a comparison of 2022 with previous years (2020 and 2019) shows that this decrease is less significant; it suggests that 2021 was an exceptional year in terms of media exposure for SEI, largely due to exceptional, attention-getting publications such as the 2021 edition of the [Production Gap Report](#).

Promoting our work through the SEI website

The SEI website (sei.org) provides an important online home for all our work. It enables us to highlight breaking stories and draw readers into our ecosystem of knowledge. In 2022 we increased the production of web content: we published 136 features (up 18% from 2021) and 104 perspectives (up 30% from 2021). We also worked on a design refresh that will be launched in the second quarter of 2023. This refresh includes all templates and an update of the top navigation settings of the website. The refresh will improve the site's user friendliness, making it easier to find and access our research.

In 2022, sei.org received nearly 1.5 million pageviews, a small decrease of 1.7% compared to 2021. The number of unique visitors to the website was 553 440, which is an increase of 10% from 2021. Our analysis shows that 85% of our visitors return to our website, indicating that they use it as a regular source of information. Our analysis further shows that 64% of our visitors arrive via organic searches (e.g., through Google), 22% go directly to the site, and 8% arrive via social media (with 4% coming from LinkedIn).

As in 2021, most of our visitors were from the US, Sweden and the UK. In 2022, the other top countries for our users were (in order) India, the Philippines, Germany, China, Canada, Thailand and Kenya. As in 2021, gains were especially strong in the US (up 30% from 2021), the Philippines (up 26% from 2021) and in China (up 28%).

Enhancing our visibility through social media

We use social media to disseminate and draw attention to our work and to raise awareness of key issues. All our social media channels gained more followers during 2022, with particularly significant growth of followers on the Twitter accounts of SEI Latin America (212%) and SEI Asia accounts (53%), and on the LinkedIn channel of SEI (40%). Engagement rates – the percentage of followers that engage by commenting, liking or sharing SEI content in their channels – improved across all accounts, except LinkedIn, which still retained high engagement.

In 2022, we put more emphasis on targeting key messages to a general audience to enhance shareability of posts across platforms. We also improved our approach to tagging and optimizing hashtags to gain more traction. We introduced emojis and more in-post imagery to increase the reach of and engagement with our posts. We employed different strategies across our social media accounts, with focuses on multimedia content, Twitter threads and Twitter Spaces. For example, we worked with SEI Latin America to host two Twitter Spaces, which offer a way to have audio conversations on Twitter that are open to anyone to join, listen or speak. These events reached more than 650 listeners and boosted the number of followers for @SEIenEspanol.

We use YouTube to host and share our various video content, including webinars and content-specific videos. In 2022, our content on YouTube – which has over 3000 subscribers – drew 95 946 views, equating to approximately 6355 hours of watch time.

Reaching out to the Arab-speaking world

This year SEI's communications team benefitted from the presence of a Yemeni journalist with a wide range of communications experience, a wide following on social media, and a background in working on gender-related issues. She translated some of our press releases and media advisories into Arabic, significantly expanding SEI's visibility in previously difficult-to-reach countries. This coverage included several SEI-specific articles, including in *Rose al-Yūsuf*, a well-known magazine in Egypt and one of the top Egyptian media outlets, and in *Akhbar Alaan*, a pan-Arab infotainment outlet based in Dubai with 1 million followers on Twitter and over 19 million followers on Facebook. SEI was also featured and quoted in other articles, radio and social media channels that reach the Middle East.

LEVERAGING COP27 TO FOR A COMMUNICATIONS CAMPAIGN ON THE “LOSS AND DAMAGE” AGENDA

The annual UN Climate Conference provides an important opportunity for SEI to engage with crucial issues, influence agendas, and showcase relevant research and expertise. Following our global media strategy of leveraging high-profile events, we deliberately expanded our media outreach in the run-up to COP to prime journalists on key issues that would be highlighted at COP27. We invited journalists to a pre-COP27 media briefing, where our researchers provided expertise and insights on a range of issues relevant to the conference. This briefing gave reporters an overview of what to expect from COP27 and an understanding of the importance of this event for Africa. We provided journalists with needed background information to inform coverage on climate finance, highlighting the rising “loss and damage” issue to compensate countries suffering from climate change-related impacts. The briefing was widely attended, with participants from: *SR Ekot*, *Sveriges Television (SVT)*, *Tidningarnas telegrambyrå (TT)*, *Svenska Dagbladet (SVD)*, *Aktuell Hållbarhet*, *Dagens Nyheter*, *Svenska FN-Förbundet*, *Dagens Nyheter (DN)*, *Tidningen Världshorisont*, *Omvärlden*, *Expressen TV*, *TV4*, *Mundus-International*, *Rundfunk Berlin-Brandenburg*, *Deutsche Welle*, *Deutschland Radio*, *Arbeitsgemeinschaft der öffentlich-rechtlichen Rundfunkanstalten der Bundesrepublik Deutschland (ARD)*, *Climate Home News*, the *Financial Times*, and *The Wall Street Journal*.

Beginning in the summer before COP27 began and continuing after COP27 had concluded, SEI researchers worked with communications experts to produce an outreach campaign. For example, [SEI's report on loss and damage](#) was the focus of a several months-long media push, featuring interviews in the media (e.g., [Le Monde](#)), op-eds at high-profile outlets (e.g., [Climate Home News](#)), a podcast, and a Q&A on the SEI website. The report was covered by at least 20 news outlets. This communications effort helped to put the issue at the forefront of the COP27 agenda and contributed to the breakthrough agreement at COP27 to provide loss and damage funding for countries hit hard by climate disasters – one of the highest-profile and most significant outcomes of the event. This breakthrough is described in Section 2.

In connection with COP27, SEI was mentioned in 615 articles with a potential reach of 3,5 billion people. These included major news outlets such as the Cable News Network (CNN), The Economist, The Washington Post, and Deutschland Funk. Most media exposure was in Sweden, US, India, Canada, UK and South Africa. The largest proportion of the articles linked to the loss and damage work, but coverage was not limited to that subject. Media covered deforestation research undertaken by SEI, and the report *The Carbon Inequality Era* by Oxfam and SEI, originally published in 2020. The Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa, to which SEI contributed, also received considerable attention with the original press release republished on around 50 media sites.

4.4 Communications products

At SEI we work continuously to make our research accessible and easily actionable. We write op-eds and produce multimedia — including videos and podcasts — to raise awareness of and increase traction on key issues and to highlight our work for new and broader audiences.

Here we share select further examples of communications products we have used to engage stakeholders across the world and promote action in our three key outcome areas. These are a credit to the active collaboration between strategic policy engagement teams, researchers and communication officers across centres.

Publications & op-eds

Sustainable energy in Asia

SEI, in collaboration with Fair Finance Asia (FFA) and research partners Profundo and Strategia Development Research Institute (SDRI), launched the report, *Financing the Just Transition: Powering Asia's Sustainable Energy Future*, which provided new data on Asia's readiness to shift from fossil fuels to renewables, as well as to mitigate the adverse social and environmental impacts of this transition. Released at the FFA General Assembly in Bangkok, the report received extensive media coverage. SEI reflected on *Why Asia Needs 'Just Climate Finance'* in an op-ed in [The Diplomat](#). We also participated in an online FFA-hosted [dialogue](#) aimed at reviewing Asia's readiness to make this historical fossil fuels transition and identify key priorities for follow-up during the Indian G20 Presidency.

Productive agriculture in Colombia

In February 2022, SEI published the brief, *El control biológico y bioinsumos en la bioeconomía de Colombia*, which explored the state of the art of bio-inputs and biological controllers in Colombia's agricultural sector and their challenges and opportunities for the bioeconomy, including what steps need to be taken to ensure their sustainable use. We promoted the findings of this work in an agribusiness-focused op-ed in [Agronegocios](#).

Climate change adaptation

2022 saw two key SEI reports on transboundary climate risk. *Nordic perspectives on transboundary climate risk: current knowledge and pathways for action* and *New risk horizons: Sweden's exposure to climate risk via international trade* highlight crucial transboundary climate risks and what governments can do to advance action to adapt to these risks. The latter report was cited by *The Economist* in its 5 November issue, published just as UNFCCC COP27 started. SEI also penned and op-ed for Thomson Reuters Foundation on the need for greater investment in adaptation, highlighting that finance to build resilience to these impacts is falling woefully short. It was also covered by DN and Aktuell Hållbarhet.

Disaster risk reduction

SEI wrote an op-ed in *Rappler* (Philippines) focusing on what lessons we have (and have not) learned almost a decade after the climate disaster of Super Typhoon Yolanda. Released as COP27 started and given the passage of nine years since Yolanda, the op-ed reflects on the observance of Pa-siyam, the tradition of praying nine consecutive days for the dead. SEI also produced a series of animation videos on *environmental defenders* to educate viewers about their efforts toward disaster risk reduction, including how environmental defenders mobilize against the challenges of the existing sociocultural, economic, and political contexts that shape disasters.

SEI Podcasts

Water stories, a podcast about the world of water

In this podcast series of 12 episodes in English and Spanish, SEI experts explain complicated topics, such as efforts to manage water in California, the importance of giving ecosystems a “voice” in water planning, the intersection of poverty and water availability, and the role of computer models in managing water amid a changing climate.

Environment and Policy in Asia: a platform for dialogue on improving policy and practice on key sustainability challenges in Asia

In 2022, this series expanded from three episodes (in 2021) to 12 episodes in 2022. It covered various topics including air pollution in the world of work, gender and disaster risk, women environmental defenders, bioeconomy, sustainable finance, optimizing urban food systems resilience and inclusive access to build resilience to climate change. Podcast guests range from environmental experts, think tanks, researchers and policymakers to journalists and civil society representatives who explore collaborative pathways towards improving policy and practice on sustainability challenges in the region.

SEI CURRENTS: RAISING SEI'S PROFILE AS A THOUGHT LEADER ON GLOBAL ISSUES AND TRENDS

Building on the success of the inaugural SEI Currents in January 2022, we prepared to hold a second rendition in January of 2023. The Currents project taps SEI's global expertise to examine trends on the horizon that affect the world and its efforts to limit climate change and foster sustainable development. In 2022, we interviewed key researchers from throughout the Institute, and surveyed all colleagues about the trends surfacing in the regions and research agendas in which SEI works. At the Science Forum, we held a dedicated session with key members of the SEI Science Advisory Council to discuss how the trends we highlighted in 2022 played out over the year, and to debate proposed trends for 2023. The four Currents that emerged from this process were: the “democracy deficit” (a decline in global freedom and a rise in authoritarianism); the “meaning’ crisis” (the rise in the use of misinformation and disinformation); the cost-of-living crisis and what it means for the green transition; and technological disruption, with a focus on the use artificial intelligence and the implications for social equity.

Perspective pieces published in late 2022 ([Breakdown or breakthrough: currents to watch in 2023](#)) examined these four interweaving trends, which were also featured in the video, [Currents 2023](#). An external panel of experts discussed these and other trends in an [online event](#) in early 2023. The event concluded with a keynote speech by UN General Assembly President Csaba Kőrösi.

4.5 Environmental policy and travel emissions

At SEI we strive to carry out our work as sustainably as possible. To do so, we have put in place measures, policies and processes intended to increase our own sustainability ambitions. At the center of these efforts is our goal to reduce greenhouse gas emissions from work-related air travel by 25% per capita by 2024 (compared to 2017 levels). Partnerships, engagement in policy processes, and participatory methods remain essential to achieving our vision, and air travel continues to facilitate the international relationships and capacity-building that underpin this. At the same time, air travel also is responsible for most of our emissions.

We are making progress towards our emission-reduction goal. In 2022, emissions from business-related air travel started to increase with the end or relaxing of restrictions connected with the pandemic. We estimate that air travel undertaken for all SEI in 2022 generated 667 metric tons of carbon dioxide equivalent (CO₂e) emissions. By comparison, SEI air travel generated 58.4 tons CO₂e in 2021, 95.8 tons in 2020, and 895 tons in 2019.

Though we expect emissions to continue to rise from the low levels recorded since the pandemic began, we aim to capitalize on our enhanced capacity to engage and operate remotely. Where appropriate, online meetings and remote participation at events are prioritized as the primary mode of international collaboration. We have invested in technologies and software, including both video-conferencing and collaborative online tools, reimagined and tailored our participatory approaches for use online, and actively shared relevant good practices internally via webinars. We are also sharing these capacities with our partners, empowering them to better engage their stakeholders remotely.

In 2022, the institute began requiring all centres to use SEI's Tracking, Reflecting and Reducing Air Travel (TR²AIL) tool, which is designed to be used prior to air travel. It allows staff to see the emissions of their planned trips, to understand how a given trip will contribute towards their individual and Centre limits, and to reflect on the reasons for a trip. The TR²AIL tool enables SEI to standardize emissions reporting from throughout the institute, and to collect data to inform future travel policy. We are currently exploring ways to scale up TR²AIL for wider use in the research sector.

Our centres are also actively taking steps to reduce their environmental footprints, at their offices and host buildings and institutions. These include co-hosting public events focused on environmental issues, and supporting partners to develop environmental management and emission reduction strategies. A new Centre reporting and action plan for reporting emissions from 2022 and actions for 2023 further raises the ambition of Centre initiatives while aligning with the new EU Corporate Sustainability Reporting Directive (CSRD). This template incorporates greater quantitative assessment of emissions arising from SEI operations, including scope 1, 2 (both mandatory) and 3 (voluntary) emissions. It also aims to promote greater staff engagement and ownership of activities aimed at reducing our collective environmental footprint. The first reporting cycle using the new approach completes 31 March 2023.

4.6 Organizational learning

During 2022, SEI continued to implement several activities to promote organization-wide learning.

Learning Events. Following the success of internal Learning Events in 2021, which allowed for informal but deep discussion and experience-sharing between colleagues, we increased the frequency and diversity of learning events in 2022 and collaborated with the Gender Equality, Social Equity and Poverty (GESEP) programme on a special event series in support of an internal GESEP Community of Practice (see Section 5 for more details). Topics of learning events delivered in 2022 include:

- Good practices of online stakeholder engagement,
- How to be successful with a research proposal,
- The Community of Practice for GESEP,
- GESEP Innovation Hub session on environmental defenders,
- GESEP mainstreaming in policy engagement projects, and
- Strengthening cross-Centre collaborations in SDG projects & improving our current work with strategic partners.

All learning events are recorded and made accessible on the Knowledge Management Hub – the space within SEI’s internal Office 365 environment dedicated to facilitating knowledge exchange between colleagues across SEI.

In 2023 we will continue to expand the frequency of these events. Among these will be a learning event on MEL approaches for SEI tools, which will draw on learning from a tools and methods project (see Section 4.8), and an event, co-hosted by SEI’s Global Research Committee and leaders of SEI initiatives, to learn about research and engagement insights, and to elicit cross-initiative findings.

The SEI Knowledge Management (KM) Hub.

We have continued the expansion and improvement of the KM Hub to make this living digital resource as user-friendly as possible as its content grows and diversifies. A notable addition in 2022 was the launch of a new section targeting newcomers at SEI: the New Joiner Hub. This space was developed by junior staff in response to requests from other new and junior staff. It provides a detailed background on SEI and resources for further developing research, communication and project management skills, including links to useful internal webinars and interviews with key SEI experts. Like the overall KM Hub, this is a living resource that will grow over time. We also launched a new space to support the SEI GESEP Community of Practice.

We continued to use and develop the KM Hub to support the 2022 Science Forum (see Section 4.8) and provide easy access to knowledge from previous Science Forums.

A SEI tool review process.

Another key activity in 2022 was the collaborative development of a tool review process for all new and existing SEI tools that are integral to our work. Designed to work in tandem with the living, interactive tool development guide, this process, which will be piloted in 2023, aims to support the development and maintenance of high-quality tools and improve tool documentation and communication. In parallel, the knowledge management team has also collaborated with the SEI communications team on the design of SEI tool descriptions on the SEI website.

Centre-level activities.

SEI centres continue to nurture discussion and learning through regular events and internal communications. “Lunch and learn”, “brown bag lunch” and “SEIminar” sessions are used to share experiences and new ideas, discuss relevant issues, connect with SEI Affiliates, and provide a platform for less experienced staff to improve their presentation skills.

4.7 Quality assurance systems

In 2022, we finalized and launched our SEI global MEL procedure, a process that sets standards for monitoring, evaluation and learning (MEL) in projects undertaken by SEI. The new MEL procedure focuses on a series of questions applied at different points in the project cycle. We set up supporting templates for the procedure, setting out how it can be applied, depending on the needs, types and lengths of projects. SEI launched the MEL procedure with two global seminars in spring 2022. In autumn 2022, SEI introduced the MEL procedure to communications officers; over time, we intend for communications officers to take leading roles in MEL processes. This work continues in 2023.

We made further changes to the organization that underpins the MEL procedure by introducing a new position: Impact and Learning Officer (replacing the former position of MEL specialist). The new position was created to build on significant progress made in previous years on SEI global and project MEL activities, and to start linking these to a greater degree with organizational learning activities.

We strengthened our IT governance and management by introducing a new position: IT and Data Security Manager. The new position was created to ensure that SEI has the level of IT and data security that it needs.

We organized two leadership training sessions for project managers at SEI HQ. These pilot training sessions were very well received, and they will be offered again next year. We also began to review how the project model is applied at SEI HQ, to ensure it is aligned with the new HQ line organization and with the role of the project owner. This work continues in 2023.

We continued to enhance our risk-management procedures by drafting and approving an Institute-wide risk policy, and fine-tuning the reporting format to the SEI Board.

In 2022, we continued to implement and refine our quality-assurance processes regarding scientific quality and research integrity. The SEI Peer Review process, now firmly institutionalized, is being used for all SEI-branded publications. The number of submitted manuscripts increased by more than 30% from 61 in 2021 to 82 in 2022. We continue to refine the process to maintain short review times and focus review efforts where most needed. The submission system was updated to emphasize the need to state conflicts of interest and to provide assurance that the research has undergone ethics screening and review, which are standard requirements for scientific publications generally. In 2023, the Peer Review Team is planning to provide Institute-wide training on SEI's peer review processes to increase the pool of reviewers, build capacity, and further improve the quality of reviews.

In 2022, we continued to implement the SEI Ethical Practice guideline across the Institute. A total of 21 ethical practice plans were submitted for projects during 2022 (up from 11 during 2021), and 30 ethics screenings were conducted. We held two learning events to help researchers understand and use the process, and we convened a session on research integrity during the Science Forum. We recruited two new members for the ethics subcommittee to provide additional capacity to review ethics plans, and to help build researchers' own capacity to address ethics issues across the Institute. In the autumn of 2022, we revised the guideline to help focus efforts on projects that gather data on human subjects, and to highlight risks to research independence and integrity. For HQ, we more systematically consider the Swedish legal requirement for ethics review, with the designated authority (*Etikprövningsnämnden*), and we assess when it should be used instead of SEI internal process.

In 2022 SEI began developing a process for peer review of SEI tools, led by the Tools Taskforce (see Section 4.6). We also began the development of a formal process for handling complaints on research quality.

4.8 Innovative spaces

SEI's work requires innovative thinking. We nurture innovation by hosting events, cultivating spaces, and offering occasions that bring together the diverse expertise and transdisciplinary knowledge of SEI's researchers. These efforts stimulate discussion among colleagues throughout SEI – helping spark new ideas, raise potential solutions to complex issues, and forge new collaborations across disciplines and among SEI centres. We deliberately generate and test new concepts internally, with an eye towards vetting innovations within the Institute first, so that we can refine ideas in ways to give them a better chance of both attracting external funding and achieving external reach and traction.

In 2022, SEI benefitted from mechanisms for nurturing innovative spaces at both the global and Centre levels. Highlights include:

Funding seed-and-innovation and tools and methods projects.

SEI initiated three new seed-and-innovation (S&I) projects and two new projects focused on tools and methods. The new seed-and-innovation projects focus on understanding vulnerability in the context of disaster displacement in Naivasha, Kenya; best practices to design early-warning systems for extreme weather; and the use of citizen science for achieving inclusive public water and sanitation services. The new tools and methods projects focus on the development of a global subnational agricultural production database, and the development of monitoring, evaluation and learning (MEL) approaches for four of SEI's established tools: LEAP, WEAP, Trase and weADAPT. The work from these projects enables SEI researchers to leverage and build new networks both within and outside of the Institute. In 2022, an examination of the efficacy of the seed-funding mechanism led to recommendations for some changes. In late 2022, SEI's Global Research Committee followed up with project leaders of approved seed-and-innovation and tools and methods projects to discuss their results and future plans. We will continue this practice in 2023, to strengthen the “seeding” function of these projects. This will help us access and leverage external funding, and draw lessons from these projects to support institutional learning for the Institute.

Connecting and reconnecting through the Science Forum.

In October, we held the 2022 Science Forum as a series of hybrid events: science-driven evidence sessions, workshops aimed at advancing SEI's work on specific issues, and “blue skies” sessions exploring emerging topics and issues of relevance to SEI's agendas. Topics were wide-ranging, including, for example, engaging with decision-makers; supporting local, national, and regional planning and action; working with Indigenous Peoples; and interacting with the private sector, local communities, and global processes. All sessions included dedicated time and collaborative activities to stimulate reflection and discussions. Key researchers from each Centre participated in person in Stockholm to present them with an opportunity to meet each other and key colleagues in person, and to strengthen research networks across the organization. Members of the Global Research Committee attended and facilitated discussions of key reflections on a closing session each day.

Strengthening engagement and synergies through our Strategic Policy Engagement tracks.

In 2022, our strategic policy engagement team on oceans and biodiversity produced a series of publications on nature-based solutions (NbS) – a subject that offered SEI an opportunity to bring together expertise from various centres on related issues, and to combine its ocean and biodiversity agendas. The series led to a S&I proposal and seeded the Stockholm+50 background paper *[Towards multifunctionality: adaptation beyond the nature–society dichotomy](#)*. The subject was also addressed through a [podcast](#) hosted by “Talks 4 Action” and produced by the Partnership for Environment and Disaster Risk Reduction (PEDRR) and UN Environment Programme (UNEP).

Our strategic policy engagement teams host regular Institute-wide calls, and use Microsoft Teams to present pertinent work, share updates, discuss key and emerging topics, and stay abreast of relevant policy processes and events. This work plays an important role in coordinating activities in SEI, exploiting synergies between our projects and expertise, and strategically targeting our outreach at times and in places with the potential to lead to policy impact.

LEVERAGING OUR ANNIVERSARY CELEBRATIONS TO HOST DISCUSSIONS AND SET AGENDAS

In 2022, SEI Tallinn celebrated its 30th anniversary, and SEI Oxford celebrated its 20th anniversary. Both centres marked these milestones by hosting hybrid events that drew together global experts and ministers to discuss crucial issues on the global agenda, and to lay the foundation for work to come.

SEI Tallinn's 30th anniversary conference, "[Building resilience through sustainability](#)", brought together interdisciplinary views from government ministers and high-profile experts on building resilient, just, democratic and sustainable societies. The conference took place against the backdrop of turmoil and turbulence caused by the pandemic, extreme weather events, natural disasters, supply-chain disruptions, energy crises, and the war in Ukraine. The event included in-depth discussion of two crucial topics: building resilience in urban settlements, and developing sustainable and resilient energy systems.

SEI Oxford's 20th anniversary event, "[The future of climate change adaptation](#)", brought together leaders on adaptation research and practice from around the world. Held in the atmospheric University of Oxford Museum of Natural History, the interactive event featured two panels. The first addressed the main goals for adaptation, the key barriers to adaptation and the ways to achieve progress. The second panel held a lively, intergenerational chat about the similarities and differences from one generation to the next about priorities and approaches to address adaptation, social justice, and decision-making to mitigate climate change and achieve sustainable development.

5. SEI Initiatives

SEI's seven initiatives are hubs for signature SEI research and involve researchers from multiple centres. They represent the biggest investments of SEI core funding and are expected to deliver innovative and high-quality scientific research, outcomes and impact on the ground, and to attract external funding.

Here we highlight examples of the initiatives' key achievements and the external interest they have attracted.

5.1 Carbon Lock-In

The Carbon Lock-In Initiative seeks to uncover and address the interwoven social, political, and technical barriers that uphold the high-carbon economy. Through research and policy engagement, we will identify policies and strategies to break dependence on high-carbon industries in order to accelerate the transition to a low-carbon future.

Key achievements in 2022

In September, the Initiative hosted the third International Conference on Fossil Fuel Supply and Climate Policy in Oxford, UK. While covering a broad range of issues, this year's conference emphasized going beyond "carbon tunnel vision" by incorporating discussions on health and biodiversity impacts of fossil fuel extraction, as well as its impacts on vulnerable groups. It spotlighted those most affected by climate change and the construction of new fossil fuel projects. This included Indigenous land defenders from Ecuador and South Africa, who inspired participants with their successful legal cases against major fossil fuel companies and governments, and highlighted the historic exclusion of Indigenous women from influential policymaking spaces.

The Initiative showcased new research and live discussion on the health effects of fossil fuel extraction, an emerging topic that broadens the rationale for phasing out fossil fuels and is gaining attention from key international actors such as the World Health Organization and the Lancet Countdown. Indeed, the Lancet Countdown's 2022 report and regional policy briefs focus predominantly on fossil fuels and its US policy brief features a case study led by an Initiative member.

The Initiative continues to engage stakeholders at all levels to foster dialogue and action around just transition planning and help shape the just energy transition agenda. In Latin America, researchers were invited to contribute to the energy transition section of the new four-year National Development Plan of the newly elected Colombian government, to multistakeholder dialogues establishing the just energy transition roadmap, to the Petro administration's Congressional Ad-Hoc Commission on Mining Policy Reform, and to a training on just transition from coal for Colombian Congress members and their staff. In each opportunity, SEI staff highlighted the importance of centring justice and inclusive, democratic processes toward phasing out coal. This work led three top media outlets to select an Initiative co-lead as one of the 42 most influential voices on Colombia's energy transition.

Media and policymakers increasingly recognize the Initiative's expertise. We are cited and quoted in news outlets of all kinds on carbon lock-in and energy transition policy, and by policymakers such as US Congressman Raja Krishnamoorthi in his public inquiries into tax breaks for ExxonMobil and Chevron. We are also regularly invited to participate in legislative and research proposals and events, including with high-level national and local public officials. For example, through the Colombia - Peru Platform for Sustainable Recovery, we expressed specific concerns and recommendations on the energy transition to private meetings with Colombian presidential

candidates' teams before the election. The elected Colombian president has made energy transition a top priority of the new government.

We have used our position to advance carbon lock-in and just transition issues among key civil society organizations. For example, we organized a special session on just energy transition for the Colombian Civil Society Platform for Transparency in Extractive Industry, where community leaders from coal extraction regions shared their experiences of coal extraction and mine closure, emphasizing the need to consider the economic well-being of those affected by the energy transition. The Initiative's research, including the Production Gap Report, continues to be used by boundary partners to challenge carbon-intensive development and accelerate the transition, including in legal proceedings.

5.2 Integrated Climate and Development Planning

The Integrated Climate and Development Planning Initiative enables low- and middle-income countries to integrate planning to achieve Nationally Determined Contributions and Sustainable Development Goals, the measures that underpin two global missions: the Paris Agreement and the 2030 Agenda for Sustainable Development.

Key achievements in 2022

The Initiative has aided low- and middle-income countries to integrate development priorities into their Nationally Determined Contributions (NDCs). A prime example is our work with Côte d'Ivoire. In May 2022, the Government of Côte d'Ivoire submitted its updated NDC, which commits to reducing greenhouse gas emissions by 30% unconditionally by 2030 and by 99% with sufficient international assistance (both compared to a business-as-usual scenario). The NDC was based on scenario analysis developed using the Low Emissions Analysis Platform (LEAP), with support from SEI, the Ministry of Environment, and the Université Félix Houphouët-Boigny. This analysis integrated key development priorities, such as reforestation, energy security, and a plan to increase food production to become an independent grower of key, staple crops. Thus, projected emission reductions reflect a future in which Côte d'Ivoire achieves key development priorities. In addition, Côte d'Ivoire became one of a small number of countries to quantify the health benefits of implementing its NDC; more than 7000 premature deaths per year can be avoided by achieving these emissions reductions.

The Initiative has also contributed to the completion and launch of the Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa (the Africa Assessment) by the UN Environment Programme, the Climate and Clean Air Coalition and the African Union Commission. Launched at COP27, the Africa Assessment is based on a LEAP model of Africa that the Initiative helped develop. The Assessment highlights that the achievement of Agenda 2063 – the development vision of the African Union Commission – can be facilitated and enhanced by actions that also reduce emissions of greenhouse gases and air pollutants. The study has had high political impact. For example, at the 18th Session of the African Ministerial Conference on the Environment, environment ministers from all African countries adopted Decision 18/1(b) on phasing out open burning of waste, citing as one justification, the Assessment findings urging countries to “support the development and implementation of 37 recommended measures as a continent-wide Africa clean air program, coordinated with strong country-led initiatives, cascaded to the regional economic communities and higher levels of policy setting”.

The development of a regional LEAP model (which SEI maintains and updates) has enhanced our capacity-building efforts. The model allows us to train new LEAP users with a dataset that reflects their national circumstances. In 2022, for example, we used it to train over 50 officials from ministries of energy and planning in Ethiopia and Côte d'Ivoire.

The Initiative has applied LEAP-Macro, a macroeconomic modeling tool produced under the Initiative, to investigate the water-energy-food-environment nexus in Central Asia. Conducted under the Water and Vulnerable Environment Activity (WAVE) of the US Agency for International Development (USAID), the study investigated links between water scarcity, climate change, agriculture, energy transitions, ecosystem protection and economic development in Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. In collaboration with government and research partners from the four countries, SEI built interconnected models that allow for the simultaneous exploration of sustainable development priorities related to water, food, energy and climate. The integration of water-resource modeling (using SEI's Water Evaluation and Planning system (WEAP)) and agricultural modeling (with LEAP and LEAP-Macro) is an important analytical advance. Results show the cross-sectoral benefits of cooperative actions on water and the synergies between NDCs, agriculture and water-resource management. Endorsed by government partners, the findings are now supporting ongoing dialogue in the region. On 28 September 2022, the findings were reviewed and accepted by the WAVE Regional Coordination Committee (RCC), a forum for dialogue on transboundary cooperation; the committee includes representatives from water, energy, agricultural and other ministries in the four study countries and Turkmenistan.

5.3 Governing Bioeconomy Pathways

A modern bioeconomy – producing materials, foods and feeds, fuels and more from biological resources with the help of science and technology – is a vital element of poverty reduction and global sustainable development transitions. The Governing Bioeconomy Pathways Initiative aims to better articulate the alternative pathways available for bioeconomy development, and to identify the policies, institutions and governance mechanisms that can facilitate them.

Key achievements in 2022

The Initiative staff played a key role in drafting and disseminating the East African Regional Bioeconomy Strategy 2022-2032, which was approved by the East Africa Community Council of Ministers in April 2022. The strategy integrates three plans – the 2030 Agenda for Sustainable Development, the East Africa Community vision 2050, and the Africa Union's Agenda 2063 – to develop and achieve a sustainable, circular bioeconomy in the region. The strategy highlights optimal uses of the region's bioresources and capacities to create bio-based products and services that add economic value to local communities in East Africa. SEI Africa staff served as key authors in the drafting and launching of the status report, "State of the Bioeconomy in Eastern Africa: 2022". Together, the strategy and report provide a roadmap for policymakers and private-sector actors across the region to take actions and make investments to expand the bioeconomy. SEI staff are now kick-starting the process for the 2024 updated version of this report.

We are supporting improved sustainability and competitiveness of the cassava value chain in Colombia through a number of channels, all building on the findings of an Initiative working paper from 2021. The paper has provided guidance for Colombian government agencies and research centres, including the main agricultural research institute, AGROSAVIA; the Ministry of Agriculture and Rural Development; and the Ministry of Science, Technology and Innovation. The paper's recommendations have also influenced decision-making and new policies, including the design of the National Plan "Cassava Country" (2022) promoted by the Ministry of Agriculture and Rural Development and AGROSAVIA. In addition, the paper led AGROSAVIA to invite SEI to serve as a key expert on the bioeconomy in discussions and working groups on cassava value chains, and it allowed SEI to provide key inputs to respond to a call by the Ministry of Science, Technology and Innovation for a new, 9.3 million SEK programme to strengthen the country's cassava value web. As part of the three-year programme, the Initiative will promote agreements for sustainability among the stakeholders in the value chain, monitor economic impacts on job

and income generation, enhance policy-making capacities within local governments, and advance research on the bioplastic market in Colombia. This new programme will also play a fundamental role in connecting SEI with private-sector cassava production firms, such as Almidones de Sucre S.A.S., the Asociación Nacional de Productores y Procesadores de Yuca, and Poltec S.A.S., allowing us to work directly with enterprises and to influence their business models in a more sustainable way.

The Initiative continues to generate high-level discussions around the links between the bioeconomy and the circular economy, and to put this issue onto the agendas of different regional institutions. For example, the Initiative staff in SEI-Asia hosted an online event with guest speakers from the UN Conference on Trade and Development (Geneva), the University of Ferrara (Italy), and su.re.co (Indonesia). A keynote speech by a member of the Initiative at the World Bioeconomy Forum is understood to have helped shape the focus of a subsequent panel on the international dimension of the bioeconomy at a high-level conference in Brussels in October 2022. The keynote speech also led to an invitation for SEI to speak at the regional Bioeconomy Forum for Eastern Africa in April 2023.

5.4 Gender Equality, Social Equity and Poverty

The SEI Initiative on Gender Equality, Social Equity and Poverty (GESEP) seeks to understand the inter-connections between gender, equity, poverty and sustainability from the lens of power to inform and advance transformative and sustainable development.

Key achievements in 2022

While most Initiatives – and other GESEP phases – are externally oriented, the 2022 phase of GESEP was intentionally focused on re-grouping and laying the groundwork for more strategic focus, increased effectiveness and greater coherence and momentum on GESEP issues *within* SEI. To this end the Initiative has:

- Enhanced the clarity, conceptual sharpness and shared understanding of the three key GESEP concepts (gender equality, social equity and poverty) among GESEP team members and SEI staff. We achieved this through analysis and re-framing of GESEP based on internal consultations, a literature review, two SEI learning events, an interactive Science Forum session, and staff input to a written conceptual framework and guidance.
- Set the direction for strategic research in GESEP's next phase. This is now aligned to SEI priorities and external opportunities. This work included identifying ways to improve the methodological design of GESEP research and resulted in a more systematic approach that is more rigorous and suitable for influence at multiple scales.
- Established the SEI GESEP Community of Practice, which provides a space for interested staff to connect, share and learn on GESEP issues. This included surfacing, sharing and reflecting on SEI capacity needs. This Community comprises the GESEP Learning Platform, which supports internal learning events and dialogue, and the GESEP Innovation Lab, which connects staff with similar interests and creates space for sharing their work and developing ideas on a joint theme. The pilot labs focused on the theme of environmental defenders and have already resulted in a proposal submitted to the United Nations Democracy Fund in November 2022.

To further support GESEP thinking across SEI, the Initiative finalized an internal GESEP review guidance document for optional use by the SEI Global Research Committee and produced an internal Guidance Note on Poverty in SEI Research that provides insights on poverty-focused thinking and application within SEI research. This new guidance note refines SEI's

perspective on poverty and harmonizes SEI's approaches and methodologies on how to engage in poverty research.

The Initiative continues to undertake and publish research and collaborate with the other initiatives. For example, this year the team published a journal article that fills critical data gaps on and describes how science-informed decisions can consider the involvement of Indigenous people and women in local water resources planning processes, in collaboration with the Water Beyond Boundaries Initiative.

5.5 City Health & Well-being

The City Health & Well-being (CHeW) Initiative investigates how rapidly growing cities are affecting the well-being of residents, and how this interacts with the overall health of city systems.

Key achievements in 2022

The Initiative continues to work closely with local stakeholders in Nakuru, Kenya, to inform urban planning for enhanced well-being, and to improve air quality monitoring and regulation. This work builds on trust developed over successive years with local community members from Kaptembwa (a settlement in Nakuru), the Nakuru City Board and the County Government of Nakuru. Ongoing relationship building helps us to work with people in the area to co-explore legitimate needs and opportunities there.

In the Kaptembwa Settlement, our participatory mapping work (begun in 2019) has informed plans to now under consideration to improve public spaces for the benefit and safety of the local community. The mapping – indicating the places that community residents like to go for recreation and the places that they fear or avoid – identified public spaces that could be used for relaxation if interventions were undertaken. Improvements for some of these spaces are now being considered by various entities, including a local urban initiative, an ongoing World Bank project to upgrade informal settlements (the Kenya Informal Settlements Improvement Project), and the county government as part of its third Nakuru County Integrated Development Plan. This 2023-2027 plan seeks to fund improvements to at least three more spaces in Kaptembwa, Kwa Rhonda and Free Area settlements.

In Nakuru City, authorities have used our 2021/2022 air quality data for the Kaptembwa and Free Area settlements to inform their draft policies, and they have requested further assistance from the Initiative. Our data and methods are also informing the Nakuru County Sustainable Energy Access and Climate Action Plan, which will contribute to a countywide goal of reducing emissions and improving climate resilience. GIZ, which is supporting the plan, has invited SEI to produce a countywide data set using the environmental stressors analysis framework we developed. The County Government of Nakuru has also requested support from us to develop its climate change action plan and air quality regulations. We continue to work with the UN Environment Programme (UNEP) to produce the data needed for regulatory planning and implementation of measures to address these issues. As a result of this partnership, UNEP has installed four additional sensors that enable the long-term tracking of air quality in various facilities in Nakuru City. With support from the Initiative, the data from these sensors will be used by the Nakuru City Board and the County Government of Nakuru to inform preparation of air quality regulations and policy in a bid to institutionalize air quality monitoring in the City. This air quality monitoring platform is co-managed by UNEP, SEI and the County Government of Nakuru. Our work on air quality has also led to a new partnership with Slum Dwellers International (SDI-Kenya) through which we will support the Nakuru County Government to develop a climate change adaptation plan to address climate challenges in Nakuru's informal settlements.

5.6 Water Beyond Boundaries

Access to water is the greatest risk to global prosperity and addressing the sustainable development goals (SDGs). Policymakers face multiple challenges regarding water management and must grapple with both an uncertain future and competing interests, while also ensuring there is enough water for people, cities, agriculture and ecosystems. The Water Beyond Boundaries (WBB) Initiative is introducing new ways of thinking about sustainable water planning to respond to these challenges.

Key achievements in 2022

The Initiative has developed and used the Water Without Boundaries (WBB) framework to support inclusive, integrated water management plans in Colombia and Thailand. We achieved this through novel stakeholder engagement approaches to earn buy-in on the plans, and developed and tested a rapid assessment tool to support scaling and tailoring of the WBB framework to new contexts.

In Colombia, the initiative team used serious games – based on SEI flagship water modeling software, WEAP – to facilitate discussion and consensus-building between conflicting communities, authorities and government in the Campoalegre watershed, which is an important coffee-growing area filled with smallholder farms and is home to Indigenous populations. Using the lessons of the serious games, stakeholders collaborated to formulate their new Integrated River Basin Management Plan, known as POMCA. The Initiative's work resulted in the inclusion of marginalized groups such as the Indigenous Peoples of the Suratena and Altomira – many of whom lack basic household water access and sanitation – in water planning dialogues and processes, as well as the addition of ecosystem analysis to water planning agendas. It also led to a concept note, developed together with Minambiente (Colombia's Ministry of Environment and Sustainable Development), Sustainable Development Solutions Network, *Universidad Javeriana*, and *Universidad Nacional*, for the development of a pilot collaborative stakeholder platform for the Chinchiná River Basin, based on the serious game approach, to produce a POMCA that results in more equitable water access.

In Thailand, the initiative connected and built the capacities of over 13 government agencies, two local CSOs, three academic institutions, and the Mekong River Commission, and shifted their thinking on the region's water planning, looking beyond existing site boundaries. The Department of Water Resources used this new knowledge to lay the groundwork for a Master Plan to manage the Lower Songkhram River Ramsar Site, which comprises northeast Thailand's largest area of flooded forest. The Master Plan will inform the work of government ministries, including Forestry, Fisheries and Water Resources. The Initiative's involvement will expand its scope to include upstream and downstream impacts on the Ramsar site and consider additional environmental flows. The Initiative also assisted the Nakhon Phanom Provincial Office of Natural Resources and Environment to integrate sustainable use of ecosystem services and natural resources into a proposal for a provincial plan for the Ramsar site. Moreover, the Initiative informed the design of a new Asia-Pacific Network for Global Change Research project on food security and climate in the Lower Mekong Basin, ensuring that it fills key gaps and leverages ecosystem-based thinking and WBB tools.

These achievements showcase the new improvements to the WBB framework that examine and address geophysical, human-centric, and participation boundaries that contribute to water management shortcomings. A newly developed rapid assessment tool will enable the scaling of this work to new areas and has been tested with the Trase H2O team for Brazil. The tool determines how to apply the different parts of the improved WBB framework in different biophysical and governance settings. Knowledge and insights from the Initiative are being shared with a broader audience through its newly launched Water Stories podcast.

5.7 Gridless Solutions

Providing access to basic services such as electricity, sanitation and fresh water is a key challenge in geographically isolated places, in conflict zones, and in nations with fragile societal institutions. The Gridless Solutions Initiative works to find approaches to develop and scale deployment of decentralized “off-grid” technologies to fill this gap in such contexts, and to help accelerate actions to achieve the goals of the Paris Agreement and the 2030 Agenda for Sustainable Development.

Key achievements in 2022

The Initiative has mobilized private companies developing gridless products for humanitarian and development contexts to use co-creation processes to systematically identify the challenges and enabling factors involved in scaling up these innovations.

Relying on the Public Private Development Partnership method of the Swedish International Development Cooperation Agency (Sida), we have helped innovators understand the challenges that they must overcome to succeed at various stages of product development, and we have created a new tool to help them address the particular challenges posed by humanitarian and developing-market contexts. We developed this model by closely examining the product-development processes of our partners’ innovations. The insights that emerged contributed to the development and design of seven Swedish gridless innovations, context-adapted business models, and knowledge-development exchanges at six test sites. Countries involved include Bolivia, Cuba, Lebanon, South Africa, Sweden and Tanzania. Conducted through the sWASH & grow project, which is co-funded by the Initiative, we worked on a collaboration platform, matchmaking tool, and water and sanitation solutions. Highlights include:

TreeWell – In Lebanon and South Africa, we supported testbeds of this small, scalable, nature-based wastewater system, which treats sewage and heavily contaminated waters to purify water safely and effectively for a variety of uses.

The Millennium Desalination Device (MDD 2K Titan) – In Sweden, we supported the development of a prototype of this robust “water-in-a-box” innovation that can both desalinate and purify water using renewable energy.

SaniC – In Bolivia, we helped to further develop this modular and scalable wastewater treatment system that uses chemical-free, water- and energy-saving techniques that eliminate disease-causing bacteria in wastewater.

The Biomweb – We supported a testbed established in a refugee camp near Maalaka in the Zahlé-Bekaa region of Lebanon as part of a project that seeks to remotely monitor and operate wastewater treatment plants by using Internet of Things-enabled sensors.

The East African-Swedish portal

We designed this portal, launched in December 2022, to match and deliver best-in-class technologies, expertise, and financial resources from Sweden to support circular infrastructure and energy systems for projects in countries in East Africa.

The Initiative led to findings that are intended to influence development-cooperation agencies, international organizations and private-sector innovators working in humanitarian and developing-country contexts. Key findings thus far:

- Future aid programmes should support private-public research collaboration.
- Programmes should find and work with local partners and collaborators to create local supply and service chains.
- Partners should develop post-deployment strategies for maintenance and scaling up of new innovations into other contexts.
- Pre- and post-project evaluations should be conducted to understand user needs.

The Initiative's outputs were used in the Malmö University course module, "Global product development", which targeted engineering professionals interested in the humanitarian and development fields, and enrolled more than 60 students from around the world.

sWASH & grow has demonstrated the importance of having a low-cost and localized approach to innovation that considers user needs and wants. To help innovators and researchers better understand user needs and to co-create solutions, we developed MapStakes: a five-step tool that helps users with little or no experience of participatory methods define system boundaries; identify, map and involve stakeholders; and monitor engagement processes.

Building on the success of sWASH & grow, the Initiative has raised more than SEK 22 million through externally funded projects that have expanded SEI's work into new island and coastal regions (Cuba, Lake Victoria, and Zanzibar). These include an awarded project from the Mistra Blue Economy program, which will advance our work with multi-use marine solutions for energy and water provision, and position SEI amongst the frontrunners in the fast-developing field of research on "blue growth".

Annexes

Annex 1: The 10 most-cited SEI-authored, peer-reviewed journal articles published in the last five years, according to Web of Science

Authors	Article title	Source title	Document type	Publication year	Times cited, WoS Core
Gusenbauer, M., Haddaway, N. R.	Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources	Research Synthesis Methods	Article	2020	313
Liu, J. G., Hull, V., Godfray, H. C. J., Tilman, D., Gleick, P., Hoff, H., Pahl-Wostl, C., Xu, Z. C., Chung, M. G., Sun, J., Li, S. X.	Nexus approaches to global sustainable development	Nature Sustainability	Review	2018	281
Barlow, J., Franca, F., Gardner, T. A., Hicks, C. C., Lennox, G. D., Berenguer, E., Castello, L., Economo, E. P., Ferreira, J., Guenard, B., Leal, C. G., Isaac, V., Lees, A. C., Parr, C. L., Wilson, S. K., Young, P. J., Graham, N. A. J.	The future of hyperdiverse tropical ecosystems	Nature	Review	2018	277
Haddaway, N. R.	Open Synthesis: on the need for evidence synthesis to embrace Open Science	Environmental Evidence	Editorial material	2018	243
Haddaway, N. R., Macura, B., Whaley, P., Pullin, A. S.	ROSES RepOrting standards for Systematic Evidence Syntheses: pro forma, flow-diagram and descriptive summary of the plan and conduct of environmental systematic reviews and systematic maps	Environmental Evidence	Review	2018	243
Nilsson, M., Chisholm, E., Griggs, D., Howden-Chapman, P., McCollum, D., Messerli, P., Neumann, B., Stevance, A. S., Visbeck, M., Stafford-Smith, M.	Mapping interactions between the sustainable development goals: lessons learned and ways forward	Sustainability Science	Article	2018	227
Fritz, S., See, L., Carlson, T., Haklay, M., Oliver, J. L., Fraisl, D., Mondardini, R., Brocklehurst, M., Shanley, L. A., Schade, S., Wehn, U., Abrate, T., Anstee, J., Arnold, S., Billot, M., Campbell, J., Espey, J., Gold, M., Hager, G., He, S., Hepburn, L., Hsu, A., Long, D., Maso, J., McCallum, I., Muniafu, M., Moorthy, I., Obersteiner, M., Parker, A. J., Weissplug, M., West, S.	Citizen science and the United Nations Sustainable Development Goals	Nature Sustainability	Article	2019	200

Authors	Article title	Source title	Document type	Publication year	Times cited, WoS Core
Dai, J. Y., Wu, S. Q., Han, G. Y., Weinberg, J., Xie, X. H., Wu, X. F., Song, X. Q., Jia, B. Y., Xue, W. Y., Yang, Q. Q.	Water-energy nexus: A review of methods and tools for macro-assessment	Applied Energy	Review	2018	197
Mills, G., Pleijel, H., Malley, C. S., Sinha, B., Cooper, O. R., Schultz, M. G., Neufeld, H. S., Simpson, D., Sharps, K., Feng, Z. Z., Gerosa, G., Harmens, H., Kobayashi, K., Saxena, P., Paoletti, E., Sinha, V., Xu, X. B.	Tropospheric Ozone Assessment Report: Present-day tropospheric ozone distribution and trends relevant to vegetation	Elementa: Science of the Anthropocene	Article	2018	187
Hecht, J. S., Lacombe, G., Arias, M. E., Dang, T. D., Piman, T.	Hydropower dams of the Mekong River basin: A review of their hydrological impacts	Journal of Hydrology	Review	2019	175

Annex 2: The 10 most-cited SEI-authored, peer-reviewed journal articles published in the last five years, according to Scopus data

Authors	Title	Year	Source title	Cited by
Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F., Fünfschilling, L., Hess, D., Holtz, G., Hyysalo, S., Jenkins, K., Kivimaa, P., Martiskainen, M., McMeekin, A., Mühlemeier, M. S., Nykvist, B., Pel, B., Raven, R., Rohrer, H., Sandén, B., Schot, J., Sovacool, B., Turnheim, B., Welch, D., Wells, P.	An agenda for sustainability transitions research: State of the art and future directions	2019	Environmental Innovation and Societal Transitions	841
Gusenbauer, M., Haddaway, N. R.	Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources	2020	Research Synthesis Methods	358
Liu, J., Hull, V., Godfray, H. C. J., Tilman, D., Gleick, P., Hoff, H., Pahl-Wostl, C., Xu, Z., Chung, M. G., Sun, J., Li, S.	Nexus approaches to global sustainable development	2018	Nature Sustainability	317
Barlow, J., França, F., Gardner, T. A., Hicks, C. C., Lennox, G. D., Berenguer, E., Castello, L., Economo, E. P., Ferreira, J., Guénard, B., Gontijo Leal, C., Isaac, V., Lees, A. C., Parr, C. L., Wilson, S. K., Young, P. J., Graham, N. A. J.	The future of hyperdiverse tropical ecosystems	2018	Nature	293
Nilsson, M., Chisholm, E., Griggs, D., Howden-Chapman, P., McCollum, D., Messerli, P., Neumann, B., Stevance, A.-S., Visbeck, M., Stafford-Smith, M.	Mapping interactions between the sustainable development goals: lessons learned and ways forward	2018	Sustainability Science	255
Haddaway, N. R., Macura, B., Whaley, P., Pullin, A. S.	ROSES RepOrting standards for Systematic Evidence Syntheses: Pro forma, flow-diagram and descriptive summary of the plan and conduct of environmental systematic reviews and systematic maps	2018	Environmental Evidence	239
Dai, J., Wu, S., Han, G., Weinberg, J., Xie, X., Wu, X., Song, X., Jia, B., Xue, W., Yang, Q.	Water-energy nexus: A review of methods and tools for macro-assessment	2018	Applied Energy	231
Fritz, S., See, L., Carlson T., Haklay, M. M., Oliver, J. L., Fraisl, D., Mondardini, R., Brocklehurst, M., Shanley, L. A., Schade, S., Wehn, U., Abrate, T., Anstee, J., Arnold, S., Billot, M., Campbell, J., Espey, J., Gold, M., Hager, G., He, S., Hepburn, L., Hsu, A., Long, D., Masó, J., McCallum, I., Muniafu, M., Moorthy, I., Obersteiner, M., Parker A. J., Weissplug, M., West, S.	Citizen science and the United Nations Sustainable Development Goals	2019	Nature Sustainability	220
Weitz, N., Carlsen, H., Nilsson, M., Skånberg, K.	Towards systemic and contextual priority setting for implementing the 2030 Agenda	2018	Sustainability Science	211
Mills, G., Pleijel, H., Malley, C. S., Sinha, B., Cooper, O. R., Schultz, M.G., Neufeld, H. S., Simpson, D., Sharps, K., Feng, Z., Gerosa, G., Harmens, H., Kobayashi, K., Saxena, P., Paoletti, E., Sinha, V., Xu, X.	Tropospheric ozone assessment report: Present-day tropospheric ozone distribution and trends relevant to vegetation	2018	Elementa	200

Annex 3: SEI's top 10 scientific publications by Altmetric Attention score

Title	Altmetric Attention Score	Overton policy citations
Outside the Safe Operating Space of the Planetary Boundary for Novel Entities	2157	32
Scientific evidence on the political impact of the Sustainable Development Goals	692	3
Solar geoengineering: The case for an international non-use agreement	523	1
Disentangling the numbers behind agriculture-driven tropical deforestation	514	3
Reducing adverse impacts of Amazon hydropower expansion	227	
Pathways to an International Agreement to Leave Fossil Fuels in the Ground	227	
Co-productive agility and four collaborative pathways to sustainability transformations	209	1
Addressing indirect sourcing in zero deforestation commodity supply chains	177	
How trade policy can support the climate agenda	103	1
Post-2025 climate finance target: how much more and how much better?	101	5

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