



BRIDGING SCIENCE AND POLICY SINCE 1989



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ABOUT THIS REPORT

SEI's biggest successes in 2011 were achieved through our partnerships. This report shows that we are most effective when we work collaboratively, mobilize our networks and cooperate with stakeholders, as well as draw on our own international staff and diverse expertise.

In May, SEI and four other organizations arranged the 3rd Nobel Laureate Symposium on Global Sustainability, gathering 50 of the world's most renowned thinkers and experts in the field (page 18). In the autumn, SEI mustered 12 leading research and policy bodies to provide the knowledge base for the Bonn2011 Nexus Conference, which helped define the emerging field of research on the nexus between water, energy and food (page 18). We also coordinated the work of more than 80 scientists from government and academia to produce two reports for the United Nations Environment Programme on how cutting air pollution can benefit the climate, human health and food security – work which has led to the creation of the Climate and Clean Air Coalition (page 10). And our Africa office has worked closely with academics and public officials in Tanzania to make water resources for smallholders a priority for the Tanzanian government (page 15).

Our bases in Africa, Europe, North America and Asia enable us to work more closely with regional stakeholders and policymakers. On pages six and seven, staff members from each centre give insights into how they work and what motivates them. Pages eight and nine show a world map of a few of our projects that were under way in 2011, from mapping the urban metabolism of Bangalore, India, to low-carbon development in the U.S. These pages also introduce key examples of our work in 2011, organized under our four research themes (pages 10–17). 2011 also saw reform of SEI's management and governance structure (page 22). Finally, none of our work would have been possible without the support of more than 100 key donors and partners (page 20).

STATEMENT

from the Executive Director and the Chair of the Board

In our globalized world, political and financial crises in one region can rapidly propagate instability in others, and teleconnections can trigger turbulence at scales way beyond the scale of the original shock or crisis. In recent years – and 2011 was no exception – there has been increasing evidence that the environment has also entered the globalized phase of human development. We have entered a new geological epoch, the Anthropocene, where humans constitute the largest driver of environmental change at the planetary scale. Moreover, social, economic and environmental changes now interact from local to global scales, generating new and unexpected feedbacks that reinforce one another and impact on our societies. Volatile food prices, which trigger social instability, are no longer only a result of speculation and geographic shifts in demand. Human induced changes in climate, land-use and water resources, and growing nervousness over constrained resources such as oil and phosphorous, now interact with social factors to generate social-ecological shifts of unexpected strength.

Interlinked challenges require integrated solutions based on systems understanding. SEI has always taken an interdisciplinary and policy oriented approach to understanding social-environmental interactions in the context of human development.

From this emerges a core aim to provide integrated solutions. In 2011 SEI advanced its research on the interactions and synergies between energy, water and food – a long-standing focus for SEI – and last year this "nexus" approach was launched as a key priority among governments and agencies. In the scientific background report to the Bonn 2011 Nexus Conference, SEI provided evidence for how an integrated approach to renewable energy, sustainable agriculture and productive use of water offers multiple development and sustainability benefits. Similarly, SEI's longstanding research on co-benefits between air pollution abatement and climate mitigation resulted in an SEI-led report for UNEP on strategies to reduce so-called "short lived climate forcers". These short-lived greenhouse gases, such as ozone and black carbon, originate from sources such as pollution from transport, industrial processes and burning of biomass. This work demonstrates that while action is urgently needed to reduce all emissions of GHGs – CO₂ and short-lived forcers alike – there is a real opportunity to reduce the risks of dangerous climate change by taking rapid action on short-lived gases; action that can bring immediate positive impacts. Moreover, tackling pollution would have important co-benefits for human health and crop production.



2011 was Johan Rockström's final year as SEI's Executive Director after a highly successful eight-year tenure – the maximum term available for the post. He is pictured here with SEI's incoming ED, Johan Kuylenstierna (right).

On climate change, SEI published a key study on the climate policy strategies of the BASIC countries (Brazil, South Africa, India and China) in the run-up to the 17th Conference of the Parties to the United Nations Framework Convention on Climate Change in Durban, South Africa. SEI continues to provide knowledge support across the entire spectrum of climate issues, from mitigation, adaptation, finance and equity, to development, economics, and policy.

In a landmark development the Swedish government marked its recognition of the importance of SEI's work: after 20 years of static support the government increased its core-funding to SEI from 12 to 17 MSEK/year. This is a welcome first step, but needs to be followed by a further increase.

SEI is a global research institute for sustainable development. It is therefore very satisfying that, for the second year in a row, SEI has ranked among the world's top-ten environmental think tanks, according to the 2011 United Nations University/University of Pennsylvania "Go-to Think Tank" report.

One reason for SEI's effectiveness is our emphasis on producing high-quality research and ensuring that knowledge gets to the right people. 2011 was an important year for our efforts to bridge science and policy, with the hosting of the 3rd Nobel Laureate

"We have entered a new geological epoch, the Anthropocene, where humans constitute the largest driver of environmental change at the planetary scale"

Symposium on Global Sustainability, together with the Stockholm Resilience Centre, the Swedish Royal Academy of Sciences and the Potsdam Institute for Climate Impact Research. The Symposium generated a "Stockholm Memorandum" which was delivered, in a joint Stockholm dialogue, to UN Secretary-General's High Level Panel on Global Sustainability. The Stockholm Memorandum strongly influenced the panel's report, which was a key contribution to the UN Rio+20 Earth Summit in June 2012.

The 2012 Earth Summit comes at a critical juncture for human development, at a moment where we know that the world needs to – and can – rapidly tackle negative environmental change. SEI will continue to be a core player in supporting the world with knowledge to enable a transition to global sustainability.



Kerstin Niblaeus – Chair of the SEI Board

OUR CENTRES, OUR PEOPLE

SEI has offices on four continents. Being close to our partners and embedded in the regions where we work means we can more closely tailor our research to regional issues. Our diverse staff represents more than 20 countries, and here researchers from each centre offer insights into their work and what motivates them.

SEI Stockholm (established 1989)

Fiona Lambe



My focus is on energy access, specifically household energy in rural and peri-urban communities, and understanding why households choose particular cooking fuels and stoves. We are now seeing new momentum towards addressing the global household energy crisis, with significant potential benefits in terms of health, livelihoods and climate. But to bring about a large-scale shift, we need to understand the socioeconomic drivers and contexts of target communities. In 2011 we launched a three-year project in northern India looking at the dynamics of household energy choices, which will support the government's recently launched clean cookstove initiative. We carried out a series of

in-depth interviews with women in rural Haryana State, and identified design parameters for a potentially improved stove for these communities. Also last year, we launched a project in Ethiopia to pilot-test small-scale ethanol production using sugar cane molasses and other agricultural wastes, for use as a household fuel in a low-income community in Addis Ababa.

SEI U.S. (established 1989)

Peter Erickson



I want the planet to remain a vital, resilient, healthy place, and I see climate change as the greatest threat to natural systems and long-term human prosperity. I help design policies to bring about a low-carbon economy, and expose flawed policies. I work at different levels – from cities to

international organizations – helping policy-makers understand the implications of different options. Addressing climate change requires strong policies, and SEI plays an important role in ensuring the environmental integrity of legislation and international agreements. The equity implications are staggering, both across generations and for people today who already face climate impacts. In 2011, my colleague Michael Lazarus and I conducted an analysis of a major loophole in global climate policy: the potential for double-counting international greenhouse gas offsets. If both hosts and buyer countries were to count them, it would dilute the Copenhagen pledges by up to 10% of

"Addressing climate change requires strong policies, and SEI plays an important role in ensuring the environmental integrity of legislation and international agreements"

the abatement needed for a 2°C pathway. We were the first to look at this rigorously, and our paper made a noticeable impact on the negotiations.

SEI York (established 1989)

Andreas Heinemeyer



I specialize in measuring and modelling terrestrial carbon fluxes and stocks, primarily in forests, peatlands and agriculture. A particular focus is on soil respiration and soil biota. My work has great relevance for sustainability, providing better process-level understanding to improve models that show stakeholders and policy-makers how carbon stocks and fluxes and climate change affect ecosystem services, like water provision and food. Right now I'm involved in a project in Niger using human urine as fertilizer (see page 8). I recently collaborated with Forest Research in England to look at the link between canopy carbon uptake and below-ground (soil) carbon turnover, focusing on the mycorrhizal symbiosis – a mutual symbiosis between plant roots and soil fungi. The work revealed a tight coupling of canopy and soil carbon fluxes, and strongly supports the view that forest carbon cycling should be seen as a plant-soil continuum. The data will now likely be used by modelers across the globe.

SEI Oxford (established 1992)

Tahia Devisscher



I believe we face complex, interconnected social, economic and environmental problems that cross disciplines, knowledge

types and value systems and require decision-making under deep uncertainty. This is why so much of my work focuses on supporting decision-making for sustainability, and bringing together different types of scientific and local knowledge. I specialize in climate change adaptation, mainly in developing countries, and am particularly interested in decision-making on adaptation and governance of social-ecological systems. I'm also exploring synergies between adaptation and REDD+ in the tropics. I also work with partners on the weADAPT.org knowledge-sharing and collaboration platform. One of my main projects is COBAM, in the Congo Basin, which looks at the synergies and conflicts between mitigation and adaptation around forest management. I am also looking at decision making and knowledge networks in Bangladesh and Kenya to support sustainable management of coastal ecosystems for poverty alleviation (see page 14).

SEI Tallinn (established 1992)

Kaja Peterson



I specialize in evaluating human impacts on the environment. I have been at SEI since 1993, serving

as a Programme Director since 1998 and, since 2009, also as co-leader of the rethinking development research theme. Working with different partners, I have developed methods and tools for impact assessment of policies, plans and programmes, and contributed to the development of legal frameworks for impact assessments in Estonia and the European Union. One of my top projects in 2011 was the development of an evaluation methodology for the United Nations Environment Programme multilateral environmental agreements (MEAs), with my SEI-Tallinn colleagues Piret Kuldna and Valdur Lahtvee. In 2011, I also became chairman of the Estonian Commission of Sustainable Development, a 16-member group that advises the Estonian government, which gives me the opportunity to launch discussions on key issues and channel proposals to the government.

SEI Asia (established 2003)

Nantiya Tangwisutijit



I've been raising awareness of environmental degradation in Southeast Asia for nearly three decades, and it's the

human toll that fuels my passion: coastal fishing communities facing an 80% decline in stocks; forest communities struggling to sustain their livelihoods; chronic health problems caused by toxic industrial estates. As communications coordinator for SEI Asia, I develop creative approaches and foster partnerships to get SEI's research into the field, which often involves providing people with the practical knowledge to apply our insights. New media let us quickly reach vast numbers, but the complexity of SEI's work also requires traditional approaches, like interactive workshops, to ensure messages stick. And SEI is helping to build capacity to meet the major need to adapt to impacts that some are already experiencing. Though planning in this region seldom goes beyond the next season, SEI's pilot projects in Thailand and Vietnam look 50 years ahead, and we plan to scale-up our work this year.

Africa centre (established 2008)

Victor Kongo



I work across the whole spectrum of water resources management, with a focus on improving livelihoods in rural communities

and sustainable use of water. I look at the impacts of water management choices – allocation, governance, environmental concerns – and try to innovatively quantify the components of the hydrological cycle. I work with a wide range of people, including river basin managers, policy-makers and implementers, fellow researchers, and local communities. I currently work with the AgWater Solutions project (see page 15) it's very rewarding to see stakeholders engaging with scientific information and adopting it in policy frameworks. I am also working on the second phase of Smallholder System Innovations in the Pangani River basin in Tanzania, analyzing hydrological systems, and on the MARAFLOW research programme in Kenya, where we're establishing a watershed monitoring network in the Mara River basin. Both are collaborations with the UNESCO-IHE Institute for Water Education and local partners.

OUR WORK

SEI is active throughout the world. These pages map a selection of our projects under way around the globe, and pages 10–17 detail highlights of our work in 2011, organized under our four research themes.

EUROPE

EUREAPA

What policies promote sustainable consumption and production in Europe and beyond? EUREAPA is an online policy assessment tool that is helping to answer this question. Using its scenario functions, policymakers can visualise the environmental impacts of consumption in the context of lifestyles or national differences. EUREAPA, which is funded by the European Union FP7 OPEN:EU project, contains baseline data on the economy, greenhouse gas emissions, ecological footprints and water footprints for every EU member state and 16 other countries and regions of the world.

AFRICA

Food security in Niger

SEI is taking forward its work to tackle Africa's three-way squeeze on food security from low yields, import problems and a growing population. Our controlled field trials in Niger took an integrated approach to the issue, testing whether productive sanitation, water harvesting and conservation tillage can increase resilience and food security. Our 2011 baseline studies say it can, and we are now moving the trials to real world "on farm" situations in Ethiopia. SEI has also set up a working group across ministries, universities and NGOs to build policy momentum behind the approach.

NORDIC REGION

Mistra/SWECIA

This programme asks how climate change, economics and adaptation hang together at the global regional and local level. Specifically, SEI is examining how forestry – one of Sweden's key industries – can adapt and thrive in a changing climate. Through interdisciplinary research, field studies, and close links to Swedish policy-makers, our work offers an improved knowledge base for decision making.

ARCTIC

Assessing Arctic futures

Many have a stake in the Arctic, and many want to shape its future. SEI is working to understand why and how Arctic futures are created. Assessing Arctic futures is about analyzing the political contexts of the race for resources in the Arctic, today and in the past, in order to offer new tools to policymakers. (See page 16)

INDIA

Urban metabolic mapping

Many cities have already overwhelmed their ecological resource base. In the booming city of Bangalore there are chronic shortages of water and electricity, while pollution is a serious problem. An SEI project has set out to develop a tool for decision-makers that treats the city as a "living entity". By mapping the city's "metabolism" in the context of socio-demographic trends – how it uses resources and produces useful products and waste – the model will support action toward urban sustainability, and can in turn be applied to different cities.



CHINA

China: inside and out

In 2011 SEI has continued its strategic engagement in China. On the domestic front, we published a report on internal carbon trading and a project to assess the impact of China's twelfth five-year plan for energy, climate and the environment. And we've helped to build understanding of China and its role in a changing geopolitical context through our report on the BASIC countries' (Brazil, India, South Africa and China) approach to climate policy, and research on the true scale and meaning of Chinese land investments abroad.

INDONESIA, THAILAND, CAMBODIA

Agricultural transformation

Agriculture is vital for social and economic development in the Greater Mekong region. Rapid changes in demography, income, production, and industry (especially biofuels), combined with environmental change, are reshaping agricultural systems just as the urban and rural poor are becoming less food secure. We are working towards a deeper understanding of rural change in the region, and to use this new knowledge to influence land use planning and development policy to enhance ecosystem services and support livelihoods.

UNITED STATES

Low-carbon development

Emissions produced within a country or area are only one way to measure them. King County in Washington State and the State of Oregon commissioned SEI to produce a truer picture of emissions – one that can help people take more effective action. And the City of Seattle hired SEI to build on this work by developing a carbon neutral scenario for the city. The scenario spells out how taking measures like retrofitting buildings and shifting to electric cars and biking can feasibly decrease per capita greenhouse gas emissions by 90% by 2050, relative to 2008 levels.

LATIN AMERICA

WEAP

SEI is helping to more effectively manage water resources in Latin America via WEAP – its water evaluation and planning system. As part of a 2011 World Bank investigation into how climate change might impact on water resources, SEI combined WEAP with measurements of glacier evaporation and accumulation in Peru. We are also using WEAP to help bring about institutional change in the Andes. The tool is supporting negotiations between countries on the best way to share the benefits of Andean rivers across national borders.

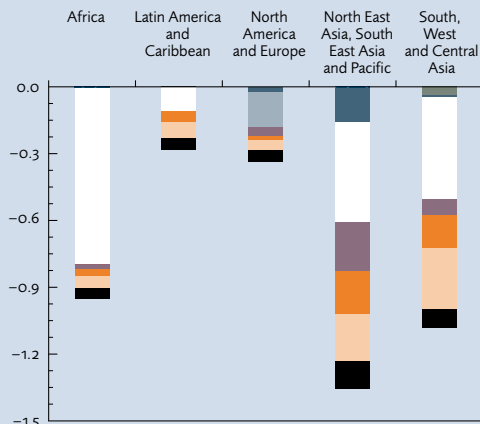
THEME 1
Managing environmental systems
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THEME 2
Reducing climate risk
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THEME 3
Transforming governance
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THEME 4
Rethinking development
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Change in black carbon emissions in 2030 compared to the 2030 reference scenario (millions of tonnes of black carbon)



Note: for biomass cookstoves, only the effect of substitution with LPG and biogas stoves is shown for clarity; with 100% substitution with fan-assisted biomass cookstoves, the emissions reduction would be about 6% less.

- Replace traditional brick kilns with vertical shaft kilns
- Replace traditional coke ovens with modern recovery ovens
- Switch from traditional biomass cookstoves to stoves fueled by LPG or biogas or to fan-assisted biomass stoves (in developing countries)
- Replace current residential wood burning technologies with pellet stoves and boilers (in industrialized countries)
- Replace lump coal with coal briquettes in cooking and heating stoves
- Elimination of high-emitting vehicles
- Additional reduction from Euro-6/VI vehicle standards (including DPF) after elimination of high-emitters
- Ban of open burning of agricultural residues

Cuts in soot emissions that could be achieved in different regions up to 2030, if measures developed by SEI and its partners were put in place. Cuts to black carbon could save millions of lives by preventing lung disease and respiratory disorders, and protect crops. Many of the measures can be taken now, and some can even save money over the long-term.

We now know that curbing air pollution saves lives, checks climate change, and boosts crop production. But how to do it? SEI has coordinated research that offers policy-makers a toolbox of measures to cut emissions of so-called short-lived climate forcers.

Forcers the issue

2011 WAS A watershed for SEI's work on air pollution. We built on our 20 years experience in air pollution research to coordinate the UNEP/WMO assessment of black carbon and ozone, published in June, which made the case for tackling air pollution, revealing the benefits of action for health, food security and climate protection.

Now governments are asking how to manage these substances at the regional level, and we are helping them find answers. A second UNEP study, also coordinated by SEI and published last November, details a package of 16 concrete policy actions to cut emissions of black carbon and methane. These target transport, industry, agriculture, fossil fuels and households and could cut global emissions of black carbon and methane by 38 and 77%, respectively. Annually, this could save around 2.5 million lives as well as 32 million tonnes of crops, mainly in Asia and the developing world, and cut global warming by 0.5°C by 2040.

The report, *Near-term Climate Protection and Clean Air Benefits: Actions for Controlling Short-Lived Climate Forcers*, shows that most of the 16 actions are low-cost, and half would even save money. The

measures would also have many economic, social and environmental benefits not factored into the cost estimates. For example, upgraded waste-water treatment systems would reduce methane emissions and improve water quality, and modernized brick kilns produce better bricks and less soot.

UNEP Executive Director Achim Steiner said that the report offers pathways and policies that will allow nations to "achieve some remarkable gains in terms of a transition to a low emission, resource efficient Green Economy over the near term".

To support regional action, last year we organized a seminar in Bangladesh with Sweden's Ministry of Environment to develop cooperation between the countries, and advised the IGBP/IGAC Air Pollution and Climate: Science-Policy Dialogue in Taiwan. We also held side events at the UNEP Governing Council in Nairobi, and at the international climate negotiations. With our partners, we refined the research in an article in *Science*, and worked with media such as the *Washington Post* to get the message out beyond the research and policy communities.

Managing water resources involves tough trade-offs, and climate change makes the challenges even harder. So it is with California's spring-run Chinook salmon, whose survival, SEI research shows, may depend on hydropower choices.

Electricity or salmon?

SPRING-RUN CHINOOK salmon populations in California have declined dramatically, from about a million fish per year to about 16,000. They are particularly vulnerable to climate change because adults over-summer in freshwater streams before spawning in the fall.

Aiming to help local officials save this prized species, SEI-U.S. researchers and colleagues at the University of California-Davis built a custom model to quantify the problem and explore potential solutions, using Butte Creek, a tributary of the Sacramento River, as a case study.

The model, presented by SEI's Marisa Escobar at World Water Week 2011 – and also described in journal articles and featured on California public radio – combines climate projections through 2099, a stream-flow and water temperature simulation using SEI's WEAP (Water Evaluation And Planning) tool, and a specialized salmon population modeling system.

The outlook is not good. Under all climate scenarios and model combinations, summer water levels dropped, water temperatures rose, and fewer fish survived to spawn. Most potential adaptation measures failed

to save them, except for the most dramatic: not diverting any water at all at a major dam from July through September.

That, the model shows, would significantly improve the salmon's survival chances, but at the expense of large amounts of power generation during the peak demand season.

David Purkey, co-author of the study, says that while findings are specific to Butte Creek, the model highlights a challenge that is arising with hydropower operations in many parts of the world.

The answer is not to stop hydropower production, he notes, but rather to fine-tune regulatory regimes to meet ecosystem objectives with minimal impact on electricity generation.

For California water planners, the research has immediate relevance. More than 150 hydropower dams in the state are set to be re-licensed in the next decade – and the conditions placed on those dams may determine the future of Chinook salmon.



On the run: SEI is looking at how to fine-tune hydropower regulation to protect ecosystems and threatened species like California's Chinook salmon.



A solid bloc? South African President Jacob Zuma, Chinese Premier Wen Jiabao, Indian Prime Minister Manmohan Singh and Brazilian President Luiz Inacio Lula da Silva consult at the COP 15 climate conference in Copenhagen, 2009. Their cooperation was decisive at the talks, and SEI is assessing what the BASIC alliance means for climate negotiations.

At the Copenhagen climate talks, four emerging economies banded together and forced a new path in the negotiations. SEI analysis is helping to build understanding of the BASIC alliance for more effective climate policy.

Climate game changers

MUCH OF the world was stunned when, at the climate conference in 2009, Brazil, South Africa, India and China joined forces and struck a deal with the United States to produce the Copenhagen Accord. And in both Cancún in 2010 and Durban in 2011 the so-called BASIC countries played crucial roles again: sometimes fostering collaboration, but also refusing to compromise on key issues.

So what brings these countries together, and how should Europe and other parties engage with them? With support from the Nordic Council of Ministers, SEI researchers spent more than a year examining the BASIC alliance and its members, interviewing almost 100 policy-makers, climate negotiators, researchers, and civil-society members, and observing negotiations.

The resulting report, *Together Alone: BASIC Countries and the Climate Change Conundrum*, shows that the four countries differ significantly in terms of development, energy resources, economic strength, and ideology. Their domestic and foreign-policy dynamics vary considerably, and they also disagree on key principles in the climate talks, such as the meaning of "common but differentiated responsibilities."

What brings them together is both the growing external pressure to adopt binding emission-reduction targets like richer countries, and also the broader geopolitical environment.

The analysis also addresses claims that BASIC is nothing but an "obstructionist" force. In reality, the authors argue, the group's positions mirror those long held by developing nations, and individual BASIC members have shown a substantial willingness to compromise.

Looking ahead, the SEI researchers say it's unclear whether the BASIC alliance will hold – or whether the countries will find enough common ground to put forth a unified climate agenda. At worst, they say, the countries may just use BASIC as a "firewall" when they're feeling ambushed by the developed world. But, at its best, the group could serve as a forum for constructive dialogue.

Research on the BASIC countries continues at SEI, with several projects in the pipeline looking at both the alliance, and its individual members.

Most greenhouse gas emission scenarios assume that the poorest countries will stay poor, meaning their emissions will stay low. But what if, like India, they exceed expectations? An SEI project explores this question – and charts a smarter alternative.

A model for success

ECONOMIC GROWTH, improved energy access and poverty eradication are key priorities for developing countries, and are widely recognised as worthy goals. Yet as success stories like India show, development can also lead to higher greenhouse gas emissions. If the world's poorest countries all grew at that pace, their emissions would quickly surpass those of rich countries.

Most emission scenarios used to guide climate policy don't grapple with this problem, but rather assume that developing countries will not develop at pace. If this assumption is right, emissions from poor countries will grow very modestly, and take up only a small share of the global 21st century emissions budget. Under a business-as-usual scenario, the 45 poorest countries, home to 35% of the global population by 2105, would emit only 6% of a total 10,800 Gt CO₂e.

Even then, global emissions would have to reduce dramatically – by more than 8,000 Gt CO₂e – to stay within "safe" climate limits, according to the SEI analysis. But if the poorest countries grew as fast as India, for which standard models assume almost 4% annual

growth this century, total emissions would jump to 20,700 Gt CO₂-e, with 21% from the 45 poorest countries.

There is a third scenario, however: if world leaders adopt strong policies to sharply reduce emissions in richer countries and support low-carbon development in poorer ones, they could keep reductions within a safe 2,700 Gt CO₂-e carbon budget, including only 600 Gt of emissions from the poorest countries, even though their incomes would still be much higher.

That is the best path forward, the SEI analysis suggests – otherwise, if development succeeds, climate policy will fail.

The authors also offer a case study showing the impact of the three scenarios on Latin America and the Caribbean, and a related report explores low-carbon energy options for the region, with a focus on hydropower.



Fired up: India's economy is growing fast. SEI is developing a greenhouse gas scenario that allows for higher than expected growth in developing nations.



AMINATA

Net gains: SEI software will provide policy-makers with tools to better manage coastal resources.

On what basis do local people and governments decide how to use coastal resources? What decisions will secure their future prosperity and preserve the ecosystems on which they depend? An SEI project is working in Kenya and Bangladesh to find out.

The right call for coasts

KNOWING WHY PEOPLE choose to use resources in a particular way is vital to managing them sustainably. The coasts of Kenya and Bangladesh support the livelihoods of millions, and over exploitation of coastal resources threatens those livelihoods. In Kenya, overfishing is a particular problem, while shrimp farming and foraging in the mangrove forests of Bangladesh is altering coastal ecosystems. The SEI project WD-NACE (Whole Decision Network Analysis for Coastal Ecosystems) is finding out how decisions get made, and helping people make the right choices for their future prosperity.

SEI is talking to a range of people, from beach fishermen in Kenya to policy-makers at regional and national levels, to gather economic, social and behavioural data related to resource use. We will then map this data to create a picture of the social networks associated with the ecosystems in each area. Then, working with local stakeholders, we will use modelling software to "code" the behaviour of actors, and to predict the consequences of policies aimed at reducing poverty and managing ecosystems sustainably.

For example, in Kenya, overfishing is linked to the amount of available farmland along the coast. The software will allow decision-makers to look at whether providing local people with more farmland – and so the opportunity to grow more food – would protect fish stocks in a given location. Or, if a policy-maker proposes a marine protected area, users can adjust variables in the modelling software to learn whether this might relieve or increase poverty over different timescales or locations.

The project will unite our knowledge of the social context in which information is produced, used and communicated, with a technical analysis of that information and how useful it is. In 2012 we aim to scale up this work and apply it in a range of locations and settings, such as policy-making institutions and international development organizations, and local contexts. These tools will help communities, governments and civil society make the right choices for prosperity and environmental protection.

Smallholder farming can drive growth and reduce poverty, but farmers in developing countries often struggle without the means to harness water resources. The technology is there, but the challenge is to get it to those who need it.

Water for wealth

THROUGH THE PROJECT AgWater Solutions, funded by the Bill & Melinda Gates Foundation, SEI and its partners are enabling smallholder farmers to fully exploit available water by making available appropriate technologies, such as rainwater harvesting, motorized pumps, and tapping groundwater. Communal irrigation is also vital, through building small reservoirs and diverting rivers.

These technologies and methods are relatively simple, but institutional barriers can prevent uptake. SEI's role in the project is to work to lift those barriers. This means getting the right people in the public and private sectors to put the best research findings into direct use, and deciding where to make investments and decisions to accelerate incomes in sustainable and equitable ways.

In the past year our Africa Centre, working in tandem with our York Centre, has led efforts to raise awareness about irrigation for development among decision makers in Tanzania. In close partnership with Sokoine University of Agriculture and the Permanent Secretary of Tanzania's Ministry of Agriculture, who is now the national focal point for the project, SEI has facilitated

various policy dialogue events on behalf of the AgWater Solutions project, targeting research evidence at the highest levels. And this has won results: our knowledge support has contributed to more targeted and effective investments in smallholder irrigation.

There is now a clear window of opportunity for Tanzania to drive forward the policy effort to support smallholder farmers via the government's flagship initiative Kilimo Kwanza (agriculture first), and SAGCOT, its operational arm.

SEI will be working to support these processes to develop sustainable and long-term solutions with the Government of Tanzania and farmers alike.



Harvesting rainwater is just one way for smallholder farmers in Africa to make the most out of this precious resource.



Weathering change: Arctic people need to be prepared for both the problems and opportunities that shifts in ecosystems will bring.

In the Arctic, rapid declines in sea ice, glaciers and snow cover provide dramatic previews of a new geography in a warming world. SEI is helping to understand what this change means for Arctic people and ecosystems, and devising ways to cope.

Arctic futures

TOGETHER WITH the Stockholm Resilience Centre, SEI is leading the Arctic Resilience Report, a project approved by the Arctic Council in 2011. The report will identify the risk of shifts in Arctic ecosystems – shifts which can be sudden and hard to predict, and perhaps impossible to reverse.

The Arctic is one of the world's global change hot-spots. Here, climate change intersects with powerful commercial and political interests bringing potentially grave outcomes for communities and the environment, but also new opportunities, for mineral and energy prospecting, farming, and new passageways for shipping.

Communities in the Arctic and beyond will need sustainable ways to manage rapid change, and this project will propose new ways to better understand both the challenges that people and ecosystems face and the capacities needed in society to meet these challenges.

The Arctic Resilience Report will assess potential tipping points in Arctic social-ecological systems, and how to manage those tipping points, whether through improved resilience or through a transition towards a more sustainable future.

The project is a priority for the Swedish chairmanship of the Arctic Council, and will support the Arctic Council in taking a more active role in managing Arctic change. SEI and its partners will deliver an interim report at the end of the Swedish chairmanship in May 2013.

Last year SEI also launched the project Arctic Futures in a Global Context: Voices, Resources and Governance. Funded by Mistra, this collaboration with historians at KTH Royal Institute of Technology and the European University in St Petersburg is part of an effort to build Arctic social science capacity in Sweden. The project will develop new tools for exploring and assessing Arctic futures. The tools will explicitly recognize the growing number of contradictory voices in debates about the Arctic. These include states, but also indigenous peoples, environmental organizations and transnational companies.

SEI sees a need for a strong emphasis on human and social values in Arctic policies, and recognizes that those values are often subject to debate.

What is the most effective and efficient way to decarbonize our cities?
Decision makers often find it tough to pick the right options because they lack quality information. SEI methodology is helping them to make informed choices.

Low-carbon costs crunched

THERE ARE HUNDREDS of low-carbon options available that can reduce energy bills and carbon footprints, but there is often a lack of reliable information on their performance. This information gap results in a higher level of risk and uncertainty that can be a major barrier to action, making it hard to develop a political, business or social case for investment in low carbon options.

To address this problem SEI, in collaboration with UK universities, has developed a methodology and model to explore the cost and carbon effectiveness of a wide range of the low carbon options that could be applied at the local level in households, industry, commerce and transport. It then explores the scope for their deployment, the associated investment needs, financial returns and carbon savings, and the implications for the economy and employment.

The results highlight very significant and commercially viable opportunities for decarbonization at the city-scale. Exploiting these would generate wider social and economic benefits when combined with the effects of projected energy price increases on demand, and of lower carbon forms of energy supply. Indeed, by 2022

cities many cities in the UK, and potentially over Europe, could cut their 1990 levels of carbon emissions by up to 35% by exploiting the profitable opportunities and by up to 40% at no net cost.

Evidence from a test-case city shows that roughly every GBP £1 billion of investment in low carbon options would generate GBP £220 million of energy cost savings. This would pay for itself, in commercial terms, in just over four years. Every GBP £1 billion of investment would also create 1,000 new jobs and wider economic benefits equivalent to GBP £50 million a year. Such investments would also protect competitiveness, improve energy security, reduce fuel poverty and improve public health.



Preferential parking for electric cars is just one among a huge array of low-carbon measures available to decision makers. SEI is helping cities find the most effective solutions.

COMMUNICATION

In 2011 our communications had a bigger impact than ever, ensuring that our research reached the right people when it mattered. But our most successful efforts were accomplished alongside our partners.

HIGHLIGHTS OF 2011

SEI coordinated the groundbreaking United Nations Environment Programme (UNEP)/World Meteorological Organization (WMO) black carbon assessment, which shows how tackling air pollution can benefit the climate, human health, and crop production. UN Under-Secretary-General Achim Steiner said that the report offered "abundant and compelling reasons to reduce levels of pollutants". This process led to the establishment of the Climate and Clean Air Coalition.

We moved up the rankings of the Global-Go To Think Tank index, the definitive list produced by the University of Pennsylvania. SEI now numbers as the eighth most influential global environmental think tank.

In the autumn, SEI compiled the knowledge base for the Bonn2011 Conference on the water-energy-food nexus, organized by the German Government. The "nexus" approach has gained huge traction in 2011, and has been cited by the UN High Level Panel on Global Sustainability in the run up to the Rio+20 conference.

At the climate change negotiations in Durban in December, the Swedish International Agricultural Network Initiative (SIANI), hosted at SEI, showcased a

new methodology for smallholder farmers to decrease emissions from agriculture, while at the same time increasing yields. Messages from the event fed into the official negotiations. And at the plenary meeting, the Indian environment minister, Jairam Ramesh, cited an SEI report showing that developing country pledges on emissions amount to more than the pledges of developed countries.

PUBLICATIONS AND MEDIA

Our publications also won plaudits in 2011. The University of Cambridge named two of our books – *Adaptation to Climate Change in Southern Africa* and *The Economics of Climate Change in China* – in the top ten publications on sustainability in 2011, at places two and ten, respectively.

Our research again featured in top journals such as *Nature*, along with around 70 articles in high quality peer-reviewed publications, while SEI's in-house journal, *Climate and Development*, achieved ISI-ranking. Our work on the Anthropocene made it to the front page of *The Economist*, and our research was covered in international media from Sri Lanka to New Zealand, in outlets including the BBC, *The New York Times*,





The Guardian, China Daily, The Huffington Post, National Geographic, Reuters and Associated Press.

FROM STOCKHOLM TO DURBAN TO RIO: THE NOBEL LAUREATE SYMPOSIUM

SEI was a key partner in the 3rd Nobel Laureate Symposium on Global Sustainability, which gathered around 50 renowned scientists and thinkers – half of them Nobel Laureates – and delivered urgent and far-reaching recommendations on global sustainability to the United Nations.

From 16 to 19 May 2011, participants debated issues including climate change, poverty, biodiversity loss, and a world population that is projected to top 9 billion in 2050. The deliberations resulted in the Stockholm Memorandum, which was delivered to the UN High Level Panel on Sustainability, and was a crucial input for the panel's preparations ahead of the 2012 UN Conference on Sustainable Development in Rio de Janeiro (Rio+20). The memorandum concludes that the world has moved into a new geological age – the Anthropocene – and calls for both immediate and long-term responses to the sustainability challenge

The event led off from earlier meetings in Potsdam

(2007) and London (2009), and was organized by the SEI, The Beijer Institute of Ecological Economics, the Potsdam Institute for Climate Impact Research, The Royal Swedish Academy of Sciences and the Stockholm Resilience Centre.

In her inaugural speech, Crown Princess Victoria of Sweden said "A call from Stockholm: This is not a local call; it is a long distance 911 call from the future, a call that we need to take right now."

To maintain the impetus built by the symposium, and as a bridge to the Rio+20 conference in June 2012, SEI and its partners organized a high-level round table at December's international climate negotiations in Durban. Top scientists and policy experts discussed sustainability and its links with climate change, and the round table positioned climate issues within the broader agenda of sustainable development. Political leaders present included President of South Africa Jacob Zuma, European Commissioner for Climate Action Connie Hedegaard, Sweden's Minister for the Environment Lena Ek, Vice President of Tanzania Gharib Bilal, and Canada's Minister of the Environment Peter Kent. President Zuma said, "The level of ambition on climate change should meet the demands of science."

1. **Executive Director of the United Nations Environment Programme Achim Steiner.** Steiner said that a UNEP report on air pollution, coordinated by SEI, offers pathways to "achieve some remarkable gains".
2. **India's environment ministry Jairam Ramesh,** cited SEI research at the plenary meeting of the international climate negotiations.
3. **President of South Africa Jacob Zuma.** Zuma attended the high-level round table in Durban at the international climate talks in December.

4. **Amartya Sen signs the Stockholm Memorandum at the Nobel Symposium.**
5. **Gretchen Daily, Professor in biodiversity, Stanford University,** speaks at the Symposium press conference.
6. **HRH Crown Princess Victoria of Sweden meets Nobel Laureate in Literature Nadine Gordimer.**

MAIN FUNDERS AND PARTNERS

3C AB (Combat Climate Change)
Academy for Educational Development (AED)
AEA Technology plc
African Centre for Technology Studies (ACTS)
Agriconsulting Europe SA
AngloGold Ashanti Ltd
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California Attorney General's office
California Department of Water Resources
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CDM-Watch
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European Environment Agency (EEA)
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Fridtjof Nansen Institute (FNI)
Global Climate Adaptation Partnership (GCAP)
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Göteborgs Universitet

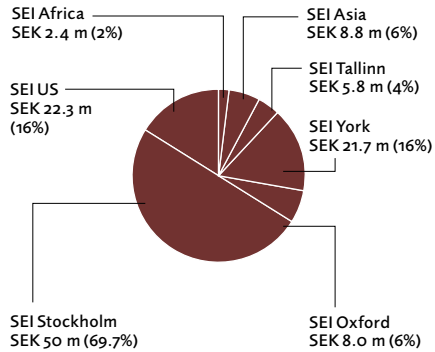
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Institute of Development Studies (IDS)
Inter-American Development Bank (IDB)
International Atomic Energy Agency (IAEA)
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Miljödepartementet (Swedish Ministry of Environment)
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Natural Environment Research Council (NERC)
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NHS Wales
NOAK, Nordic Council of Ministers
NordForsk
Nordic Africa Institute
Nordic Environment Finance Corporation (NEFCO)
Office of Sustainability, City of Seattle WA
Okeanos Foundation
ORGUT Consulting AB
Overseas Development Institute (ODI)
Palestinian Water Authority
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Swedish Environmental Research Institute (IVL)
Swedish International Development Cooperation Agency (Sida)
Swedish Meteorological and Hydrological Institute (SMHI)
The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS)
Svenska PostkodLotteriet
Tallinn Botanical Garden
Tesco Supermarkets
The Commonwealth Scientific and Industrial Research Organisation (CSIRO)
The Nature Conservancy
Totalförsvarets forskningsinstitut (FOI)
Transparency International
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
UK Dept for Environment, Food and Rural Affairs (DEFRA)
UK National Lottery
Union of Concerned Scientists
United Nations (UNDP, UNEP, UNESCO, UNFCCC, UNOPS, FAO)
United States Agency for International Development (USAID)
University of Maryland
University of Tübingen
University of York
U.S. Fish and Wildlife Service (USFWS)
Water Research Foundation
Western Governors Association
World Wildlife Fund (WWF)
Yorkshire Forward

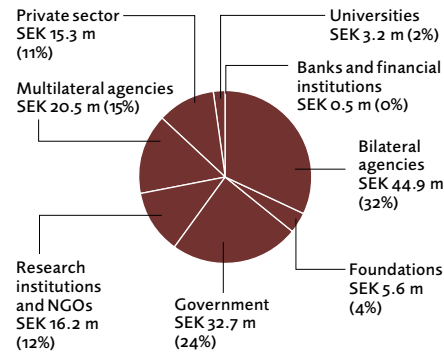
FINANCE

2011

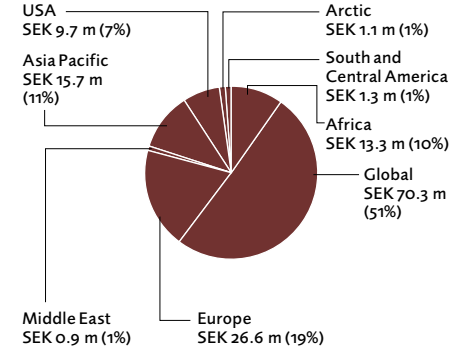
SEI CENTRES



FUNDING SOURCES BY SECTOR

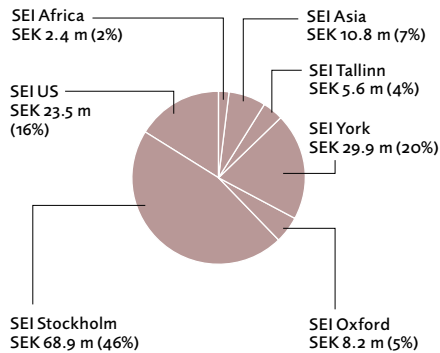


GEOGRAPHIC FOCUS

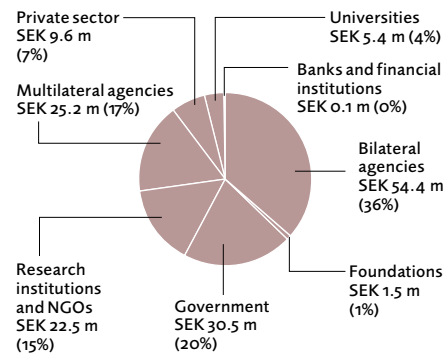


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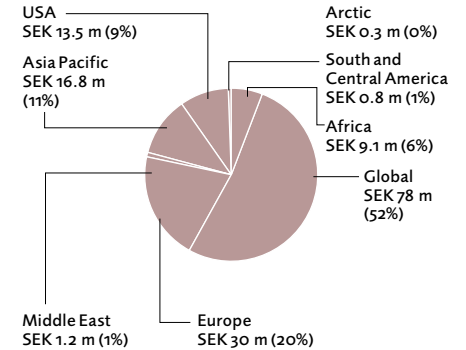
SEI CENTRES



FUNDING SOURCES BY SECTOR



GEOGRAPHIC FOCUS



GOVERNANCE

IN 2011 we made several changes to our governance structure to make our operations more coherent and effective. Crucially, a decision was taken to create a second board – the Science Advisory Council – to work specifically on developing and improving the SEI research base. This will leave the existing board to focus only on overall management matters.

The SEI Board and Scientific Advisory Council

The SEI Board appointed by the Swedish Government, and focuses on overall management matters. The board consists of seven members, with an international profile, appointed for a maximum period of four years. In 2011 the Board members were:

Kerstin Niblaeus (Chair), Sweden

Former Director General for Environment and Health at EU Council of Ministers

Lidia Brito, Mozambique

Assistant Professor in Wood Science and Technology at Eduardo Mondlane University

Patrick Bükler, SEI staff representative

Research focus on the impacts of air pollution.

Andreas Carlgren, Sweden

Former Swedish Minister for the Environment

Carl Folke, Sweden

Director of the Beijer Institute and Science Director, Stockholm Resilience Centre.

Ulla-Britt Fräjdin-Hellqvist, Sweden

Fräjdin & Hellqvist AB

Johan L. Kuylenstierna, Sweden

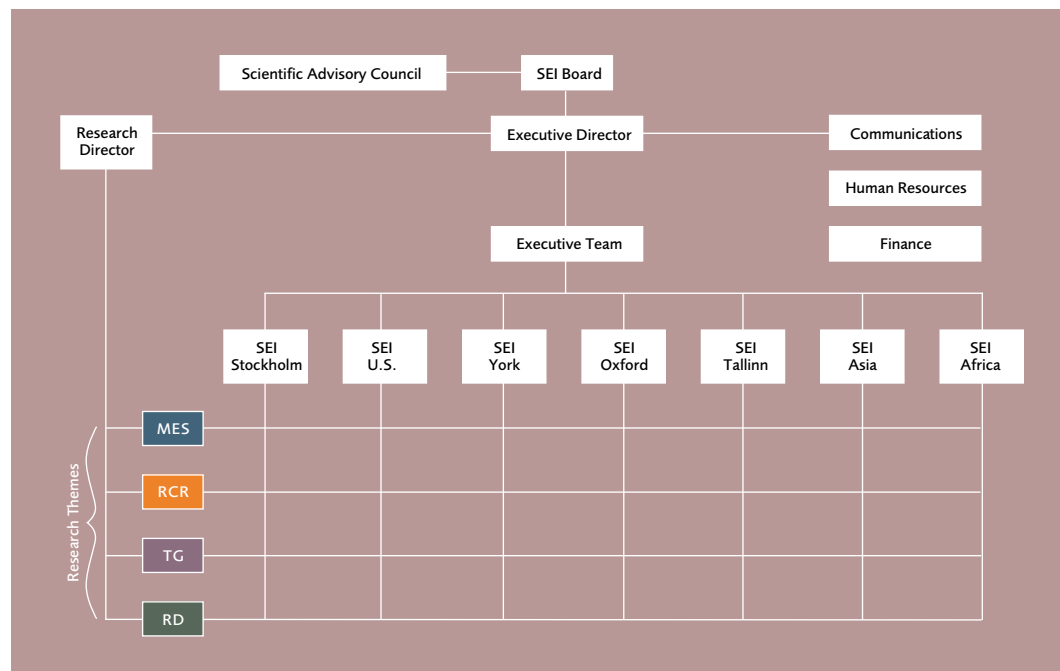
Executive Director, Stockholm Environment Institute

The Scientific Advisory Council will operate from 2012, and will consist of 8–12 leading international scientists, appointed by invitation from the SEI board and the Swedish Minister for the Environment. Its overarching role is to provide strategic advice on research priorities and to follow up and monitor SEI's

scientific achievements. The individuals who will serve on the board will be announced in 2012.

New management framework

We have also reformed the management framework across the institute (see diagram). In particular, the new set up will enable us to take fuller advantage of the expertise and networks in each of our centres, and ensure closer collaboration between them.



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This annual report has been produced using environmentally-certified printing processes and printed on paper with the environmental standards Swan and FSC.

FSC, the Forest Stewardship Council, is an international organisation that promotes the responsible management of the world's forests, assuring that products come from forests that are managed to meet the social, economic and ecological needs of present and future generations.





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