

11/12/08

# SEI U.S. CENTER

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ANNUAL REPORT  
2008

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## 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 Thailand, the UK, Estonia, and the USA.

SEI's U.S. Center currently has a staff of 25. 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 160 countries worldwide.

## **1.1 Personnel**

In 2008 the U.S. Center has continued its rapid expansion. Starting with 12 staff at its inception in 2006, the Center has now grown to 25. US center staff as of late 2008 are as follows (with main program affiliations):

### **Climate & Energy**

Frank Ackerman  
Ramón Bueno  
Victoria Clark  
Bill Dougherty  
Pete Erickson  
Amanda Fencf  
Roel Hammerschlag  
Cornelia Herzfeld  
Charles Heaps  
Anja Kollmuss  
Sivan Kartha  
Michael Lazarus  
Carrie Lee  
Flavia Resende  
Liz Stanton  
Adam Knoff (intern)  
Allison Myers (intern)  
Clifford Polycarp (intern)

### **Future Sustainability**

Tariq Banuri  
Eric Kemp-Benedict

**Sustainable Water & Sanitation**

David Purkey  
Charles Young  
Brian Joyce  
Vishal Mehta  
Jack Sieber  
Christopher Swartz  
Marisa Escobar

**Administrators**

Kim Shaknis  
Linda Rhines

## 2 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 this challenge through research, policy assessment, and capacity building.

We work on six major themes:

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

### 2.1 Greenhouse Development Rights (GDRs)

The Greenhouse Development Rights Framework, devised by SEI and Ecoequity, offers solutions to the climate crisis while supporting development in the South.

The framework report, titled **The Right to Development in a Climate Constrained World**, is authored by Sivan Kartha, director of SEI's Climate and Energy Program and Paul Baer and Tom Athanasiou of EcoEquity, supported by Christian Aid, the Heinrich-Böll Foundation 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. And it draws the necessary conclusions: those who are wealthier and have produced higher levels of emissions must take on the bulk



of the costs of a global “emergency program” of mitigation and adaptation.

## **GDR Analyses for Sweden and Europe**

SEI has allocated IPS funding to support the Greenhouse Development Rights work. The main outputs have been a report called “Sweden’s Leadership in a Climate Constrained World: An analysis for Sweden of the Greenhouse Development Rights framework” that was the basis of a high-level seminar in the Swedish Parliament, and a report “A Call for Leadership: A Greenhouse Development Rights analysis of the EU’s proposed 2020 targets” that is being used as the basis of campaigns in several EU member states.

**Funder:** SEI IPS core funds  
**Budget:** \$65,000 (2008-2009)  
**Staff:** Sivan Kartha, Eric Kemp-Benedict

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## **Climate Equity analysis**

The analysis underlying the Greenhouse Development Rights framework has been significantly updated this year. The main change has been the shift from a static (one-year) analysis of national responsibility and capacity to a dynamic analysis based on the World Energy Outlook 2007 global scenario. The other major change has been the development of a much more accessible and user friendly online calculator, which we are intending to release in time for the Posnan COP

**Funder:** SEI-US internal core funds  
**Budget:** \$15,000 (2008)  
**Staff:** Eric Kemp-Benedict, Sivan Kartha

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## **Climate for Development**

The Sida Climate for Development initiative has provided support for further development of the Greenhouse Development Rights work. Several publications this year were supported, including a paper submitted to the Harvard University Project on International Climate Agreements Research Paper Competition, a chapter in a book edited by Jonathan Harris and Neva Goodwin, a chapter of a book edited by Martin Vos, and paper for the inaugural issue of Climate and Development.

**Funder:** Sida  
**Budget:** \$80,000 (2007-2009)  
**Staff:** Sivan Kartha, Eric Kemp-Benedict, Roel Hammerschlag



## 2.2 Climate Economics

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

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### Climate Change: The Costs of Inaction in Florida

We worked with Synapse Energy Economics to analyze the expected monetary and environmental costs for Florida of business-as-usual carbon emissions and economic growth through the end of this century. The report "Florida and Climate Change: The Costs of Inaction" estimates that costs in just four areas – tourism losses, hurricane damages, effects of sea-level rise on coastal residential property, and increased electricity costs – could reach 5 percent of gross state product by 2100.

**Funder:** Environmental Defense Fund  
**Budget:** \$70,000  
**Staff:** Elizabeth A. Stanton, Frank Ackerman, Synapse Energy Economics  
**URL:** [http://www.sei-us.org/climate-and-energy/Florida\\_Inaction\\_Cost.html](http://www.sei-us.org/climate-and-energy/Florida_Inaction_Cost.html)

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### Climate Change: The Costs of Inaction for the US

We worked with Synapse Energy Economics and Chris Hope (at the University of Cambridge) to analyze the costs of business-as-usual emissions for the US. The report "The Cost of Climate Change: What We'll Pay if Global Warming Continues Unchecked" includes critiques of the conventional economic models that estimate only minimal damages as well as of the Stern Review's PAGE2002 model estimates for the US. It also includes an analysis of storm damages, sea-level rise, changes in energy costs, and the linked crises of water supply and agriculture in the western part of the country.

**Funder:** Natural Resources Defense Council  
**Budget:** \$88,000  
**Staff:** Frank Ackerman, Elizabeth A. Stanton  
**Partners:** Chris Hope and Stephane Alberthe, of Cambridge



University; Synapse Energy Economics

**URL:** [http://www.sei-us.org/climate-and-energy/US\\_Inaction\\_Cost.htm](http://www.sei-us.org/climate-and-energy/US_Inaction_Cost.htm)

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### Climate Change: The Costs of Inaction in the Caribbean Region

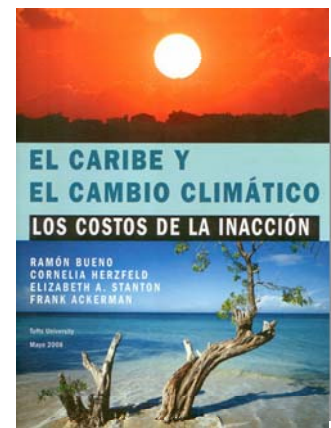
We analyzed the costs of business-as-usual emissions for the Caribbean region, updating and expanding on the World Bank's older analysis of part of the region. The costs of three major categories of business-as-usual climate damages would entirely overwhelm many of the vulnerable island economies of the Caribbean.

**Funder:** Environmental Defense Fund

**Budget:** \$25,000

**Staff:** Ramón Bueno, Cornelia Herzfeld, Elizabeth A. Stanton, Frank Ackerman

**URL:** [http://www.sei-us.org/climate-and-energy/Caribbean\\_Inaction\\_Cost.htm](http://www.sei-us.org/climate-and-energy/Caribbean_Inaction_Cost.htm)



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### Impacts of Greenhouse Gas Reduction Measures on Oil Production and Revenues

As part of the project “Assessment of Climate Change Impacts in the UAE”, we reviewed the effects of climate policies in developed countries on oil markets. The project reviewed existing models of world oil markets and economic analyses of the effects of oil prices on demand. Using a model developed by Robert Kaufmann (Boston University) for the European Central Bank, the project estimated the impacts on oil markets of several different price scenarios, finding serious impacts on OPEC revenues only at the highest prices. Finally, a speculative long-term projection examined the implications of differing discount rates for optimal oil extraction schedules, demonstrating that lower discount rates make slower production schedules more attractive.

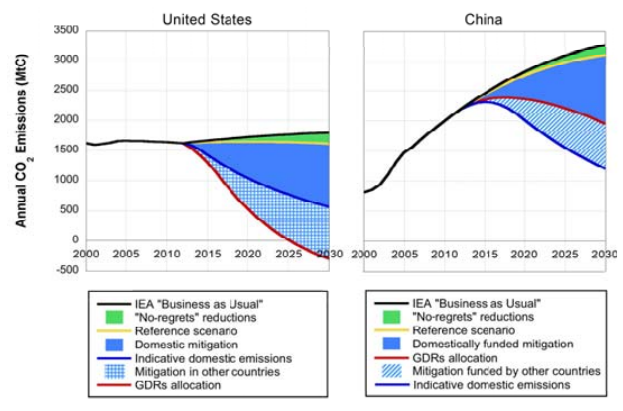
**Funder:** Abu Dhabi Environment Agency

**Budget:** \$80,000

**Staff:** Frank Ackerman; Jordan Winkler and Robert Kaufmann (Boston University)

## China: Economics of Climate Change

Within this larger project, the research is focused on providing a basis for a burden-sharing framework for allocation effort for achieving a low-carbon economy in China. This research provides an overview of the various burden-sharing frameworks that have been tabled. It also provides a further examination of the Chinese case, using the Greenhouse Development Rights framework. This includes a more disaggregated analysis for China at that draws on available sub-national data to clarify the burden-sharing implications of a GDR approach at the province level, especially given the considerable differences in wealth between provinces.



**Funder:** GTZ, DEFRA, Sida (via SEI-Stockholm)

**Budget:** \$50,000

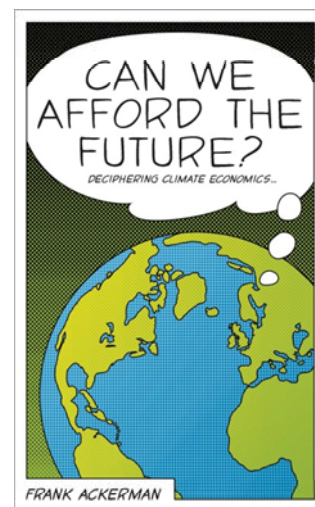
**Staff:** Sivan Kartha, Eric Kemp-Benedict

## Can We Afford the Future? Economics for a Warming World

With support from both SEI and the Global Development and Environment Institute at Tufts University (GDAE), Frank Ackerman has written the first in a new series of short, popular books on economic policy, to be published by Zed Books in London. "Can We Afford the Future? Economics for a Warming World" is a popular explanation of the economics of climate change aimed at a lay audience. It covers recent debates about climate economics, including the views of neoclassical modelers and the debate surrounding the Stern Review. It also proposes a new and better way of thinking about the economic dimension of climate change, rebutting arguments against prompt, vigorous action to mitigate climate change.

**Funder:** GDAE and US Center core funding.

**Budget:** \$36,000



**Staff:** Frank Ackerman  
**URL:** <http://tinyurl.com/5z3svu> (Amazon order page)

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### **The Shadow Price of Carbon**

We have analyzed the "shadow price" for carbon emissions established by the UK's Department for Environment Food and Rural Affairs (DEFRA). The report addresses logical, technical, and ethical issues to show that the DEFRA methodology is flawed, and the resulting shadow price is too low (as well as resting on inconsistent foundations).

**Funder:** Friends of the Earth – England, Wales and Northern Ireland  
**Budget:** \$9,800  
**Staff:** Elizabeth A. Stanton, Frank Ackerman  
**URL:** <http://www.sei-us.org/climate-and-energy/DEFRA.html>

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### **Understanding Consumer Surplus: Analysis of a Possible Expansion of Heathrow Airport**

We have analyzed the decision of the UK Department for Transportation (DfT) to expand Heathrow Airport, a decision that was based on DfT's forecasts of the costs and benefits of the expansion. The use of the technical concept of consumer surplus threatens to conceal the underlying reality: DfT's methodology minimizes concerns about carbon emissions and other environmental impacts.

**Funder:** Friends of the Earth – England, Wales and Northern Ireland  
**Budget:** \$15,000  
**Staff:** Elizabeth A. Stanton, Frank Ackerman  
**URL:** <http://www.sei-us.org/climate-and-energy/Heathrow.html>

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### **A Consumer's Guide to Environmental Protection**

We are 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:** Frank Ackerman, Elizabeth A. Stanton, Ramón Bueno  
**Partners:** Suzanne Shaw (UCS)



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### Climate and Development Model

We are building a new integrated assessment model for climate and development choices. The model rests on a fundamental reframing of the joint climate/development problem; it incorporates the best features of existing climate models, combined with recent advances in climate science and the economics of uncertainty, and brings global equity into the picture, eliminating the technical obstacle that prevents many climate models from “seeing” the development problem. We have developed a schematic description of the principal model relationships, and will, by December, have completed a simplified “proof of concept” version of the model in Excel.

**Funder:** SEI (Nova and US Center core funding)  
**Budget:** \$115,000 (2008 only)  
**Staff:** Frank Ackerman, Elizabeth A. Stanton, Ramón Bueno

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### Understanding Equity in Climate Economics Models: Negishi Welfare Weights

Equity between regions of the world, at any moment in time, is intentionally excluded from most climate economics models, as many employ “Negishi welfare weights,” a little-known technical procedure which effectively imposes an assumption that human welfare is more valuable in richer parts of the world. A paper on the equity implications of Negishi weighting is planned for early 2009.

**Funder:** SEI (US center core)  
**Budget:** \$5,353  
**Staff:** Elizabeth A. Stanton

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### China’s Trade Emissions

SEI is analyzing the carbon embedded in China’s trade and will quantify the substantial share of emissions in China that are attributable to exports. China’s large trade surplus would suggest that the carbon embedded in the country’s exports (arguably, the responsibility of China’s trading partners) is much greater than the carbon embedded in imports (emissions which occur elsewhere but are “embedded” in goods consumed in China). Following upon this analysis, SEI is exploring the policy implications of this consumption-based perspective on emissions.

**Funder:** SEI (China Economists 50 Project)  
**Budget:** \$77,700  
**Staff:** Frank Ackerman, Elizabeth A. Stanton, Flavia Resende

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### **The Socio-Economic Impact of Climate Change in Armenia**

SEI is conducting 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 will conclude with policy recommendations.

**Funder:** United Nations Development Programme (UNDP)  
**Budget:** \$40,000  
**Staff:** Elizabeth A. Stanton, Frank Ackerman, Ramón Bueno, Cornelia Herzfeld, Flavia Resende, Adam Knoff

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### **Distribution of Carbon Emissions by State**

In collaboration with Economists for Equity and Environment (E3), SEI is analyzing 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:** Natural Resources Defense Council  
**Budget:** \$25,000 (SEI budget)  
**Staff:** Frank Ackerman, Elizabeth A. Stanton, Ramón Bueno  
**Partners:** Kristen Sheeran (at E3)

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### **WHO Environmental Policy**

Frank Ackerman prepared a draft document for WHO's European region, on economic analysis of health and environmental policies, highlighting the role of alternatives to cost-benefit analysis, and made a related presentation at a WHO/Europe meeting in Madrid. The document will form the basis for deliberation on new priorities in economic analysis for the member states' health and environment ministries in 2009.

**Funder:** WHO  
**Budget:** \$12,000  
**Staff:** Frank Ackerman

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**G24 Carbon markets/carbon taxes**

Frank Ackerman drafted a paper on the role of carbon markets and carbon taxes in climate and development policies, and presented it at a meeting of the G24 group of developing countries in Geneva. The paper will be published by the G24 in 2009.

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

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**WESS Background Paper**

SEI has been 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 will be one of the background papers used to produce UNDESA's annual World Economic and Social Survey (WESS); the 2009 WESS will focus on climate and development.

**Funder:** UNDESA  
**Budget:** \$8,000  
**Staff:** Elizabeth A. Stanton, Frank Ackerman, Flavia Resende, Adam Knoff



## 2.3 US State and Local Climate Action

SEI-US provides analytical support and facilitation to numerous State and Local stakeholder processes (Arizona, New Mexico, North Carolina, Minnesota, Montana, New Jersey, Pennsylvania, Rhode Island, the Puget Sound area, South Carolina, Maryland, Michigan, and Virginia) that are developing comprehensive and innovative strategies to reverse GHG emissions growth in the U.S.

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### Cost Curve Development for New York State

We are providing technical assistance to New York for the development of a GHG mitigation cost curve for the electric supply sector. The analysis involves a review of 50 supply side mitigation options and will be used in future energy planning activities in the state.

**Funder:** New York State Energy Research Development Agency  
**Budget:** US\$65,000  
**Staff:** Bill Dougherty, Victoria Clark

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### State and Regional Climate Change Advisory Group Processes

We are continuing to provide analytical support and facilitation to numerous state and local stakeholder processes to develop comprehensive and innovative strategies to reverse GHG emissions growth in the U.S. These processes are typically launched by the Governors of the states. The aim is to construct a state climate action plan which will be followed-up by legislative action.

**Funder:** Various Foundations  
**Budget:** \$800,000  
**Partners:** Center for Climate Strategies (CCS)  
**Staff:** Bill Dougherty, Michael Lazarus, Sivan Kartha, Charlie Heaps, Amanda Fencel, Carrie Lee, Victoria Clark  
**Clients:** U.S. State Governments (Arizona, New Mexico, North Carolina, Minnesota, Montana, New Jersey, Pennsylvania, the Puget Sound area, South Carolina, Maryland, Michigan, Vermont and Virginia)  
**URLs:** [www.azclimatechange.us](http://www.azclimatechange.us), [www.mtclimatechange.us](http://www.mtclimatechange.us), [www.nmclimatechange.us](http://www.nmclimatechange.us),  
[www.ncclimatechange.us](http://www.ncclimatechange.us), [www.vtclimatechange.us](http://www.vtclimatechange.us)

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### **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 design of the most comprehensive cap-and-trade program designed in the US to date, covering 90% of the region's emissions.

**Funders:** Various U.S. State Governments and supporting foundations  
**Budget:** \$95,000  
**Staff:** Michael Lazarus and Carrie Lee  
**URL:** [www.westernclimateinitiative.org](http://www.westernclimateinitiative.org)

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### **Washington State Climate Action Team**

Michael Lazarus is the lead technical facilitator for the Washington State Climate Action Team that works on developing comprehensive and innovative strategies in Washington State to meet the Governor's GHG emissions reduction target. After developing an action plan in 2008, we supported the Climate Action Team in developing specific implementation plans and legislative language ranging from ambitious building energy codes to product stewardship requirements.

**Funder:** Washington State Governments and Various Foundations  
**Budget:** \$65,000.  
**Staff:** Michael Lazarus, Carrie Lee and Roel Hammerschlag  
**URL:** [www.ecy.wa.gov/climatechange/cat\\_overview.htm](http://www.ecy.wa.gov/climatechange/cat_overview.htm)

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### **Seattle Climate Action Plan**

We are providing strategic and technical support for the City of Seattle Office of Sustainability in their ongoing development of Seattle's path-breaking Climate Action Plan. We have quantified GHG reduction potentials from over fifty GHG policy proposals, and summarized these in graphical form. We are currently working on a calculator allowing the Office to test the combined effects of multiple policies enacted together.

**Funder:** City of Seattle Office of Sustainability  
**Budget:** \$25,000  
**Staff:** Roel Hammerschlag, Michael Lazarus  
**URL:** [www.seattle.gov/climate](http://www.seattle.gov/climate)

## 2.4 Carbon Trading and Offsets

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### 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 150 page report on review and assessment of current domestic and international offset programs, and will be providing a website and regular updates going forward. We also produced a memo on “Maximizing the Positive: Interactions between Offset Programs and Other Climate-related Policies in the U.S.”, which we intend to develop into a published paper in 2009.

**Funder:** U.S. EPA  
**Budget:** \$180,000  
**Staff:** Michael Lazarus, Sivan Kartha, Anja Kollmuss, and Carrie Lee

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### Technical Advisory Services to New York/ New Jersey Port Authority

We provide 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  
**Budget:** \$3000 (2008)  
**Staff:** Michael Lazarus, Anja Kollmuss  
**Partner:** Gordon Smith

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### Evaluation of Alternative Policy Approaches to Achieving GHG Mitigation in the Agricultural and Forestry Sectors

We are evaluating the various US policy options for achieving emissions reductions and removals from agricultural and forestry activities in the context of an overall ambitious climate mitigation framework. We produced a preliminary report recommending which option -- offsets, set asides, cap inclusion, incentives, and/or regulations – might provide greatest effectiveness, efficiency, equity, and feasibility.

**Funder:** U.S. EPA  
**Staff:** Carrie Lee and Michael Lazarus

## 2.5 Capacity Building & Software Development

COMMEND (COMMunity for ENergy environment & Development) is a major SEI-led international initiative designed to foster a community among energy analysts working on energy for sustainable development. A premise of COMMEND is that institutional and human capacity for energy and environmental analysis is in acutely short supply, and that Southern analysts are isolated from their colleagues in other institutions and from sources of institutional support in both the North and South. In short, there is a pressing need for initiatives that can professionalize sustainable energy analysis in the South and increase its role in decision-making.

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### COMMEND

With funding from the SEI IPS program, we have been continuing to manage and develop the online COMMEND community for Southern energy analysts. This community continues to grow very rapidly and now numbers over 4500 members in 168 countries.

Major developments in 2008 have included a significant upgrade to the COMMEND site transforming it from a primarily static information portal into a social networking tool that facilitates engagement and networking among its members. The site has also been translated into different languages including Spanish, Portuguese and Chinese with more translations under way. In late 2008, the site will be further upgraded so it can serve as a gateway for providing developing country analysts with national level energy and climate mitigation data sets for use in LEAP. Also through COMMEND, SEI has also continued to run a series of training workshops for countries using SEI's LEAP modeling system. This year workshops have been conducted in Argentina, Estonia, South Africa, Thailand, Denmark, and Germany.



**Funder:** Internal (SEI IPS Knowledge Network)  
**Budget:** US\$63,000  
**Staff:** Charlie Heaps

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### **Emissions from the Six Largest Developing Countries**

With funding from the U.S. Environmental Protection Agency, we have been working with Stratus Consulting to analyze emissions from the six largest developing countries (Brazil, India, China, South Africa, Korea, and Mexico). The core of this assignment is to identify and characterize a suite of strategies that possess a reasonable likelihood of success in spurring significant GHG emissions reductions over the next two decades. All of the countries targeted by this effort have a track record of implementing energy and environmental policies that have already yielded sizeable GHG emissions reductions, from Brazil's path-breaking ethanol program to China's ambitious energy efficiency policies. At the same time, major new initiatives are needed across all countries to effectively address the climate change challenge. The project includes the application of SEI's LEAP system to develop baseline and mitigation scenarios for each country as well as assessments of the opportunities and barriers for mitigation in each country.

**Funder :** U.S. EPA  
**Budget:** US\$ 65,000  
**Staff:** Charlie Heaps, Michael Lazarus, Pete Erickson

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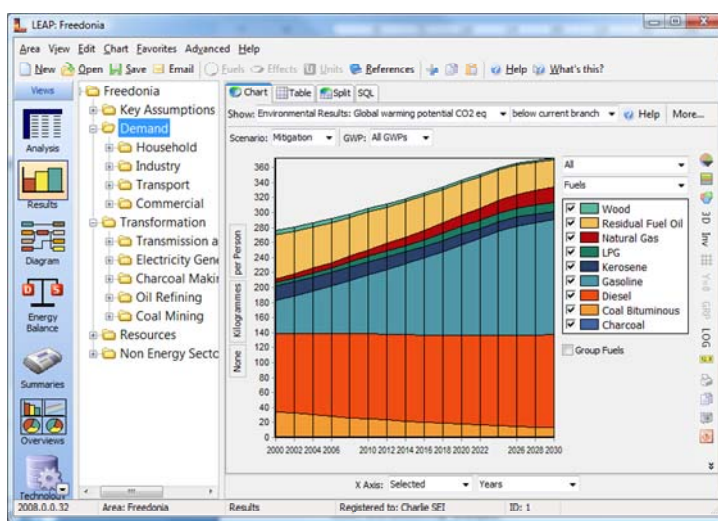
### **UNFCCC Mitigation Module**

For the UNFCCC, we have prepared a new handbook on conducting GHG mitigation assessments that will be distributed to all developing country parties to the UNFCCC. This "mitigation module" has been developed to assist non-Annex I (NAI) Parties and is intended to provide the reader with an overview of mitigation in the context of climate change, sustainable development, and the framework of the UNFCCC. The module is one of four that will ultimately comprise a complete Resource Guide for non-Annex I Parties. The handbook includes a brief overview of the science of climate change, a review of the concepts, structure and steps involved in a mitigation assessment, and a review of the most important modeling tools for mitigation in both the energy and non-energy sector sectors.

**Funder:** UNFCCC  
**Budget:** US\$5000  
**Staff:** Charlie Heaps, Anja Kollmuss

## LEAP

In 2008 we have continued to develop and update its LEAP modeling system. LEAP is rapidly becoming a worldwide standard for conducting integrated energy policy and climate mitigation analysis at the national level. 2008 also saw the release of a major new version of LEAP. Changes focused on extending the methodological capabilities of LEAP without adding complexity for existing users, while at the same time improving the overall usability of the system. The new version features improved methodologies for examining the



transportation and electric generation sectors, new capabilities for examining inter-regional trade in fuels, new approaches for examining the costs and benefits of alternative energy policies, and new capabilities for calculating and allowing users to visualize indicators of energy policies across scenarios and regions. The new version also includes important improvements to the interface that make it much easier to use. Examples of these improvements include new a “code completion” feature that helps users to quickly create models by automatically popping up lists of valid variables and a new “check as you type” feature that automatically displays errors in models in real-time as the user types. Other major improvements include a new Application Programming Interface (API) that allows LEAP to work as a set of standard programmable objects, making it possible for LEAP to be integrated with and controlled by other models. Another new option quickly adds standard IPCC emission factors throughout a data set, greatly easing the development of GHG emissions analyses. The new version also includes additional language translations including Greek, Thai, and Indonesian.

**Funders:** Multiple  
**Budget:** \$50,000  
**Staff:** Charlie Heaps

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### **Technology Needs Assessment Handbook**

We are assisting the UNDP in developing the 2<sup>nd</sup> edition of the Technology Needs Assessment Handbook, a resource being used by developing countries in their assessment of technology transfer needs relative to mitigation and adaptation to climate change.

**Funder:** United Nations Development Programme (UNDP)

**Budget:** US\$30,000

**Staff:** Bill Dougherty, Amanda FencI, Victoria Clark

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### **User guide for Investment and Financial Flows**

We are assisting the UNDP in developing the initial edition of a user guide for the analysis of investment and financial flows, a resource for developing countries in their cost assessments for mitigation and adaptation to climate change.

**Funder:** United Nations Development Programme (UNDP)

**Budget:** US\$30,000

**Staff:** Bill Dougherty, Amanda FencI, Victoria Clark

## 2.6 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.

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### National-level Climate Change Adaptation Action Plans

We are providing technical assistance to Yemen, Ghana, and Bolivia to identify climate change adaptation strategies that can be integrated into national policy. The research has focused on the vulnerability of agriculture, water resources, and public health.

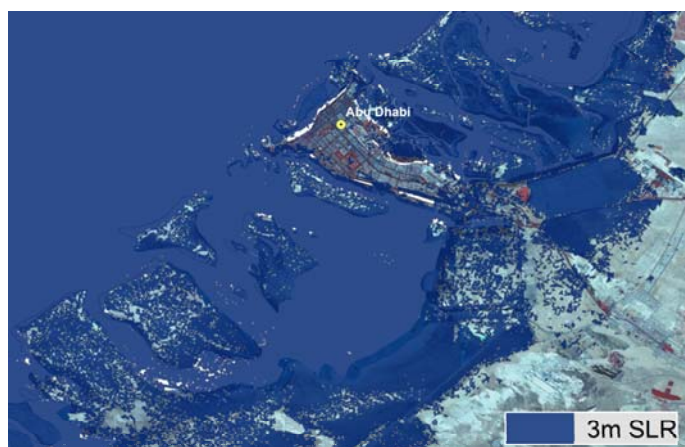
**Funder:** Various Foundations  
**Budget:** US\$110,000  
**Partner:** Center for Climate Strategies (CCS)  
**Staff:** Bill Dougherty, Amanda Fencl, Chris Swartz, Eric Kemp-Benedict



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### **Vulnerability to Climate Change in the Abu Dhabi Emirate**

We are conducting a vulnerability assessment of coastal zones, water resources, and dry-land ecosystems in the Abu Dhabi Emirate. Results are being introduced into policy discussions for adaptive management strategies. The figure on the right shows a base projection calculated by SEI of what 3m sea level rise will imply for Abu Dhabi. This could occur as soon as 2050 depending on glacial melt forecasts.



**Funder:** Environment Agency of Abu Dhabi

**Budget:** US\$196,000

**Staff:** Bill Dougherty, Amanda Fencel, Chris Swartz, David Yates, Victoria Clark

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### **Climate Change Adaptation Sourcebook**

We have developed a sourcebook of methodological guidelines, analytical tools, case studies, and other topics to assist UNEP project managers to incorporate climate risk assessment into their project development strategies.

**Funder:** United Nations Environment Programme (UNEP)

**Budget:** US\$15,000

**Staff:** Bill Dougherty, Amanda Fencel

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### **Climate Adaptation Plan for Ghana**

We assisted the Ghana EPA and the Ghana Climate Focal Point to develop a plan for climate change adaptation and mitigation. The plan seeks to make Ghana's Poverty Reduction Strategy more robust by incorporating climate change impacts. SEI provided training on planning techniques, including a novel approach to multi-sector planning that was developed by SEI and Ghana EPA staff and published in a peer-reviewed journal.

**Funder:** Netherlands Climate Assistance Programme  
**Budget:** US\$61,550  
**Staff:** Eric Kemp-Benedict, Bill Dougherty, Amanda FencI

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### **Afghanistan Climate Change Adaptation Action Plans**

We are providing technical assistance to the UK Department for International Development to assess their Afghanistan development assistance portfolio to ensure that proposed project activities properly address climate change risks to agriculture and water resource management.

**Funder:** UK Department for International Development  
**Budget:** US\$25,000  
**Staff:** Bill Dougherty, Amanda FencI



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### **Adaptation Project Formulation for Sudan**

We are assisting the Sudanese Higher Council for Environment and Natural Resources in developing projects implementation strategies for the highest priority adaptation project identified in the NAPA report.

The project focuses on agriculture and water resources, with public health as a cross-cutting sector.



**Funder:** United Nations Development Programme (UNDP)  
**Budget:** US\$50,000  
**Staff:** Bill Dougherty, Amanda FencI

## 2.7 Climate Mitigation Assessments

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### Clipore

We are undertaking research on several aspects of Mistra's Climate Policy Research Programme, which is a wide ranging research initiative including researchers Resources for the Future, Teri, Cicero, IVL, and the Universities of Linkoping, Goteborg, and Uppsala. Our effort is focused on (1) the interplay between climate and development, (2) adaptation funding, (3) bioresources, (4) the output legitimacy of climate policy-making. This year, efforts were focused on task (1) and included preparing a background paper on the implications of the Bali COP's agreement on "monitorable, reportable, and verifiable" support for mitigation in developing countries. This was the basis of our presentation at a high-level seminar hosted by the European Climate Platform in Madrid, and presentation at the UNFCCC intercessional in Bonn.

**Funder:** Mistra (Climate Policy Research Program)  
**Budget:** US\$100,000 (2007-2010)  
**Staff:** Sivan Kartha, Eric Kemp-Benedict

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### Bhutan Greenhouse Gas Inventory

We are providing training and technical assistance to Bhutan for their national GHG inventory as part of the UNFCCC Second National Communication Process.

**Funder:** United Nations Development Programme (UNDP)  
**Budget:** US\$23,000  
**Staff:** Bill Dougherty, Amanda Fencel

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### Sudan Second National Communications

We are providing training and technical assistance to Sudan for their national vulnerability and GHG mitigation assessments as part of their UNFCCC Second National Communication.

**Funder:** United Nations Development Programme (UNDP)  
**Budget:** US\$23,500  
**Staff:** Bill Dougherty, Amanda Fencel, David Yates

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### **SEI Scenarios Project**

This new SEI initiative will develop SEI's scenario analysis capabilities. This initiative is intended to develop an energy and environmental scenario analysis capability within SEI and apply that capability in a collaborative assessment of GHG mitigation that engages developing country policy makers.

The initial focus has been 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. In this regard, we are now putting the finishing touches to a new system capable of generating both national level and multi-national regional LEAP data sets for energy policy and climate mitigation assessment. These data sets will help overcome some of the most significant barriers to mitigation assessment by making data readily available and by making analyses much less complex to conduct. They will also make the assessments much more comparable, which has been a significant problem for the UNFCCC.

The project is already demonstrating its policy relevance through linkages to many other initiatives both internal to SEI and to the wider community of practitioners working on energy policy and GHG mitigation. Internally our new scenario analysis capabilities are being employed to examine low carbon scenarios for China. Externally, the research conducted here and its products have already been made use of as part of a major study that SEI is conducting for the US EPA to assess mitigation potential in the six largest developing countries.

2009 will see the widespread application of these tools in policy-relevant areas. The new tools will be applied in various applications for examining global, regional and national sustainability trends. We also plan on broadening and deepening the scope of our analytical capabilities to allow new issues to be introduced that go beyond the topics of energy policy and GHG mitigation assessment.

**Funder:** Internal (SEI IPS Scenario)

**Budget:** SEK 500,000

**Staff:** Charlie Heaps

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### **Food, Feed and Fuels**

We collaborated with the Dutch development NGO Hivos to conduct a global survey of knowledge on the impact that biofuels development may have on availability and cost of food and fuels in developing nations. Hivos has released a public version of the resulting report.

**Funder:** Hivos (Netherlands)  
**Budget:** \$35,000  
**Staff:** Roel Hammerschlag and staff from three SEI Centers

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### **Agricultural and Land-Use Modeling**

We are designing a land-use module as an integrated part of the integrated assessment model currently under development at SEI. The model will be designed and implemented specifically with the intention of illuminating the food security and livelihoods policy discussion. SEI will begin implementing the model in 2009, with the intention of yielding publishable analytical results in the third and fourth quarters of 2009.

**Funder:** Sida (Climate for Development package).  
**Budget:** \$135,000 over 2 years.  
**Staff:** Roel Hammerschlag, Carrie Lee.

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### **Religious Institutions and Environmental Policy Making**

With NOVA funding, we are examining the role of religious institutions in environmental policy making. The project will produce two products: (1) an academic journal article filling knowledge gap in the literature on religious institutions and environmental-social policymaking; and (2) a proposal seeking funding for launch of a coherent and comprehensive SEI strategy on religious institutions and sustainable development. The journal article and proposal are supported by an initial knowledge survey examining both academic and grey literature on the role of religious institutions in sustainability policymaking, designed to identify the knowledge gaps most needing research attention.

**Funder:** SEI (NOVA)  
**Budget:** SEK 250,000  
**Staff:** Roel Hammerschlag, Carrie Lee, Eric Kemp-Benedict, Sivan Kartha, Bill Dougherty and staff from three other SEI Centres.



### 3 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 at SEI-US 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.

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#### Policy Guidance on Forest-Related Trade and Investment and Its Environmental and Social Impacts

We are working closely with the CGIAR Center for International Forestry Research (CIFOR) to develop a multi-scale scenario analysis that links international trade and investment flows with impacts on forests. The approach is expected to be used in future years under further USAID funding. In support of this project, SEI staff led a workshop on scenario quantification at the CIFOR annual meeting in Bogor, Indonesia.

**Funder:** U.S. AID  
**Budget:** US\$80,000  
**Staff:** Eric Kemp-Benedict, Roel Hammerschlag, Carrie Lee, Sivan Kartha, Vishal Mehta, Eva Lindskog, Goran Nilsson Axberg

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#### Great Transition Scenario Consultation

We are working with the Tellus Institute both updating their “Conventional Worlds” global scenario as well as substantially expanding their “Great Transition” global scenario. These scenarios seek to define and explore a truly sustainable path into the future that includes a substantial shift in values.

**Funder:** Tellus Institute  
**Budget:** US\$13,352  
**Staff:** Eric Kemp-Benedict



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**Bayesian Methods for Incorporating Livelihood and Poverty Issues into Development Planning**

This NOVA funded project is pushing forward work pioneered in the CPWF Mekong Basin Focal Project. The goal of the project is to develop new ways to incorporate livelihoods into quantitative planning models, especially water resources planning. The approach uses Bayesian statistical analysis in order to capture the uncertainties and variability that are inherent in socio-ecological systems.

**Funder:** NOVA

**Budget:** US\$25,158

**Staff:** Eric Kemp-Benedict, Chayanis Krittasudthacheewa, Sukaina Bharwani, Neela Matin

## 4 Sustainable Water and Sanitation

The second full year of operation for the Water Resources Group within the independent U.S. Center of the Stockholm Environment Institute, 2008, was marked by continued growth and strengthening of the of the group.

To further build cohesion within the group, the staff all participates in weekly staff teleconferences. The US Water Group also tried to expand contact and collaboration with Water Program partners in other centers during 2008. SEI-US staff continues to work on two projects being managed out of other centers, both of which involve the use of WEAP. Both the GLOWA Jordan Project managed out of Stockholm and the *Mekong Basin Focal Project managed out* the Asia Center are using SEI-US staff to provide technical assistance for critical WEAP application development. A major collaboration with SEI staff from the Oxford Office was also undertaken in 2008, leading to a grant from Google.org to develop a climate change adaptation decision support system based on the Google Earth technology. We have also worked with the Water Group in Stockholm to support the use of WEAP as a teaching tool at Stockholm University and the Swedish Technical University.



### WEAP in the Middle East and North Africa (MENA): Linking WEAP to MODFLOW

In order to help promote integrated water resources planning in the MENA region, SEI is working closely with the Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD, based in Damascus) and the German Federal Institute for Geosciences and Natural Resources (BGR) to build capacity in the use of WEAP. In addition, in order to better address the issues in the arid regions of MENA, particularly those of groundwater, WEAP has been enhanced to dynamically link to MODFLOW, a finite difference groundwater modeling system. We are currently discussing further capacity building activities and WEAP enhancements for a new phase that would begin April 2008.

**Funder:** German Federal Institute for Geosciences and Natural Resources (BGR)  
**Budget:** US\$62,000  
**Staff:** Jack Sieber, Chuck Young

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### Supporting Long-Term Water Management Negotiations in the Klamath River Basin

SEI is providing support to settlement negotiations related to dam removal and long-term water allocation on the Klamath River. The goal is to allow the Yurok Tribe and its partners to simulate water management scenarios in a computer model of the hydrology of the upper Klamath Basin in order to understand the implications of potential settlement terms. SEI is providing technical assistance to evaluate settlement strategies that consider: (1) possible changes in reservoir inflow associated with the acquisition of certain water rights and their conversion to stream flows; (2) physical alteration of project reservoirs; (3) volumetric limitations of the water made available to farmers in the Klamath Irrigation Project; (4) tradeoffs between the allocation of water between competing environmental objectives; and (5) possible changes in reservoir inflows associated with climate change. The settlement negotiations have the potential to bring stability to one of the most protracted water management struggles in the American West.

**Funder:** The Yurok Tribe  
**Partners:** The Klamath Tribes  
**Budget:** US\$20,000  
**Staff:** David Purkey, Brian Joyce, Marisa Escobar

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### Modeling Riparian Vegetation Establishment along the Sacramento River in California

Operation of water management structures such as dams and diversions often negatively impact downstream geomorphologic and vegetation growth processes. This occurs due to the reduction in peak flows and sudden changes in river stage that often result from dam and diversion operations. Riparian vegetation, which serves as wildlife habitat and a source of food and fuel for human communities, has difficulty in propagating due to these changes in the stream hydrograph. To study this problem, SEI has teamed with the U.S. Bureau of Reclamation to develop a detailed model of riparian vegetation establishment. The model considers the physical processes of plant growth in combination with a physically based accounting for soil moisture and atmospheric conditions, which allows for an accurate estimation of seedling survival under various river management scenarios. The model is currently being calibrated for cottonwood trees on the Sacramento River in California through field work and a greenhouse study at the University of California at Davis.

**Funder:** U. S. Bureau of Reclamation  
**Partners:** University of California, Davis, WRIME, Inc.  
**Staff:** Chuck Young  
**Budget:** US\$126,000

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### **Netherlands Climate Assistance Project - Yemen Country Support**

Water resources are critically vulnerable to climate change impacts in the arid nation of Yemen, and identifying adaptation strategies to meet these challenges will be key to developing sustainable livelihoods and addressing poverty in the country. Three distinct geographic/socio-economic case study areas have been selected for stakeholder consultation and analysis and integrated modeling of water resource vulnerability, potential adaptation strategies, and resilience. For each of the case study areas, WEAP was used to develop scenarios that investigate the feasibility and impact of adaptation strategies that have been identified and prioritized by stakeholders via a multi-criteria analysis methodological tool developed by William Dougherty.

**Funder:** ETC Foundation  
**Staff:** Chris Swartz  
**Partners:** Water & Environment Centre, Sana'a University  
**Budget:** US\$49,000

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### **Water Poverty Modeling in the Mekong River Basin**

This study assesses the current biophysical and socio-economic conditions of water use within the Mekong basin, focusing on water productivity and water poverty dimensions. Analyses will identify opportunities and risks of change in water management that will influence water poverty, with an emphasis on integrating across local to basin-wide scales. These analyses will utilize WEAP to integrate domestic, agricultural, and aquacultural water use and availability information at a basin-scale to inform development of scenarios outlined in the Basin Development Plan. Bayesian Belief Networks serve as the core of an innovative methodology to aid in determining likely livelihood impacts of proposed opportunities to increase water productivity in the basin. These impacts are measured in terms of changes to the five classes of livelihood asset profiles as defined under the Sustainable Livelihoods Framework. The study will attempt to implement a linked analytical framework incorporating the Bayesian Network, WEAP model, and the Knowledge Elicitation Tool (KnETs) to develop a robust decision support methodology for elucidating impacts and responses under a variety of water-centered livelihood strategies.

**Funder:** Challenge Program on Water and Food  
**Staff:** Eric Kemp-Benedict, Chris Swartz  
**Partners:** SEI Asia, CSIRO  
**Budget:** US\$48,800

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### **Climate Change in the Sierra Nevada Mountains: Implications for the Management of Hydropower Facilities and Aquatic Ecosystems**

The Sierra Nevada Mountain Range is the water tower of California. The accumulation of snow during the winter months, and the progressive melting of that snow during the late spring and early summer, provides a supply of water to which water management systems in California have been finely tuned. This includes a large number of hydropower facilities which provide a significant amount of power during the hot dry summer but which create many problems for the managers of aquatic ecosystems within the zone of water storage, diversion, and release associated with hydropower production. The expectation in California is that climate change will result in a significant reduction in the amount of snow accumulating in the Sierra Nevada. This project is using a WEAP application of the entire Sierra Nevada Range to investigate how best to balance hydropower production and ecosystem management on an eco-regional basis in the face of climate change.

**Funder:** The Resource Legacy Fund Foundation  
**Staff:** David Purkey, Brian Joyce, Chuck Young, Marisa Escobar  
**Partners:** University of California, Davis, Watercourse Engineering, Inc.  
**Budget:** US\$200,000

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### **Sharpening Drought Plans for Climate Change**

SEI has established collaboration with the El Dorado Irrigation District, a water purveyor on the western slope of the Sierra Nevada Mountains, 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, as well as other long-term actions being contemplated by the district.

**Funder:** National Oceanic and Atmospheric Administration  
**Staff:** David Purkey  
**Partners:** University of California, Berkeley, National Center for Atmospheric Research  
**Budget:** US\$170,000

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### **Preventing Loss of Ecosystem Services Provided by Chinook Salmon 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 of Monterey Bay. Based on hydrologic and climatic conditions, individual streams accommodated genetically different salmon populations, or runs. The enormous amount of hydrologic manipulation in California over the course of over a century has led to the decline of several of these runs, none more so than the Spring Run. Spring run salmon return from the ocean in March and April when the rivers are high and the water cold. They then swim up to deep pools where they hold over the hot Summer months before they spawn when the water cools in October or November. The extent of the spring run in California has been reduced to only a few streams, and these are at grave risk due to climate change. This project will use a WEAP application linked to a model of salmon life cycles to investigate what management options are open to manage spring run Chinook salmon and what the implications for the total ecosystem would be if this pinnacle species is lost.

**Funder:** U.S. EPA  
**Staff:** David Purkey, Marisa Escobar  
**Partners:** University of California, Davis  
**Budget:** US\$220,000

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### **Decision Support for Water Resource Policy in South Africa**

The Department of Water Affairs and Forestry (DWAF) is responsible for the formulation and implementation of water policy and for supervising the provision of water services in South Africa. DWAF recently set about reviewing decision support tools to replace the antiquated and poorly understood simulation models that they currently use to conduct assessments of their managed water resources systems. SEI's WEAP system was selected by DWAF as one of eight models in contention for replacing their current systems. In support of DWAF's efforts to understand and appreciate the full capabilities of the WEAP system, SEI developed an application for a South African watershed and demonstrated the model's utility by performing a sample analysis typical of DWAF water planning studies. This case study was presented to an expert panel at a model-review workshop in Pretoria in May 2008.

**Funder:** SEI (IPS)  
**Staff:** David Purkey, Brian Joyce, Jack Sieber  
**Budget:** US\$23,000

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### Updating the California Water Plan

The **California Water Plan** provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California's water future. The Plan, which is updated every five years, presents basic data and information on California's water resources including water supply evaluations and assessments of agricultural, urban, and environmental water uses to quantify the gap between water supplies and uses. The Plan also identifies and evaluates existing and proposed statewide demand management and water supply augmentation programs and projects to address the State's water needs. To support DWR in this effort, SEI is developing an application of the WEAP model that will be used as the analytical foundation for the California Water Plan Update process. This application will be used to conduct integrated scenarios analysis, wherein various management strategies are assessed within the context of a range of uncertainty relating to future trends in water demand and climate.

**Funder:** California Department of Water Resources  
**Staff:** Brian Joyce, David Purkey, Vishal Mehta, Jack Sieber, David Yates  
**Partners:** RAND Corp., Montgomery-Watson-Harza Eng.  
**Budget:** US\$169,000

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### Agricultural Adaptation Strategies for Climate Change in 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. Included in the assessment are reports on mitigation and adaptation strategies that may combat the anticipated negative effects of climate change. The Stockholm Environment Institute was invited to participate in the most recent assessment, in 2008, and 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 WEAP to assess how changes in climate may impact water supply reliability for irrigated agriculture, which represents the largest water user in the state. Since initial investigations suggested that climate change will make it increasingly difficult to meet agricultural water demands, this work was extended to consider how agricultural management practices could change in response to changing water supplies such that water shortages were minimized.

**Funder:** California Energy Commission  
**Staff:** Brian Joyce, David Purkey, Vishal Mehta  
**Budget:** US\$40,000



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### **Riparian Habitat Establishment in the Sacramento River System**

SEI is working with the U.S. Bureau of Reclamation to develop a numerical model of riparian vegetation establishment. The model will be used to study the effects of reservoir operations on the establishment and survival of riparian vegetation in order to develop operations scenarios that support healthy riparian forests. In addition to model development SEI has been funded to manage a detailed field experiment to investigate cottonwood seedling growth. The experiment was conducted in collaboration with University of California at Davis researchers. The resulting data from the experiment will be used to parameterize the Riparian Habitat Establishment Model.

**Funder:** U.S. Bureau of Reclamation  
**Staff:** Chuck Young  
**Budget:** US\$336,550

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### **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.

**Funder:** U.S. Bureau of Reclamation  
**Staff:** Chuck Young, Brian Joyce  
**Budget:** US\$263,000

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### **Development of a Strategic Vision of SEI Activity in Latin America**

Water program staff members at SEI-US are investigating opportunities for collaborative research in the water sector in Latin America. This effort entails research and interviews with regional experts to determine where the SEI skill set will be most applicable in addressing the challenges faced by the water sector. In order to build on existing networks, the focus of this effort is on Columbia, Peru, and Brazil. The output from this effort will be a white paper detailing water sector challenges, key institutions, and a network of contacts.

**Funder:** SEI (US Center Core)  
**Staff:** Chuck Young, Marisa Escobar  
**Budget:** US\$15,000

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### **Holistic Water Resources Management in Massachusetts**

In making investment decisions about water supply development and wastewater management, towns in Massachusetts typically 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 were internalized then perhaps towns would make water management decisions with less impact on the environment. SEI made some modifications to WEAP that allow for this sort of more holistic analysis and has tested the upgrade through a WEAP application in the Town of Sharon. The Commonwealth of Massachusetts will now promote WEAP to other towns in order to encourage this sort of planning.

**Funder:** Massachusetts Department of Fish and Game, Riverways Program  
**Staff:** Brain Joyce, Jack Sieber  
**Partners:** Tufts University, MCubed, Inc.  
**Budget:** US\$100,000

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### Adapting to the Loss of Glaciers in the Peruvian Andes

This project focuses on assessing potential changes in the watersheds of the Andes Mountains in Peru associated with the loss of glaciers due to climate change. An effort is underway to develop a module within the Water Evaluation and Planning system that represents the evolution of glaciers under different future climate scenarios. This module will be used to develop WEAP applications of three Peruvian watersheds: the Santa; the Rimac; and the Mantaro. These applications will be run using climate scenarios developed for the region to investigate the water management implications of the loss of glaciers and possible water management adaptations.

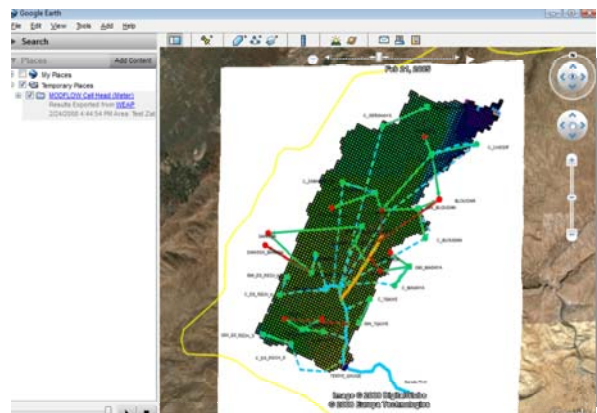
**Funder:** World Bank  
**Staff:** David Purkey, Marisa Escobar  
**Partners:** IRD-France  
**Budget:** US\$46,000

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### Google Earth applications in support of Climate Change Adaptation

With a grant from the Google foundation and support from the California Energy Commission (CEC), this project will apply Google Earth and related technologies to create a software platform on climate change adaptation. This project is a major collaboration between SEI-US and SEI-Oxford. The expected outcome is a suite of technology tools that will be linked within the Google Earth and SEI's weADAPT framework and applied in two regions – California and Kenya. Staff in the US will be creating the WEAP-Google Earth interface and developing a local adaptation study for the El Dorado Irrigation District.

**Funder:** Google.org; California Energy Commission  
**Budget:** US\$321,825 (Total SEI-US and SEI-Oxford)  
**Staff:** Jack Sieber, Vishal Mehta, Dylan Beaudette



## **5 Selected Recent Funders and Partners**

Abu Dhabi Environment Agency

Asia Pacific Energy Research Centre (APEREC), Tokyo, Japan

California Department of Water Resources

California Energy Commission

Center for Climate Strategies

Center for European Integration Studies (ZEF), University of Bonn

Challenge Program on Water and Food

City of Seattle Office of Sustainability

Council for Scientific and Industrial Research (CSIR) South Africa

Environment Agency of Abu Dhabi

Environmental Defense Fund

ETC Foundation

Friends of the Earth – England, Wales and Northern Ireland

Fundacion Bariloche, Argentina

Global Network on Energy for Sustainable Development (GNESD)

G24: Intergovernmental Group of Twenty-Four on International Monetary Affairs and Development

German Federal Institute for Geosciences and Natural Resources (BGR)

Hivos, Netherlands

International Energy Agency (IEA), Paris, France

The Joint Graduate School of Energy and Environment (JGSEE), Bangkok, Thailand

National Oceanic and Atmospheric Administration

Natural Resources Defense Council

Netherlands Climate Assistance Programme

New York State Energy Research Development Agency

Organización Latinoamericana de Energía (OLADE), Quito, Ecuador

Royal Technical University (KTH), Stockholm, Sweden

Sida (Climate for Development)

Tellus Institute

The Resource Legacy Fund Foundation

The Yurok Tribe

University of Cape Town, South Africa

U.S. Agency for International Development (U.S.AID)

U.S. Bureau of Reclamation

U.S. Environmental Protection Agency (U.S. EPA)

UK Department for International Development

Union of Concerned Scientists

United Nations Department of Economic and Social Affairs (UNDESA)

United Nations Development Programme (UNDP)

United Nations Environment Programme (UNEP)

United Nations Framework Convention on Climate Change (UNFCCC)

Various U.S. State Governments (Arizona, New Mexico, North Carolina, Minnesota, Montana, New Jersey, Pennsylvania, Rhode Island, the Puget Sound area, South Carolina, Maryland, Michigan, and Virginia)

The World Health Organization (WHO)

The World Bank

## 6 Publications

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### Articles in Peer-reviewed Journals

**Ackerman, F.** (2008). "Climate Economics in Four Easy Pieces." *Development*, volume 51, no. 3, pp. 325-331.

**Ackerman, F.** (2008). "Hot, It's Not: Reflections on *Cool It!* by Lomborg, B." *Climatic Change*, volume 89, pp 435-446.

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

**Ackerman F.,** Johncheck, W. (2008) "Mad Cows and Computer Models: The US Response to BSE," *New Solutions* vol. 18 no. 2, 2008, 145-156.

**Ackerman, F. and Stanton, E.,** (2008) "Can Climate Change Save Lives? A comment on 'Economy-wide estimates of the implications of climate change: Human health.'" *Ecological Economics*, volume 66, pp. 8-13.

**Dougherty, W., Kartha, S.,** Rajanb, C., **Lazarus, M.,** Bailie, A., Runkle, B., **Fencf, A.** (2008). "Greenhouse gas reduction benefits and costs of a large-scale transition to hydrogen in the USA." *Energy Policy*, (Article in Press, Corrected Proof). [doi:10.1016/j.enpol.2008.06.039](https://doi.org/10.1016/j.enpol.2008.06.039).

Sawyer, A.M., Pasternack, G.B., Merz, J.E., **Escobar, M.I.,** Senter, A.E. (2008). "Construction constraints on geomorphic-unit rehabilitation on regulated gravel-bed rivers." *River Research and Applications*, DOI: 10.1002/rra.1173.

**Joyce, B.A.** W.W. Wallender, and T.R. Ginn. (2009) *Modeling the Transport of Spray-Applied Pesticides from Fields with Vegetative Cover*. Transactions of the American Society of Agricultural Engineers. in press.

**Kartha, S.,** Kjellen, B., Baer, P., and Athanasiou, T., (2008). "The Bali Roadmap and North-South Cooperation: the Right to Development in a Climate Constrained World". *Review of European Energy Markets*, in press.

Baer, P., Fieldman, G., **Kartha, S.** and Athanasiou, T., (2008). "Towards an equitable framework for global climate policy: 'Greenhouse Development Rights'". *Cambridge Review of International Affairs*, in press.

**Kemp-Benedict, E.,** and Agyemang-Bonsu, W.K., (2008). "The Akropong approach to multi-sector project planning". *Futures* vol. 40, pp. 834-840.

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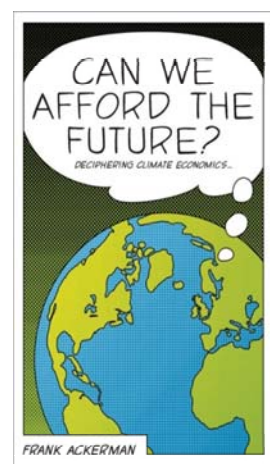
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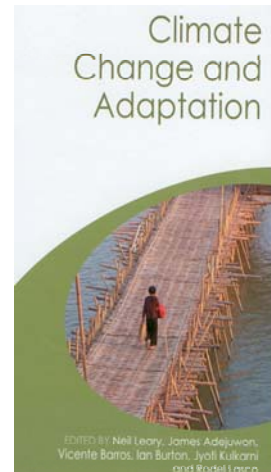
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