

10/28/09

SEI U.S. CENTER

ANNUAL REPORT
2009



Table of Contents

1	INTRODUCTION	3
2	CENTER DEVELOPMENTS	4
2.1	INSTITUTIONAL SETUP/ORGANIZATION	4
2.2	PERSONNEL	4
3	CLIMATE AND ENERGY	5
3.1	GREENHOUSE DEVELOPMENT RIGHTS	5
3.2	CLIMATE ECONOMICS	7
3.3	U.S. STATE AND LOCAL CLIMATE ACTION	11
3.4	CARBON TRADING AND OFFSETS	14
3.5	CAPACITY BUILDING & SOFTWARE DEVELOPMENT	15
3.6	VULNERABILITY & ADAPTATION	18
3.7	CLIMATE MITIGATION ASSESSMENT	22
4	FUTURE SUSTAINABILITY	23
5	WATER RESOURCES AND SANITATION	24
6	SELECTED RECENT FUNDERS AND PARTNERS	31
7	PUBLICATIONS	32

1 Introduction

The Stockholm Environment Institute (SEI) is an international not-for-profit research organization working on issues related to sustainable development. SEI's programmes aim to clarify the requirements, strategies and policies required for a transition to sustainability. SEI has its headquarters in Stockholm Sweden and additional research centers in Africa, Estonia, Thailand, UK and the USA.

SEI's U.S. Center currently has a staff of 27. Our activities are organized into three programs:



The Climate and Energy Program conducts energy system analyses, examines the environmental consequences of energy, and develops policies for a transition to efficient and renewable energy technology.



The Water Resources and Sanitation Program brings an integrated framework to freshwater assessment, one that seeks sustainable water solutions by balancing the needs for basic water services, development and the environment.



The Future Sustainability Program takes a holistic perspective in assessing sustainability at global, regional, and national levels.

In addition to providing policy-relevant analysis, our programs build capacity for integrated planning and action throughout the world through training and partnering on projects. Our decision support tools are used by thousands of users in more than 170 countries worldwide.

2 Center Developments

2.1 Institutional Setup/Organization

2009 was the third full year of operation of SEI's U.S. Center after our transition in 2006 to Tufts University. The management structures put in place in 2006 have continued to operate well and we are continuing to grow rapidly from a starting point of eight staff in early 2006 to 27 staff now.

A major development at the U.S. Center in 2009 is our effort to develop a strategic plan for the Center to complement the strategic plan being developed for SEI as a whole. The Center strategic plan will describe how we want the U.S. Center to evolve in the next 3 to 5 years, both in terms of the areas of research we would like to focus upon, and also how we would like our management and administration to evolve to meet the challenges ahead. The plan will not revisit the basic question of our mission since that is largely set for SEI as a whole by our international board of directors. However, it will address practical issues such as how large we want to become, what sort of new skills, disciplines and research programs we would like to develop, and how in practice we might achieve these goals (e.g. by developing new funding opportunities or by setting-up new programs).

To help develop the plan we have set up a strategic planning committee at the Center and we will be holding a two day retreat in early October. The retreat will be an opportunity for staff to participate in shaping the strategic plan, and to think creatively about future directions for the Center. Ultimately, we are aiming to submit a draft plan to the ED and our two Boards of Directors for approval in early 2010.

2.2 Personnel

The U.S. center staff members as of late 2009 are as follows (with main program affiliations):

Climate & Energy

Frank Ackerman
Ramón Bueno
Victoria Clark
Bill Dougherty
Pete Erickson
Amanda Fencel
Roel Hammerschlag
Cornelia Herzfeld
Charles Heaps
Anja Kollmuss
Sivan Kartha
Michael Lazarus
Carrie Lee
Flavia Resende
Elizabeth Stanton

Future Sustainability

Eric Kemp-Benedict

Sustainable Water & Sanitation

Alex Bedig
Marisa Escobar
Brian Joyce
Francisco Lopez
Vishal Mehta
Monique Mikhail
David Purkey
Jack Sieber
Christopher Swartz
Charles Young

Administrator

Kim Shaknis

3 Climate and Energy

The threat of global climate disruption and the lack of basic energy services for billions of people call for a new energy transition. Clean and affordable energy technologies must be brought to the market, and energy policies and institutions must foster equitable development. The Climate and Energy Program at SEI-US addresses seven major themes:

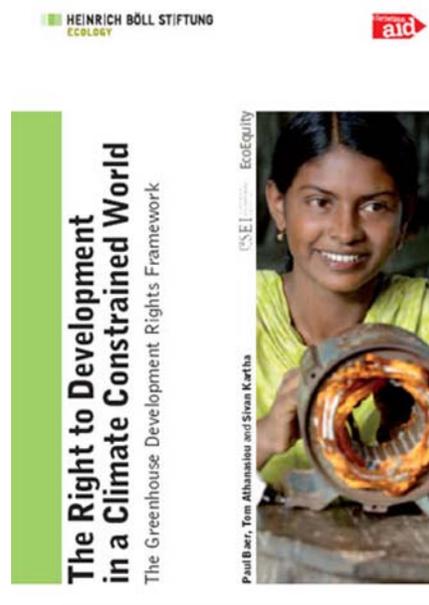
- Greenhouse Development Rights
- Climate Economics
- U.S. State and Local Climate Action
- Carbon Trading and Offsets
- Capacity Building & Software Development
- Vulnerability & Adaptation
- Climate Mitigation Assessments

3.1 Greenhouse Development Rights

The Greenhouse Development Rights (GDRs) Framework, developed by SEI and EcoEquity, offers a possible framework for a solution to the burden-sharing problem at the heart of the climate negotiating impasse. It could provide the basis for ambitious mitigation globally to avert a climate disaster, while safeguarding the right to development in the South.

The framework report, titled *The Right to Development in a Climate Constrained World*, is authored by SEI's Sivan Kartha and Eric Kemp-Benedict, and Paul Baer and Tom Athanasiou of EcoEquity, supported by Mistra, the Rockefeller Brothers Fund, Sida's Climate for Development programme, and SEI core funds.

The report argues that the emerging climate crisis must be seen against the backdrop of an ongoing development crisis, and that it is unacceptable and unrealistic to expect those struggling against poverty to focus their limited resources on averting climate change. It relies on a straightforward quantitative interpretation of the ethical principles underlying the Framework Convention on Climate Change, and draws the following conclusion: by taking on the costs of a global "emergency program" of mitigation and adaptation, the relatively wealthy population of the world who have produced higher levels of emissions can thereby protect the right to development of the world's poor.



GDR work this year has comprised several efforts. On the technical side, we have been working to expand the GDR analysis in three important directions. First, as has been demonstrated by the SEI work coming out of York on consumption-based accounting and ecological footprints, the emissions embodied in trade are an important contributor to national GHG emissions, and considering embodied emissions has important consequences for the reckoning of a country's obligations under a global burden-sharing regime. In cooperation with the York team, we have been adapting the GDR analysis to include the consumption-based emissions. Second, the GDR analysis is also being adapted to account for land-use emissions, since these are an important component of overall GHG emissions. Third, seeing as roughly one-half of the total carbon budget has already been exploited, it is useful to take a more extensive view of historical emissions in considering national responsibility. A database of national emissions has thus been integrated into the GDR analysis.

On the side of policy and public engagement, the GDR team has worked closely with national groups in several countries to prepare GDR country studies to inform decision-makers, the media, and the public about the equity dimensions of the climate crisis. Country studies have been prepared this year for Finland, Netherlands, Denmark, Ireland, Canada, Switzerland and Japan, and presentations given in a variety of forums, including meetings with Parliamentarians and Ministry officials, public audiences, civil society groups, and media. The GDR project is also working with key civil society organizations (such as Climate Action Network) and decision-making bodies (such as the European Greens) to provide analysis of reasonable expectations of financial support in a Copenhagen agreement. The project has also contributed to an effort convened by the International Center for Human Rights Policy to explore the connection between human rights and climate related technology cooperation.

On the side of academic and policy publications, several reports and articles have appeared, including in the journals *Climate and Development*, *European Review of Energy Markets*, and *Development and Change*, in the periodical *Tiempo*, and as a book chapter in *Der Klimawandel in den Sozialwissenschaften*.

The GDR project has been supported by several organizations and funders, as follows:

- Sida (through the Climate for Development project):450 kSEK (2007-2009)
- the Mistra Foundations (through the Climate Policy Research Programme):700 kSEK (2008-2010)
- the Rockefeller Brothers Fund: \$20,000 (2009)
- Sida Institutional Programme Support to SEI: \$280 kSEK (2009)
- International Center for Human Rights Policy: 4000 Swiss Francs

3.2 Climate Economics

There is a pressing need for a progressive economic analysis of climate change, to counter the argument from many influential neoclassical economists that addressing climate change is prohibitively expensive. Our Climate Economics program seeks to reframe this debate, aiming to prove that we really can afford to save the planet.

Climate and Development Model

SEI is building a new integrated assessment model for climate and development choices. The model, now called CRED (Climate and the Regional Economics of Development) rests on a fundamental reframing of the joint climate/development problem, treating both climate targets and development goals as absolute, simultaneous constraints on the world economy. It is designed for flexible incorporation of many other recent advances in climate science and the economics of uncertainty. By September, we demonstrated a fully functional model and preliminary dataset to researchers on a staff exchange from SEI-Tallinn and SEI-Asia, and presented it to an audience of technical staff at the UN in Geneva. We are now working on improving the regional data sets and cost curves.

Funder: SEI
Budget: \$118,700 (2009 only)
Staff: Ackerman, Stanton, Bueno; Nömmann, Espenberg, (both from Tallinn) Naruchaikusol (Bangkok)

RealClimateEconomics.org

SEI played a leading role in developing a new website, www.RealClimateEconomics.org, launched by Economics for Equity and the Environment Network (E3) to demonstrate the weight of economic analysis in the peer reviewed literature that supports immediate, large-scale policy responses to the climate crisis. The website offers a reader's guide to the real economics of climate change, an emerging body of scholarship that is consistent with the urgency of the problem as seen from a climate science perspective.

Funder: E3 (via Ecotrust)
Budget: \$25,000
Staff: Ackerman, Stanton

Economics of 350

SEI played the leading role in E3's research on the costs of attaining the goal of 350 ppm atmospheric concentration of CO₂, looking first at the worsening news about climate risks (i.e., the costs of inaction) and then turning to analyses of the costs of an adequate response. The report, to be released by E3 in October, concludes that this low target required a large-scale, continuing effort throughout this century, and the development of major new technologies, as well as appropriate price mechanisms, but that the costs are affordable.

Funder: E3 (via Ecotrust)
Budget: \$50,000
Staff: Ackerman, Stanton

UCS Consumer's Guide

SEI is researching and writing a consumer's guide to effective climate choices, in collaboration with the Union of Concerned Scientists. This work updates a very successful, similar work on the environmental impacts of consumer choices produced by UCS in the 1990s; the new book will add a focus on the climate impacts of consumer choices in particular. The book will be co-authored by Frank Ackerman and Suzanne Shaw (of UCS).

Funder: Union of Concerned Scientists
Budget: \$100,000
Staff: Ackerman, Stanton, Bueno; Shaw (UCS)

UCS Midwest Analysis

SEI researched the probable costs of climate change to the U.S. Midwest, an area of the country (and the world) likely to be one of the least and last affected. Nevertheless, even this area will feel the impact of rising costs if climate change continues unchecked over the course of the twenty-first century.

Funder: Union of Concerned Scientists
Budget: \$18,000
Staff: Ackerman, Stanton

Equity Considerations in Climate Economic Models

Questions of equity between regions of the world, at any moment in time, are intentionally excluded from most climate economics models. Many models that estimate regional impacts employ “Negishi welfare weights,” a little-known technical procedure which effectively imposes an unreasonable assumption that human welfare is more valuable in richer parts of the world. A paper on the equity implications of Negishi weighting is under review at a journal and likely to appear in early 2010.

Funder: SEI
Budget: \$5,353
Staff: Stanton

California Attorney General – consulting on global warming policies

SEI is providing expert advice and analysis on the economics of climate change policies to the California Attorney General’s office.

Funder: California Attorney General
Budget: Up to \$40,000
Staff: Ackerman

Socio-Economic Impacts of Climate Change in Armenia

SEI conducted a comprehensive analytical report on socio-economic impacts of global climate change on Armenia, including review of existing literature, description of methodology, analysis of economic impacts on priority sectors, and review of adaptation options for Armenia. The report concluded with policy recommendations.

Funder: UNDP
Budget: \$40,000
Staff: Stanton, Ackerman, Resende, Bueno, Herzfeld

Macedonia and Climate Change: An Assessment

SEI is conducting a comprehensive analytical report on socio-economic impacts of global climate change on Macedonia, including review of existing literature, description of methodology, analysis of economic impacts on priority sectors, and review of adaptation options for Macedonia. The report will conclude with policy recommendations.

Funder: UNDP
Budget: \$47,500
Staff: Stanton, Ackerman, Resende

Distribution of Carbon Emissions by State

In collaboration with Economists for Equity and Environment (E3), SEI analyzed inequalities in household per capita carbon emissions by state, as a guide toward development of effective climate policies that will be accepted as equitable across states and regions of the U.S.

Funder: NRDC (via E3 and Ecotrust)
Budget: \$25,000 (SEI share)
Staff: Ackerman, Stanton, Bueno; Sheeran (E3)

G24 Financing for climate investment

Frank Ackerman drafted a paper on the sources of international financing for climate investments in developing countries, for the G24 group of developing countries. The paper was presented at a meeting of the UN Commission on Trade and Development (UNCTAD) in Geneva, and will be published by the G24 in 2010.

Funder: G24
Budget: \$8,000
Staff: Ackerman

World Economic and Social Survey

SEI was commissioned to write a paper for the United Nations Department of Economic and Social Affairs (UNDESA), reviewing the existing literature on climate change and development. This was one of the background papers used to produce UNDESA's annual World Economic and Social Survey (WESS), which focused on climate and development in 2009.

Funder: UNDESA
Budget: \$8,000
Staff: Stanton, Ackerman

Economics of International GHG Offset and Credit Mechanisms

SEI is conducting an assessment of the economics of international crediting mechanisms, including standard offsets, sectoral mechanisms, and revised approaches to CDM. We are conducting a review of approaches to estimating the supply of credits, building a spreadsheet model of international offset supply, and applying this tool – as well as insights from our experience and research on CDM, alternative finance mechanisms, and global mitigation potentials – to help assess international offset instruments and policy dialogues.

Funder: SEI Core funding for start-up, first phase analysis. Further funding not yet confirmed.
Partners: Likely WRI
Timeframe: 2009
Staff: Erickson and Lazarus
Budget: \$76,000

3.3 U.S. State and Local Climate Action

We provide analytical support and facilitation to federal agencies and numerous State and Local stakeholder processes that are developing comprehensive and innovative strategies to reverse GHG emissions growth in the U.S.

Western Climate Initiative (WCI)

The WCI is a regional collaboration between seven U.S. states and four Canadian provinces, representing over 70 percent of the Canadian economy and 20 percent of the U.S. economy that aims to reduce greenhouse gas emissions by 15 percent below 2005 levels by 2020. We have advised and supported the Initiative in the development of the program design to work towards putting the program in place to start on January 1, 2012.

Funder: Various U.S. State Governments and supporting foundations
Timeframe: 2007 onward
Staff: Erickson, Lazarus, and Lee
Budget: \$146,000

NY State Power Supply Cost Curve Analysis

Many US states are developing comprehensive and innovative climate strategies to reverse GHG emissions growth in the US. Working for the New York State Energy Research and Development Authority (NYSERDA), we provided analytical support and facilitation to the New York State cost curve analysis, working closely with the Center for Climate Strategies. Final deliverables include cost curves detailing the cost per tonne of CO₂ potentially avoided by a subset of NY-specific power supply technologies as well as policy scenario analysis. We developed the interactive “New York Cost Curve Model” to produce cost curves based on user-controlled inputs to allow New York State officials to lay the foundation for future state policy development.

Date: August 2008 – September 2009
Funder: NYSERDA
Budget: US\$46,000
Staff: Dougherty, Clark

PA State Power Supply Forecast Analysis

Originating as an initiative within the Pennsylvania governor's office, a climate change action plan is being developed to address the increasing GHG emissions in the state. We partnered with the Center of Climate Strategies to create an inventory and forecast for greenhouse gases emitted from electricity generation in Pennsylvania. This work also included an analysis of GHG emissions from coal mine methane in Pennsylvania. Through the guidance of a group of stakeholders, we were able to create a forecast to serve as a baseline for the climate change action plan.

Date: January 2009 – August 2009
Funder: PA DEP
Budget: US\$11,442
Staff: Dougherty, Clark

Southern Governors Association GHG Action Plan Analysis

Through analysis of power supply policies and measures, we provided input to the Southern Governors Association, a regional body in the USA that includes 16 governors who are seeking to better understand regional options for tackling GHG emissions. The analysis focused on carbon capture technology, renewable energy, power plant efficiency improvements, and the role of nuclear energy.

Date: June 2009 – ongoing
Funder: Southern Governors Association
Budget: US\$13,225
Staff: Dougherty, Clark

Life Cycle Assessment of Woody Biomass Management Options

We are working with the Olympic Region Clean Air Agency (ORCAA) to comprehensively analyze and quantify life-cycle air emissions of options for using or disposing of woody biomass generated from forest management and land clearing operations in the Pacific Northwest. The report and spreadsheet tool we develop is intended to serve as a decision making support tool to allow managers to balance multiple objectives, including air quality and greenhouse gas emissions, when selecting and approving options for woody biomass management.

Funder: Olympic Region Clean Air Agency (ORCAA)
Partners: Gordon Smith, Ecofor LLC
Timeframe: 2009-10
Staff: Erickson, Hammerschlag, and Carrie Lee
Budget: \$76,000

Oregon Consumption-based GHG Inventory

We are conducting a consumption-based inventory of all greenhouse gases associated with the economy in Oregon (including emissions released to produce and transport goods made out-of-state). This pioneering effort, which is the first consumption-based GHG inventory for a US State, will help Oregon policymakers better understand the state's contribution to global greenhouse gas emissions and design new strategies to address the emissions associated with consumption.

Funder: Oregon Department of Environmental Quality
Timeframe: 2009-2010
Staff: Ackerman, Bueno, Erickson, Hammerschlag, Lazarus, and Stanton
Budget: \$80,000

University of Washington Climate Action Plan

We are the author of the Climate Action Plan submitted by the University of Washington to the American College and University Presidents' Climate Commitment.

Funder: University of Washington
Timeframe: Feb 2009 - August 2009
Staff: Hammerschlag
Budget: US\$ 19,500

3.4 Carbon Trading and Offsets

Carbon Offset Programs: Design, Review and Assessment

We are providing guidance for the potential development of a U.S. carbon offset program as part of a future mandatory GHG compliance regime. We issued a report including a review and assessment of 27+ current domestic and international offset programs, and have developed a website with this an additional carbon offset related information. As part of this research effort, we conducted a road-test of 5 offset protocols using sample project data to identify differences in project eligibility, offset quantification, and process rigor. This road-testing work will serve as the basis for a journal publication in 2009.

Funder: U.S. EPA
Partners: Gordon Smith, Ecofor LLC
Timeframe: 2008-09
Staff: Kollmuss, Lazarus, and Lee
Budget: \$92,000

Technical Advisory Services to New York/ New Jersey Port Authority

We provided technical advice to the NY/NJ Port Authority on their carbon offsetting strategy. The offsetting strategy is part of the Port Authority's plan to reduce greenhouse gas emissions by 80 percent by 2050, through a combination of capital investments, operational changes, and carbon offsets

Funder: NY/NJ Port Authority
Partners: Gordon Smith, Ecofor LLC
Timeframe: 2008-09
Staff: Kollmuss and Lazarus
Budget: \$15,000

Influence of GHG Cap-and-Trade Policy on Domestic Offset Supply and Emissions Benefits

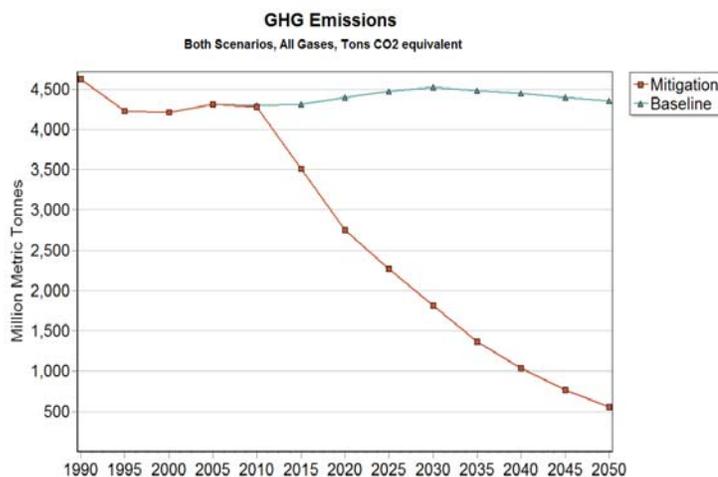
We collaborated with the World Resources Institute (WRI) on an assessment of the potential supply of domestic (U.S.) offsets under a U.S. cap-and-trade program on greenhouse gases. The study assessed how cap-and-trade design parameters such as offset protocols, offset limits, and set-asides could affect the supply of offsets from agriculture, forestry, and other sources, as well as the net environmental benefits attained under various scenarios.

Funder: World Resources Institute (WRI)
Partners: WRI
Timeframe: 2009
Staff: Erickson and Lazarus
Budget: \$50,000

3.5 Capacity Building & Software Development

**Europe’s Share of the Climate Challenge:
An Assessment of Domestic Actions and International Obligations to Protect the Planet**

This project, which is being conducted in partnership with Friends of the Earth, is examining the feasibility of achieving major cuts in GHG emissions in Europe, consistent with a global emergency pathway for protecting the planet. SEI is examining the possibility of achieving 40% cuts in GHG emissions by 2020 and 90% cuts by 2050 across all 27 EU nations. FOE has asked SEI to examine a case where these reductions would be achieved through a massive deployment of energy conservation, efficiency and



renewable energy sources whilst also considering lifestyle changes across different sectors such as transport and food consumption and production. FOE has also asked SEI to constrain its analysis to include the phase out of nuclear power, no use of coal with carbon capture and storage, and to avoid the large-scale use of biofuels. The study is also quantifying the EU’s historical responsibility using the Greenhouse Development Rights (GDR) framework and defining the financial support that needs to be given to developing countries for adaption and mitigation to climate change. The research will result in an overall report covering all 27 EU nations, and country case studies for the UK, Germany, Finland and Austria. The report will be published in late 2009 in the run up to the Copenhagen Climate Conference (COP15).

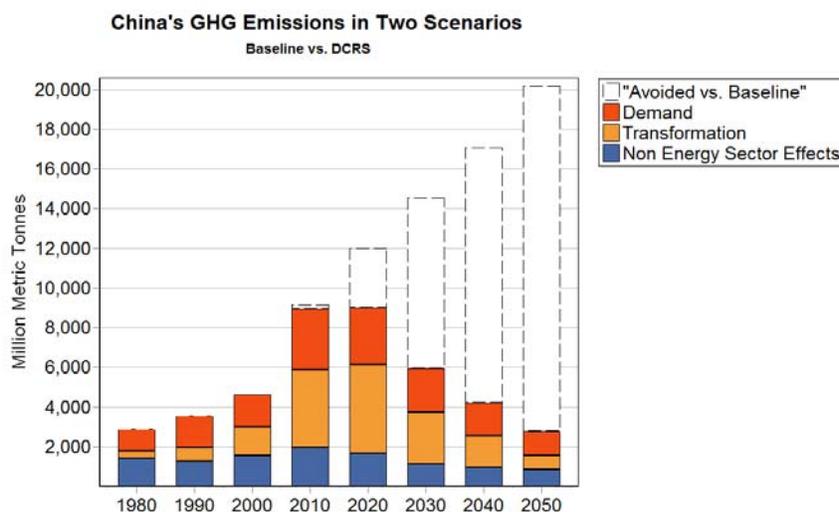
Funders: SEI (IPS funds) and Friends of the Earth.

Staff: Heaps, Erickson, Kartha, Kemp-Benedict

A Deep Carbon Reduction Scenario for China: China Economics of Climate Change Initiative

As part of the SEI's China Economics of Climate Change Initiative, we developed a series of analyses exploring important dimensions of climate mitigation in China.

A series of papers were presented at the mid-term meeting of the China Economics of Climate Change Initiative, and their findings will also be incorporated into a synthesis report and book to be published at the end of the year.



A first paper developed a scenario analysis of how China's energy systems might be altered over the coming decades to allow China to meet ambitious goals for development at the same time as keeping GHG emissions within tight budgets that provide a reasonable chance of keeping global temperature increases below 2°C. Two scenarios were developed. A **Baseline** scenario examines current and historical trends in China's CO₂ emissions and projects CO₂ emissions to 2050 assuming that China continues to develop very rapidly. A second **Deep Carbon Reduction Scenario (DCRS)** examines the feasibility of massively reducing China's CO₂ emissions in 2050: with energy sector GHG emissions reduced to only 10% of the 2050 levels projected in the baseline scenario or 15% below the level in 1990.

A second paper analyzed the carbon embedded in China's trade, and quantified the substantial share of emissions in China that are attributable to exports. We found that China's export surplus in embedded carbon is due to the country's overall carbon intensity, not to any comparative advantage in carbon-intensive sectors; thus economic growth and technological advances are likely to reduce China's exports of embedded carbon, even if the country's large trade surplus persists.

A third paper examined the connection between carbon emissions and measures of well-being. We found that there is a strong but not perfect correlation between emissions per capita and standards of living. China as a whole, and many of its provinces, are among the most carbon-intensive regions of the world; only a handful of oil-exporting and ex-Soviet economies are comparable in intensity.

Funder: SEI
Budget: \$200,000
Staff: Ackerman, Heaps, Kartha, Lazarus, Stanton

COMMEND: Community for Energy Environment and Development

Description: We are continuing to manage and develop the COMMEND: an international web-based initiative seeking to foster a community among energy analysts working on energy for sustainable development.

COMMEND activities in 2009 included a series of training workshops in the use of LEAP and the further development of the COMMEND web site: which gives access to LEAP and provides technical support for users of LEAP and other energy analysis software tools. The site also includes a library of reference materials and access to downloadable national level data sets. COMMEND membership continues to grow very rapidly and now numbers almost 6000 members in 175 countries.

Web site: <http://www.energycommunity.org>
Funder: SEI (CforD funds)
Staff: Heaps

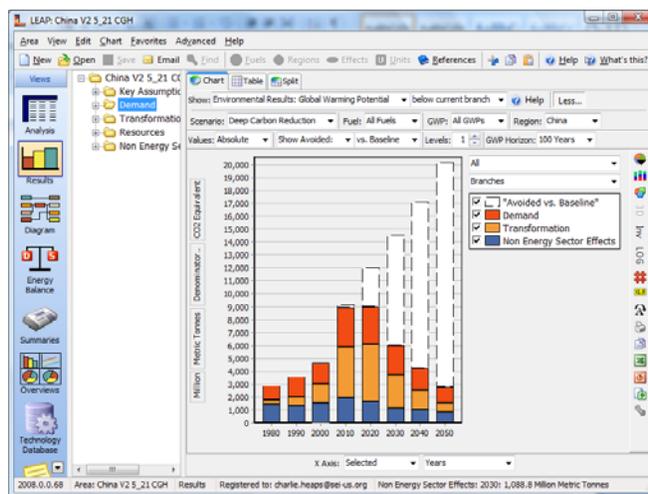
LEAP: Long range Energy Alternatives Planning System

Description: LEAP is a user-friendly software tool that is rapidly becoming a worldwide standard for energy policy and GHG mitigation assessment. SEI has continued to maintain, develop and apply LEAP in 2009 and to support its users all around the world both online and by holding numerous training workshops. Updates to LEAP in 2009 include better reporting and data management features and better improved connections to other models.

Through COMMEND, SEI has conducted or helped to organize six LEAP training workshops in 2009 in Argentina, Bahrain, Chile, Ecuador, Mozambique, and Montenegro. LEAP has also been used as the main analytical tool in the two major scenario studies for China and the EU27 mentioned above.

Detailed information on LEAP including a list of recent applications and access to the software itself is available here: www.energycommunity.org

Funder: Now largely self-funding through sales of LEAP to for-profit organizations.
Staff: Heaps



3.6 Vulnerability & Adaptation

Even if we rapidly stabilize atmospheric GHG concentrations, the impacts of climate change will continue for centuries and the adverse impacts of climate change will fall disproportionately on the most vulnerable in the least developed countries of the world.

Our work on adaptation lies at the intersection of sustainable development and climate change. Support includes vulnerability assessments, financial needs assessments, capacity-building and response strategies, and widespread integration of climate risks and adaptation actions into local, national, and regional policies and planning. We have worked with international and national agencies to develop climate change adaptation policies, training programs and software tools for adaptation for countries in Asia, Latin America, and Africa.

Adaptation Project Formulation for Sudan

We are assisting the Sudanese Higher Council for Environment and Natural Resources (HCENR) in developing implementation strategies for the highest priority adaptation project identified in the NAPA report. In 2009, SEI developed a project proposal submitted to the GEF's Least Developed Country Fund (LDCF), to support pilot adaptation projects in five vulnerable areas across Sudan. The project focuses on building resilience and adaptive capacity in the agricultural sector and in water resource management.



Date: 2007 - ongoing
Funder: United Nations Development Programme (UNDP)
Staff: Dougherty, Fencil
Budget: US\$23,100

Action Plan to Mainstream Climate Risk Management into African Development Bank Operations

The overall goal of the African Development Bank's Climate Risk Management and Adaptation Strategy (CRMA) is to ensure progress towards eradication of poverty and contribute to sustainable improvement in people's livelihoods taking into account climate change. The idea is to "mainstream" climate change adaptation into policies and practices, or in other words, "climate-proof" project developments through relevant policy implementation. The existing CRMA strategy is based on lessons learnt, as well as several

regional stakeholder consultation forums and the recommendations of the President's Working Group on Climate Change. SEI created an Action Plan to operationalize the AfDB's climate risk management strategy.

Date: April – September 2009
Funder: African Development Bank
Budget: US\$ 28,000
Staff: Dougherty, FencI

Project Design: Development of Climate Change related Technology Transfer (TT) project for Sudan

Least developed countries like the Sudan are eligible to apply for funding from the GEF's Special Climate Change Fund (SCCF) to support technology transfer. GEF criteria are such that the applications need to introduce new and priority technologies for the country. SEI, in collaboration with UNDP and Sudanese experts, developed a project entitled *Technology Transfer for Photovoltaic Electricity Generation* that will facilitate the uptake and deployment of photo-voltaic (PV/Solar) in the Sudan's fast growing peri-urban areas by demonstrating the viability of PV based mini-grids as a reliable source of energy



Date: July – August 2009
Funder: UNDP
Budget: US\$2,500
Staff: Dougherty, FencI

Developing guidelines for investment & financial flow to address climate change

SEI contributed to the development of the UNDP Handbook for estimating the investment and financial flows associated with GHG mitigation and adaptation investment strategies. The handbook is intended to be a reference document for use by 10 non-Annex 1 countries as they undertake an analysis of the incremental costs associated with meeting sustainable development objectives.

Date: Summer 2008 - Winter 2008
Funder: UNDP
Budget: US\$50,000
Staff: Dougherty, FencI

Adaptation to Climate Change in the Nile Delta through Integrated Coastal Zone Management

In collaboration with Egypt's Coastal Research Institute and other local partners, SEI has proposed a Living Shorelines Approach (LSA) to be piloted near the Nile Delta's three coastal Lagoons. The northern part of the Nile delta, where the lagoons are located, is subject to severe coastal erosion and threatened by future sea level rise. The living shoreline approach (LSA) will be applied in the Nile Delta through on-the-ground coastal adaptation pilot projects.



Date: April 2009 – ongoing
Funder: UNDP
Budget: US\$48,000
Staff: Dougherty, FencI

Enhancing the Capacity of Turkey to Adapt to Climate Change

SEI is working with the United Nations Environment Programme (UNEP) on scientific capacity building and the development of National Adaptation Programme of Action for Turkey. The goal is to mainstream climate change adaptation into Turkey's national plans. SEI and UNEP led workshops in June, September and October 2009 focusing on scientific capacity building around climate change impacts and appropriate adaptation measures, participatory vulnerability assessments to inform a national adaptation strategy, and the production of a 'how-to' guide for developing national adaptation plans.

Date: April 2009 – ongoing
Funder: UNEP
Budget: US\$80,000
Staff: Dougherty, FencI

Supporting the development of Sudan's 2nd National Communication to the UNFCCC

SEI is providing training and technical assistance to Sudan for its national vulnerability and GHG mitigation assessments as part of their UNFCCC Second National Communication. Workshops in support of the vulnerability and adaptation chapter assess coastal zones, water resources, and land use issues.

Date: 2008 – ongoing
Funder: UNEP
Budget: US\$ 23,500
Staff: Dougherty, FencI

UAE Second National Communication

SEI is working with the Abu Dhabi Environment Agency to draft their UNFCCC Second National Communication including summarizing SEI's 2008 Physical Impact Assessment for the UAE for the Vulnerability and Adaptation Chapter, updating the national GHG inventory from the 2006 Initial National Communication, and integrating the new Abu Dhabi Climate Change Policy.

Date: 2008- ongoing
Funder: Abu Dhabi Environment Agency
Budget: US\$100,000
Staff: Dougherty, Fencl, Clark

Developing a Climate Change Policy for Abu Dhabi

SEI is working with the Abu Dhabi Environment Agency to develop a policy on climate change adaptation and mitigation. The policy is focused on thirteen sectors such as coastal zones, environmental regulations for dry land, water sources, energy sector, transport, waste management, food security, agriculture, industry and residential sector. SEI has presented at and participated in multiple workshops through the course of the policy development process. The final report *Climate Change Policy for Abu Dhabi Emirate*, will be used as guideline for future legislation, regulation and practices to reduce the impact of climate change and to reduce GHG emissions.

Date: 2008- ongoing
Funder: Abu Dhabi Environment Agency
Budget: US\$75,000
Staff: Dougherty, Fencl

Technical Support for Bhutan's Second National Communication

SEI provided technical support to the Second National Communication (SNC) team for the preparation of Bhutan's National GHG inventory for the years 1994-2000. Key tasks included designing and participating in a training program for the national task force, providing support for an institutional assessment, data acquisition, and developing appropriate emission factors, and preparing a draft of the GHG inventory chapter as well as a technical report to substantiate key assumptions and methods.

Date: April 2008 – ongoing
Funder: National Environment Commission of the Royal Government of Bhutan
Budget: US\$23,000
Staff: Dougherty, Clark

Technology Needs Assessment (TNA) Handbook Second Edition

The TNA handbook is a UNDP publication that provides guidance for assessing the role of technology in reducing greenhouse gas emissions and adapting to the adverse impacts associated with increased climatic variability and climate change.

The publication is available for download at: <http://tinyurl.com/yc8sh3r>

Date: September 2008 – April 2009
Funder: UNDP
Budget: US\$23,000
Staff: Dougherty, Clark

3.7 Climate Mitigation Assessment

SEI Scenarios Project

This initiative which is funded through SEI's IPS funds is intended to develop SEI's energy and environmental scenario analysis capabilities. The initial focus in 2008 was on building-up a solid foundation for generating scenarios at various different levels of aggregation within SEI's LEAP system and conducting outreach to ensure that the initiative's outputs are highly relevant to policy makers working on energy and climate change policy assessments. 2009 saw the widespread application of these capabilities in policy-relevant areas. Most notably our new capabilities will be applied in two major climate mitigation scenario studies: one of China and one of the EU27 area (see above).

Funder: SEI (IPS)
Budget: SEK 500,000
Staff: Heaps

ClimateWorks Evaluation

SEI is contributing to an evaluation of the ClimateWorks foundation, a global philanthropic network devoted to ensuring that the global average temperature does not increase by more than 2°C. SEI's role is focused on evaluating the underlying technical assumptions and analytical frameworks employed by ClimateWorks to assess the organization's priority initiatives.

Funder: ClimateWorks, Ross and Associates and IEC
Timeframe: 2009 onward
Staff: Erickson, Hammerschlag, and Lazarus
Budget: \$25,000

Bioenergy Coherence

This project is taking steps toward establishing coherence across SEI's bioenergy-related activities. We are conducting a series of cross-Centre teleconferences involving all staff with biofuels interests with the objective of creating a catalogue of bioenergy-related projects; writing a position statement that clearly articulates SEI's stance with regard to the role for bioenergy; and drafting a strategy document proposing future directions for SEI research on bioenergy.

Funder: SEI (IPS)
Budget: US\$135,000 over 2 years.
Staff: Hammerschlag, Lee

Climate for Development - Carbon Finance for Poverty Alleviation

SEI is developing capacity to model climate and economic impacts of both direct and indirect land use change induced by enacted and/or proposed bioenergy policies. We are also authoring a report on global capacity for bioenergy development.

Funder: Sida
Partners: Natural Resources Defense Council
Timeframe: Jan 2007 - Dec 2009
Staff: Kartha, Hammerschlag, Lee
Budget: US\$ 226,000

4 Future Sustainability

Many nations, regions, and metropolitan areas have begun to examine the practical implications of sustainable development for policy and planning. They face difficult questions: How can current needs and aspirations be met while ensuring satisfactory environmental and resource conditions for the future? What technological, economic, and behavioral adaptations are required? What methods are appropriate for conducting strategic assessments and developing sustainability action plans?

The Future Sustainability Program addresses these questions by advancing the methods, concepts, data, and institutional capacity for sustainable development planning, helping to turn sustainability into a practical basis for action.

Bioenergy, Sustainability and Trade-offs: Can we avoid deforestation while promoting bioenergy?

We are collaborating with the CGIAR Center for International Forestry Research (CIFOR), CSIR, Joanneum Research, and UNAM to assess the potential impacts of bioenergy production on forests and forest-derived livelihoods. The work is being carried out with CIFOR's Trade & Investment group and focuses on biofuel production for international markets. SEI is developing and facilitating global and regional scenario exercises, and the work builds on a previous SEI collaboration with CIFOR.

Funder: EC
Budget: US\$42,800 (33,250 EUR)
Staff: Kemp-Benedict, Resende, Lee
Timeframe: 2009-2011
Collaborators: CIFOR, CSIR, Joanneum Research, UNAM

Livelihood and Poverty Analysis

Through SEI's NOVA research program, SEI is developing techniques for diagnosing and modeling water-related problems in complex situations. The approach makes use of Bayesian network models to analyze and represent livelihood and poverty dynamics. It builds on work completed as part of the Mekong Basin Focal Project (BFP) that was funded under CGIAR's Challenge Program for Water and Food (CPWF), and uses the Sustainable Livelihoods framework as an organizing framework. The project includes data analysis, model development, and field visits to areas in Northeast Thailand.

Funder: NOVA
Budget: US\$22,419 (200,000 SEK)
Staff: Kemp-Benedict, Krittasudthacheewa, de la Rosa, Bharwani, Matin
Timeframe: 2008-2009

Linking Vulnerability Mapping to Local Decision Making on Adaptation to Climate Change

SEI is developing techniques for linking livelihood analysis with vulnerability mapping. The goal is to generate dynamic vulnerability maps in order to provide information about vulnerability in a visual and accessible manner for maximum impact and communication to policy makers.

Funder: RLV New Initiatives Fund
Budget: US\$8,571 (58,500 SEK)
Staff: Kemp-Benedict, Bharwani, Butterfield
Timeframe: 2008-2009

5 Water Resources and Sanitation

Agricultural Adaptation Strategies to Climate Change in the San Joaquin Valley, California

Under an executive order from the governor, the state of California is required to complete an assessment every two years of the impacts of climate change on California's water supply, public health, agriculture, coastline, and forestry. SEI was invited to participate in the most recent assessment and was asked to evaluate the impacts of climate change on managing water supplies within the Sacramento and San Joaquin River basins, which together account for the bulk of the state's available water supplies and irrigated land. The focus of SEI's research was to use the Water Evaluation and Planning (WEAP) system to assess how changes in climate may impact water supply reliability for irrigated agriculture, which represents the largest water user in the state and to consider how agricultural management practices could change in response to changing water supplies. A particularly exciting innovation was the dynamic integration of an econometric model of agricultural crop choice and water management technology within the WEAP application.

Client: California Energy Commission
Staff: Joyce, Purkey, Mehta
Partner organizations: Numerous California research organizations
Countries/Regions: California, United States
Dates: April 2008 – March 2009
Budget: US\$40,000

WEAP Capacity Building for Holistic Water Resources Management in Massachusetts

In making investment decisions about water supply development and wastewater management, towns in Massachusetts usually employ traditional engineering cost benefit analysis. These analyses typically externalize the costs and benefits associated with the implications of a particular plan on aquatic ecosystems. If these costs are internalized towns can make water management decisions with less impact on the environment. SEI has been working with the Commonwealth of Massachusetts for three years to enhance WEAP and to build capacity for its use in supporting town level, holistic, water management planning in the State.

Client: Massachusetts Department of Fish and Game, Riverways Program
Staff: Joyce
Partner organizations: The Town of Sharon
Countries/Regions: Massachusetts, United States
Dates: October 2006 – June 2009
Budget: US\$150,000

Adapting to the Loss of Glaciers in the Andes

This project focused on assessing potential changes in the watersheds of the Andes Mountains in Peru associated with the loss of glaciers due to climate change. WEAP was enhanced to represent the evolution of glaciers under various future climate scenarios. Case studies for three watersheds in Peru investigated the water management implications of the loss of glaciers.

Client: World Bank
Staff: Purkey, Escobar
Partner organizations: IRD-France
Countries/Regions: Peru, South America
Dates: June 2008 – April 2009
Budget: US\$46,000

Managing Groundwater in the Middle East and North Africa

In order to help promote integrated water resources planning in the MENA region, SEI has enhanced WEAP to connect it to the MODFLOW groundwater model and to track the evolution of soil water conditions, irrigation requirements and crop yields. The work is being done in partnership with the Arab Centre for the Study of Arid Zones and Dry Lands (ACSAD, based in Damascus, Syria) and the German Federal Institute for Geosciences and Natural Resources (BGR). The project also involved the organization of a major WEAP conference in Syria.

Client: German Federal Institute for Geosciences and Natural Resources (BGR)
Staff: Sieber, Purkey
Partner organizations: The Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD)
Countries/Regions: Syria and Morocco
Dates: April 2006 – September 2009
Budget: US\$110,000

Negotiating Water Management in the Klamath River Basin

SEI is modeling the hydrology of the Klamath River Basin to support indigenous tribes in their negotiations with the State and Federal Government over the removal of dams and the long-term allocation of water resources in the Klamath River basin. The settlement negotiations have the potential to bring stability to one of the most continuous and protracted water management struggles in the American West.

Client: The Yurok Tribe
Staff: Joyce, Purkey, Escobar
Partner organizations: The Klamath Tribes
Countries/Regions: California-Oregon, United States
Start Date: October, 2007
Overall Budget: US\$60,000

Modeling Riparian Vegetation Establishment along the Sacramento River in California

Operation of water management structures such as dams and diversions often negatively impact vegetation growth, which serves as wildlife habitat and a source of food and fuel for human communities. SEI is developing a detailed model of riparian vegetation establishment. The model considers soil-plant-water physical processes allowing for an accurate estimation of vegetation survival under various river management scenarios. The model will be applied to help design new infrastructure investments and operating regimes in the Sacramento Valley.

Client: United States Bureau of Reclamation
Staff: Young
Partner organizations: University of California, Davis, WRIME, Inc.
Countries/Regions: California, United States
Start Date: September 2007
Overall Budget: US\$372,577

Impacts of Climate Change on Water, Energy and Agriculture in the Western United States

SEI has been given seed funding for a project to analyze the interactions of climate change with water, agriculture, and energy in the US West and Southwest over the course of the twenty-first century. This study will contrast high and low emission scenarios for the twenty-first century, identifying cost differences, wherever possible, between the two potential futures.

Funder: Kresge Foundation
Budget: \$140,000
Staff: Ackerman, Stanton

Sharpening Drought Plans to Consider Climate, the Watershed, the Regulatory Environment, and the Forces of Change

SEI is collaborating with the El Dorado Irrigation District to investigate the potential impacts of climate change on a water system that depends to a large degree on the accumulation of snow at high elevation during the winter and the progressive melting of this snow during the late spring and early summer. A WEAP application of the system has already been developed in order to test drought management triggers and actions that were defined by the district assuming that historic hydrologic patterns will be representative of future conditions. Climate change calls this assumption into question. This project will attempt to help introduce notions of uncertainty and risk management into the definition of drought plan triggers and actions adopted by the district. A particularly exciting innovation is the dynamic integration of an econometric model of water user behavior into the WEAP application

Client: National Oceanic and Atmospheric Administration
Staff: Purkey
Partner organizations: University of California, Berkeley, National Center for Atmospheric Research
Countries/Regions: California, United States
Start Date: October 2007
Overall Budget: US\$170,000

Preventing Loss of Ecosystem Services Provided in California

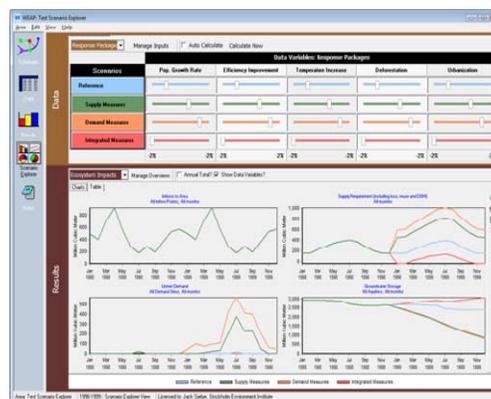
Chinook Salmon are the pinnacle species in the California’s riverine aquatic ecosystems. Historically these large fish spawned in most of the rivers and streams which flowed into the Pacific north Monterey Bay. Based on hydrologic and climatic conditions, individual streams accommodated genetically different salmon populations, or runs. Spring run salmon return from the ocean in March and April when the rivers are high and the water cold. The spring run in California has been reduced to only a few streams, which are at grave risk due to climate change. This project is using a WEAP application linked to a model of the salmon life-cycle to investigate what management options can better protect spring run salmon, as well as investigating the ecological implications for the overall ecosystem if this species is lost.

Client: U.S. Environmental Protection Agency
Staff: Purkey, Escobar
Partner organizations: University of California, Davis
Countries/Regions: California, United States
Start Date: October 2007
Overall Budget: US\$376,525

Updating the California Water Plan

The California Water Plan provides a framework for water managers, legislators, and the public to consider California’s water future. To support California in this effort, SEI is developing an application of WEAP that will serve as the analytical foundation for the overall process. The application will allow various strategies to be assessed within the context of a range of uncertainties relating to future trends in water demand and climate change.

Client: California Department of Water Resources
Staff: Joyce, Purkey, Mehta, Sieber
Partner organizations: RAND Corporation, MHW Inc., National Center for Atmospheric Research
Countries/Regions: California, United States
Start Date: April 2008
Overall Budget: US\$185,000



Integration of Anticipated Water Demand into Surface Water Allocation Decision Making

SEI is working with the U.S. Bureau of Reclamation to develop a spatially based field water balance and irrigation delivery system model for investigation of water allocation in California's Central Valley Project. The objective driving the model development exercise is to improve the consideration of short and medium-term water demands into decisions related to the allocation of available surface water supplies. Currently these allocation decisions consider only reservoir storage and anticipated reservoir inflows as parameters in defining water allocation. The tool will be used to evaluate the potential impact of climate change on agriculture in California and the implications of these changes in water allocation rules.

Client: U.S. Bureau of Reclamation
Staff: Chuck Young, Brian Joyce
Partner: WRIME Inc., RMA Inc., National Center for Atmospheric Research
Countries/Regions: California, United States
Dates: September 2007
Budget: US\$526,640

Incorporating Economics into Water Planning in the Middle East

SEI is working with academic partners to link an economic optimization model developed in GAMS for a key region of the Middle East to a WEAP application of the same geography. This project entails making major modifications to WEAP, which will allow the user community to join in developing new functionality for the WEAP software.

Client: Frank Fisher, Massachusetts Institute of Technology
Staff: David Purkey, Jack Sieber, Eric Kemp Benedict
Partners: Annette Huber
Countries/Regions: Palestine, Jordan, Israel
Start Date: August 2009
Budget: US\$64,200

Integrating Uncertainty into Water Resources Planning in California

As part of continued collaboration with the El Dorado Irrigation District initiated under the NOAA project, SEI is working with partners to implement a planning process leading to the development of a legislatively mandated Urban Water Management Plan that takes consideration of uncertainties facing EID. In addition to considering climate and socio-economic uncertainty, SEI will integrate changing risks of catastrophic wildfire on watershed hydrology into the EID WEAP application.

Client: California Energy Commission
Staff: Purkey, Mehta
Partner: RAND Corporation, El Dorado Irrigation District
Countries/Regions: California
Start Date: August 2009
Overall Budget: US\$75,000

Climate Change and Urban Water Management around Lake Victoria

SEI is developing WEAP models of the urban water utilities in three cities surrounding Lake Victoria. These models will be used to assess the potential impacts of climate change on available water supplies and water demands in these utilities in order to assess impacts to system performance and to define appropriate adaptation measures that will allow these utilities to offer an adequate level of potable water service provision to their residents.

Client: UN Habitat
Staff: Purkey, Mehta
Partner: Alliance to Save Energy, Lawrence Berkeley National Labs, Climate XL, ReSolve
Countries/Regions: Kenya, Uganda, Tanzania
Start Date: September 2009
Overall Budget: US\$52,100

Linking Hydrological Models to Ecosystem Databases

Ecological data is often dispersed between numerous databases using different formats. The University of California, Berkeley developed a database standard for such environmental data, called the DataCube. SEI is working with partners at Berkeley to test strategies for linking modeling tools like WEAP to the DataCube in the context of an application to a critical coastal watershed in California, San Gregorio Creek.

Client: University of California, Berkeley
Staff: Purkey, Mehta, Bedig
Partner: Lawrence Berkeley National Labs
Countries/Regions: California, United States
Start Date: September 2009
Budget: US\$57,240

Representing Complex Environmental Regulations in Integrated Water Resources Planning

The Sacramento-San Joaquin Delta in California is an important Pacific Coast estuary in North America and is also a central feature of California's water management systems. Competing objectives between ecosystem preservation and water management have placed this estuary in peril, leading to complex environmental regulations to govern fresh water exports from the Delta. Working with the major urban water utility, SEI has modified WEAP to examine these complex state based ecosystem regulations for use in planning for the water supply future in Southern California.

Client: Metropolitan Water District of Southern California
Staff: Purkey, Joyce, Sieber
Partners: CDM, Inc., RAND Corporation
Countries/Regions: California, United States
Start Date: July 2009
Budget: US\$36,328

Managing Water Systems to Prevent Expansion of Invasive Species under Climate Change

SEI is working to develop a WEAP application of the Upper Green River in Wyoming that will investigate water management routines that can prevent the expansion of invasive species.

Client: U.S. Environmental Protection Agency
Staff: David Purkey, Monique Mikhail
Partners: Colorado State University
Countries/Regions: Wyoming, United States
Start Date: February 2009
Budget: US\$100,000

Delivering Climate Change Information via Google Earth

Using the Google Earth technology as a platform, SEI has develop a series of tools that can be used to present and provide climate change related information to stakeholders and decision-makers. These tools have been linked to the weADAPT initiative being managed at SEI-Oxford and are also able to present information from WEAP models about alternative futures in Google Earth. Case study testing of the new technologies has been carried out in California and Kenya.

Clients: GOOGLE.ORG and the California Energy Commission
Staff: Purkey, Mehta, SEI-Oxford
Countries/Regions: California, United States, Kenya
Start Date: October 2008
Overall Budget: US\$327,625

6 Selected Recent Funders and Partners

Abu Dhabi Environment Agency

California Department of Water Resources

California Energy Commission

Friends of the Earth

German Federal Institute for Geosciences and Natural Resources (BGR)

Metropolitan Water District of Southern California

National Oceanic and Atmospheric Administration (NOAA)

New York State Energy Research and Development Authority (NYSERDA)

Oregon Department of Environmental Quality

U.S. Environmental Protection Agency (US EPA)

United Nations Development Programme (UNDP)

United States Bureau of Reclamation

World Bank

World Resources Institute (WRI)

7 Publications

Scientific Articles

Ackerman, F., Stanton E., Kartha S., (2009) Inside the Integrated Assessment Models: Four Issues in Climate Economics *Climate and Development*, vol. 1 no. 2, 166-184.

Ackerman, F., DeCanio, S., Howarth, R., Sheeran, K. (2009) Limitations of Integrated Assessment Models of Climate Change, *Climatic Change*, vol. 95 no. 3-4, 297-315.

Ackerman F., Stanton, E., Hope, C., Alberth, S. (2009) Did the Stern Review Underestimate U.S. and Global Climate Damages? *Energy Policy*, vol. 37, 2717-2721.

Ackerman F., Gallagher, K., (2008) Looks Can Be Deceiving: Measuring the Benefits of Trade Liberalization *International Journal of Political Economy* (2008) vol. 37, no. 1, 50-77.

Baer, P., **Kartha, S.**, Athanasiou, T., **Kemp-Benedict, E.** (2009) The Greenhouse Development Rights Framework: Drawing attention to inequality within nations in the global climate policy debate”, *Development and Change*, Annual Forum, in press.

Blute, N., J. Jay, **C. Swartz**, D. Brabander, H. Hemond (2009). Aqueous and solid phase arsenic speciation in the sediments of a contaminated wetland and riverbed. *Applied Geochemistry*. 24: 346-358.

Dougherty, W., Kartha, S., Rajan, C., **Lazarus, M.**, Bailie, A., Runkle, B., **Fencl, A.** (2009). Greenhouse gas reduction benefits and costs of a large-scale transition to hydrogen in the USA. *Energy Policy*, 37 (1) (2009), pp. 56–67.

Kartha S., Athanasiou T., Baer P., **Kemp-Benedict E.** (2009) The Greenhouse Development Rights Framework, *Climate and Development* 1(2009) 147-165.

Kemp-Benedict, Eric. (2009) Converting qualitative assessments to quantitative assumptions: Bayes’ rule and the pundit’s wager. *Technological Forecasting and Social Change*, doi:10.1016/j.techfore.2009.06.008.

Mehta, V.K., **Purkey, D.**, Viers, J.H., Yates, D. Modeling the hydrology of climate change in the California’s Sierra Nevada for sub-watershed scale adaptation. *Journal of the American Water Resources Association*. (in press)

Mosepele, K, P. Moyle, G. Merron, **D. Purkey**, B. Mosepele (2009) Fish, floods, and ecosystem engineers: aquatic conservation in the Okavango Delta, Botswana. *Bioscience*. 59(1):53-64

Yates, D., **Purkey D., Sieber J.**, Huber-Lee A., Galbraith H., West J., Herrod-Julius, S., Young, C., Joyce B., Rayej M. (2009). Climate driven water resources model of the Sacramento Basin, California. *Journal of Water Resources Planning and Management*, 135(5):303-313.

Yates, D., H. Galbraith, **D. Purkey**, A. Huber-Lee, **J. Sieber**, J. West, S. Herrod-Julius and B. Joyce. (2008) Climate warming, water storage, and Chinook salmon in California's Sacramento Valley. *Climatic Change*. 91, pp 335-350.

Young, C., Escobar-Arias, M.I., Fernandes, M., Joyce, B., Kiparsky, M., Mount, J.F., Walker, B., Barrett S., Polasky, S., Galaz, V., Folke, C., Engström, G., **Ackerman, F.**, Arrow, K., Carpenter, S., Chopra, K., Daily, G., Ehrlich, P., Hughes, T., Kautsky, N. Levin, S., Mäler, K., Shogren, J., Vincent, J., Xepapadeas, T. de Zeeuw A. (2009) Policy Forum Environment: Looming Global-Scale Failures and Missing Institutions, *Science* 11 September 2009: Vol. 325. no. 5946, pp. 1345 – 1346

Young, C., M. Escobar-Arias, M. Fernandes, B. Joyce, M. Kiparsky, J. Mount, V. **Mehta, D. Purkey**, J. Viers, D. Yates. (2009) Modeling the hydrology of climate change in the California's Sierra Nevada for sub-watershed scale adaptation. *Journal of the American Water Resources Association*. (publication scheduled for Dec. 2009)

Books and Book Chapters

Kollmuss, A., Lazarus M., Lee C., Polycarp, C. (2009) *Handbook of Carbon Offset Programs; Principles & Practice*. Earthscan publication forthcoming.

Lazarus, M., Polycarp, C., (2009) *International Mechanisms for GHG Mitigation Finance and Investment*, China Economics of Climate Change Initiative. Lead author. (2009) Earthscan publication forthcoming.

Kartha, S., Baer, P., Athanasiou T. (2009) *Environmental Justice: Safeguarding a Right To Development in the Global Climate Regime*. Chapter in *Der Klimawandel in den Sozialwissenschaften (Climate Change – The Perspective of Social Sciences*, edited by Martin Voss. (Wiesbaden: VS Verlag)

Articles, Reports and Working Papers

Ackerman F., (2009) [Review of Nicholas Stern's Blueprint for a Safer Planet](#), *Nature Reports: Climate Change* (on-line journal), April 2009.

Ackerman F., Stanton, E., (2009) Climate and Development Economics: Balancing Science, Politics, and Equity. SEI Working Paper

Ackerman, F. (2009) Carbon Embedded in China's Trade, SEI Working Paper

Ackerman, F., Stanton, E., Bueno, R. (2009) [Fat Tails, Exponents, and Extreme Uncertainty: Simulating Catastrophe in DICE](#), SEI Working Paper

Athanasidou, T., **Kartha, S.**, Baer, P., **Kemp-Benedict, E.** (2009). Canada's Fair Share in a Climate Constrained World An analysis of Canada's climate obligations, in the context of the pre-Copenhagen search for a viable global climate accord, and as informed by the Greenhouse Development Rights approach. A report in collaboration with Christian Aid and Trocaire.

Athanasidou, T., **Kartha, S.**, Baer, P., **Kemp-Benedict, E.** (2009). The Netherlands' role in a climate constrained world: A Greenhouse Development Rights analysis of the Netherlands' climate obligations, in the context of the EU's proposed 2020 targets and approach to effort-sharing. A report in collaboration with ICCO (Interchurch Organization for Development Cooperation).

Erickson, P., Heaps C., Lazarus M., (2009) Greenhouse Gas Mitigation in Developing Countries: Promising Options in China, Mexico, India, Brazil, South Africa, and South Korea. SEI Working Paper.

Erickson, P., Lazarus M., Kelly A., (2009) How Realistic Are Expectations for the Role of Greenhouse Gas Offsets in U.S. Climate Policy? An Examination of Offset Supply Analyses. World Resources Institute Working Paper. WRI, Washington D.C.

Hammerschlag, R.V., S. Archibald, J. Chapman, B. Balick, J. Schaufelberger, D. Martynowych, J.R. Fulton, S. Harrington, J. Kavanagh, E. Davis, R. Johnston (2009). *Climate Action Plan*. Seattle, Washington: University of Washington.

Heaps, C. (2009) *A Deep Carbon Reduction Scenario for China*. Paper presented at the Mid-term Review Meeting of the China Economics of Climate Change Initiative. A version of this paper will also be included in a forthcoming book (Earthscan – no title yet).

Heaps, C.; Erickson, P.; Kemp-Benedict, E.; Kartha, S. *Europe's Share of the Climate Challenge: An Assessment of Domestic Actions and International Obligations to Protect the Planet*. Forthcoming SEI Report.

Joyce, B., V. Mehta, D. Purkey, L. Dale, and M. Hanemann (2009) Climate change impacts on water supply and agricultural water management in California's western San Joaquin Valley, and potential adaptation strategies. White paper for the California Climate Change Center. Publication #CEC-500-2009-051-F.

Joyce, B., W. Wallender, and T. Ginn (2009) Modeling the Transport of Spray-Applied Pesticides from Fields with Vegetative Cover. Transactions of the ASABE. Vol 51(6): 1963-1976.

Kartha, S., Athanasidou, T., Baer, P., (2009). *A critique of the EC Communication 'Towards a comprehensive climate change agreement in Copenhagen'*, background paper for the Copenhagen Civil Society meeting sponsored by the Government of Denmark.

Kartha S., Athanasidou T., Baer P., **Kemp-Benedict E.** (2009) A Greenhouse Development Rights analysis of Denmark's role in a climate constrained world, (in the context of the EU's proposed 2020 targets and approach to effort-sharing), a report in collaboration with Danish Church Aid.

Kartha S., Athanasiou T., Baer P., **Kemp-Benedict E.** (2009) Finland's role in a climate constrained world: An analysis of Finland's climate obligations, in the context of the EU's proposed 2020 targets and effort-sharing strategy, and as informed by the Greenhouse Development Rights approach. A report in collaboration with Finnish Church Aid.

Kartha, S. (2009) Greenhouse Development Rights, *Tiempo: a bulletin on climate and development* (70) 12-17.

Kollmuss, A., Lazarus M., Lee C., Polycarp, C. (2009) Update of A Review of Offset Programs: Trading Systems, Funds, Protocols, Standards and Retailers. Research Report, Stockholm Environment Institute.

Kollmuss, A., Myers Crimmins, A. (2009) Carbon Offsetting & Air Travel Part 2: Non-CO₂ Emissions Calculations. SEI Working Paper

Koppen, B. van; S. Smits, P. Moriarty, F. Penning de Vries, **M. Mikhail**, E. Boelee. (2009) Climbing the Water Ladder: Multiple-Use Water Services for Poverty Reduction. International Water and Sanitation Centre and International Water Management Institute. The Hague, The Netherlands. (TP series; no. 52). 213 p.

Koppen, B. van; Smits, S.; Moriarty, P.; Penning de Vries, F; **Mikhail, M.**; Boelee, E. (2009). Climbing the Water Ladder: Multiple-use water services for poverty reduction. The Hague, The Netherlands, IRC International Water and Sanitation Centre and International Water Management Institute. (TP series; no. 52). 213 p.

Lazarus, M., Lee, C., Smith, G., Todd, K., Weitz, M. (2009). Road-testing of Selected Offset Protocols and Standards; A Comparison of Offset Protocols: Landfills, Manure, and Afforestation/Reforestation. SEI Working Paper

Mikhail, M. and Yoder, R. (2008). Multiple Use Water Service Implementation in Nepal and India: Experience and Lessons for Scale-up. Lakewood, CO, USA, International Development Enterprises (IDE), Challenge Program on Water and Food (CPWF), and International Water Management Institute (IWMI). 318 p.

Mikhail, M., Yoder R. (2008) Multiple Use Water Service Implementation in Nepal and India: Experience and Lessons for Scale-up. International Development Enterprises(IDE), Challenge Program on Water and Food (CPWF), and International Water Management Institute (IWMI). Lakewood, CO, USA. 318 p.

Stanton E., Ackerman F., Sheeran, K. (2009) [Greenhouse Gases and the American Lifestyle: Understanding Interstate Differences in Emissions](#), report commissioned by Ecotrust and the E3 Network

Stanton, E. (2009) Greenhouse Gases and Human Well-Being: China in a Global Perspective. SEI Working Paper

Stanton, E. (2009) [Negishi Welfare Weights: The Mathematics of Global Inequality](#), SEI Working Paper



Stockholm Environment Institute – U.S. Center

Email: info@sei-us.org

Main Office (Massachusetts)

11 Curtis Avenue
Somerville, MA 02144-1224
Tel: +1 (617) 627-3786

California Office

133 D Street, Suite F
Davis, CA 95616, USA
Tel: +1 (530) 753-3035

Seattle Office

Suite 205, 4556 University Way NE
Seattle, WA 98105
Tel: +1 (206) 547 4000