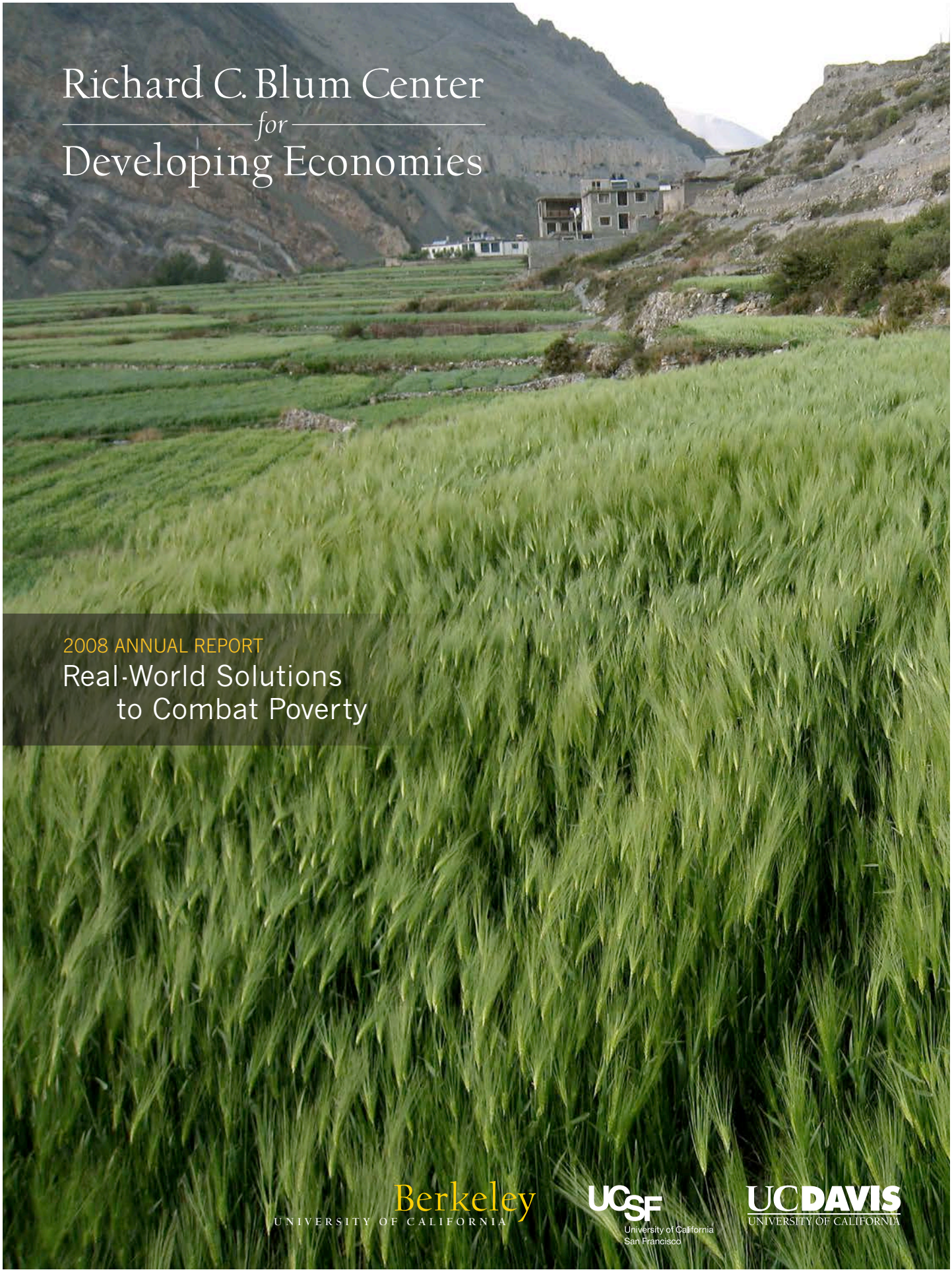

Richard C. Blum Center *for* Developing Economies

2008 ANNUAL REPORT

Real-World Solutions to Combat Poverty

Berkeley
UNIVERSITY OF CALIFORNIA

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University of California
San Francisco

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UNIVERSITY OF CALIFORNIA

Message from Richard C. Blum

At Berkeley, over 1,000 students have been a part of our Center this year, 155 of whom have declared our Global Poverty and Practice Minor, making it the largest minor on campus.

Dear Friends,

As our second year draws to a close, I'm delighted to share good news from the Blum Center for Developing Economies.

Over 1,000 students have participated in our poverty alleviation efforts and worked in 25 countries around the globe. This level of interest shows a lot about today's youth and the historic tradition of service at the University of California.

• Our **Global Poverty and Practice** minor is now the largest minor on the Berkeley campus.

• Classes to understand the key issues of poverty are incredibly popular. After the core course, offerings include *Poverty & Technology, Entrepreneurship to Address Global Poverty,* and *Water & Development.*

Beyond the classroom, we help students translate knowledge into concrete action by participating in fieldwork focused on technology and knowledge transfer.

• Early partners include **Dow Chemical Company**, with a commitment to safe water and sanitation, **Vodafone**, the world's largest mobile telecom network company, and the **Tata Group**, one of India's oldest and largest businesses, with support for students and applied research.

• Innovation initiatives concentrate on safe water and sanitation, wireless technologies and services, and energy efficient technologies for developing countries.

We are grateful to those that help ensure that the innovations identified and supported by the Center lead to lasting change. In particular:

• **The Andrew and Virginia Rudd Family Foundation** recently endowed the first Distinguished Chair in Safe Water and Sanitation at the Blum Center to significantly expand our work in this important area**.**

• **Coleman Fung** established an opportunity fund at the Blum Center to support student-faculty teams working on innovations that address global challenges such as clean water, sanitation and inexpensive energy sources.

Photo: Norbu Tenzing

Founder Richard C. Blum's vision for addressing poverty is practical and engaged, focusing on sustainable solutions for developing economies.

• **Professor Emerius Arthur Rosenfeld** received The Economist magazine's prestigious **Innovation Award in Energy and the Environment**. With Art's guidance and financial support, the Center supports work that addresses the needs of the poor by developing low-cost, energy efficient technologies while protecting the environment.

• **Dr. Steven Chu,** a Blum Center Trustee, was appointed to serve as Secretary of Energy in the Obama Administration.

• Our new directors include **Arun Sarin**, who recently stepped down as CEO of Vodafone, and **Bob Reich**, former Secretary of Labor.

Finally, I'd like to thank everyone reading this report. We are grateful for your support in helping us transform lives and improve conditions in the developing world.

Warm Regards,

Richard C. Blum

THE LARGEST MINOR ON CAMPUS

Global Poverty and Practice Minor

Photo: Eva Wong

Blum Center Education Director Ananya Roy's flagship class, "Global Poverty: Challenges and Hopes in the New Millennium" is incredibly popular every time it is offered.

The Blum Center's minor in Global Poverty and Practice provides students with the knowledge and experiences necessary to take action against global poverty. The minor combines interdisciplinary coursework in the classroom with a "global practice" experience, encouraging students to work with organizations and communities in developing countries.

Interest in the minor has exceeded all expectations. With over 155 students from 30 different majors now participating, it is now the largest minor on campus!

Classroom Learning

"Global Poverty: Challenges and Hopes in the New Millennium," a core GPP minor course taught by award-winning professor Ananya Roy, continues to draw extraordinary numbers of students, attracting 600 students in its Fall 2007 offering, and nearly 700 students in Fall 2008. Many students had to be placed on the waiting list each semester because the room only seats 480! Next year we hope to remedy the situation by moving to the largest classroom on campus with a capacity of 700 students.

Our "Ethics, Methods and Pragmatics of Global Practice" core course will double in size this Spring, providing over 70 students with rigorous preparation for practice experiences in developing countries.

In addition to these core classes, the Blum Center seeded new courses in a wide range of departments to enrich the Global Poverty and Practice Curriculum. These include Entrepreneurship to Address Global Poverty; Water and Development; Poverty and Technology; Cities and Citizenship in South Asia; and Vulnerability and Resilience in Armed Conflicts and Post-Conflict Settings.

Field Work in Developing Regions

Photo: Ian Balam

UC Berkeley student Fermin Reygadas prepares to install a water purification system he helped adapt from a technology developed at Lawrence Berkeley National Laboratory after an unprecedented flood left thousands of houses without safe water in Tabasco, Mexico.

A transformative "practice" or field experience is the signature element of the minor. This global practice allows students to partner with organizations and communities to make a meaningful contribution while having a substantive learning experience. Upon their return to campus, students work with faculty advisors to creatively and critically reflect upon this experience as part of their academic accomplishments.

This year, more than 40 students in the minor completed a field experience. We expect this number to grow dramatically in the coming year. This global practice included working to provide safe water and sanitation solutions in Ecuador and India; facilitating bicycle networks in Rwanda to help coffee growers reach the market; and initiating education efforts to address the health and nutritional issues of women in rural Mexico.

The Blum Center was delighted to provide grants to 22 students to support these experiences. The grants were distributed in a competitive process that took into account both merit and financial need. Some of the students who received grants are profiled in the next section.

To accommodate the rapidly increasing number of students who want to participate in the Minor's global practice field experience, Alexis Bucknam, Director of Student Programs, continued to expand the range of options — establishing agreements and connections with organizations all over the world.

One such partnership is with the Tata Group, one of India's largest private conglomerates. As a result, five Blum Center undergraduate students traveled to India this summer to spend eight weeks working with Tata companies on various social development projects.

Photo: Tata group

Blum Center Tata Fellows (L-R) Shu Shang, Liza Cirolia, Jamal Khan, Pedro Rosado, Annemieke Wilcox

Blum Center 2008 Tata Fellows worked on projects including: Adolescent & Reproductive Health Project, Jamshedpur (Liza Cirolia, Development Studies & Social Welfare and Shu Shang, Molecular and Cell Biology); Sustainable Livelihood through Agricultural Based Interventions, Babrala (Pedro Rosado, Sociology & Political Science, Global Poverty and Practice Minor and Annemieke Wilcox, Peace and Conflict Studies); and Water Code for the Integrated Watershed Management Project, Mithapur (Jamal Khan, Economics & Political Science, Global Poverty and Practice Minor).

Students in the Field

This year, more than 40 students in the minor completed a global practice field experience. For example:

Photo: Chris Rebuck

Zilose Lyons, a fourth year transfer Development Studies major, is a Zambian expatriate and returned last summer to work with an organization that addresses the problem of HIV and AIDS. Through the Center for Infection Disease Research Zambia, she was based in the capital Lusaka, within the Community Education component. Zilose participated in community educational events, hosted a phone-in radio talk show, assisted in the production of HIV educational pamphlets directed towards youth, proposal writing, and the coordination of on-going research studies. Zilose lost a family member to AIDS and hopes this experience will expand her understanding on how information, education and communication can alleviate HIV infection rates, as well as how international development work combines local and global knowledge and practice.

Photo: Chris Rebuck

Greg Elenbaas, a third year student in the Urban Studies major, conducted a research project in Tijuana, Mexico last summer, through an internship with the environmental organization WiLDCOAST/CostaSalvaje. He visited a land squatting settlement to survey the health of its inhabitants and the overall status of infrastructure. Through this project, Greg studied the obstacles hindering development of sanitation, electricity and water reaching these settlements, as well as the effects they have on health. He will use the information gained to write an Honors thesis on strategies to improve the infrastructure of such settlements.

Photo: Caitlin O'Donnell

Caitlin O'Donnell, a fourth year English major, traveled to the West Indies last summer to work with the Women and Development Unit (WAND) in Barbados. During her time in the Caribbean she observed and documented the successes and struggles of the La Ponte Development Committee in St. Lucia. In addition, she worked with youth development and poverty alleviation organizations in Barbados including the YWCA and Barbados Poverty Alleviation Bureau.

Photo: Chris Rebuck

Yutika Vora, a Spring 2008 graduate in Political Economy of Industrial Societies, traveled to Mumbai, India last winter to volunteer with Salaam Balak Trust, which provides educational services to street children. Having volunteered there three years prior, Yutika wanted to see if change had occurred on any level within the community, as well as examine with a discerning eye how the organization itself functions. Most of all, she wanted to participate in programs that most benefited the children, where she could contribute as much as possible. Upon her return she designed a multi-week skill building program for the Trust and attended the inaugural Clinton Global Initiative University in New Orleans to compare notes with students doing similar work.

Innovation Initiatives

Live Climate connects greenhouse gas offset projects in developing countries with individual buyers looking to maximize the impact of their carbon offset purchase. Here, Ugandan farmers receive income from carbon offsets by planting and managing trees.

The Blum Center supports more than 25 faculty and 75 students from nearly 30 departments focused on creating lasting change for the poor. Teams are working to deliver:

Safe Water and Sanitation Solutions in 8 countries: Bangladesh, Bolivia, Cambodia, Ecuador, Guatemala, India, Kenya, and Mexico.

In Mexico, we're testing a new household ultraviolet water treatment system that removes contaminants without impacting taste.

In Bolivia, we're evaluating a low-cost technology for treating drinking water using sunlight to destroy pathogens.

Energy Efficient Technologies throughout Africa, concentrating on Kenya, Tanzania, Zambia and the Darfur Region of Sudan.

In Kenya, we're working to jumpstart global efforts to replace kerosene lighting with low-cost, energy-efficient LED (light-emitting diode) lights.

In Darfur, we developed a cookstove that is four times more efficient than traditional stoves, reducing the time women spend in dangerous journeys outside the camps to collect firewood, while also decreasing smoke inhalation.

Innovative Mobile Services and Technologies in multiple locations throughout Africa and Asia.

In Uganda, we've deployed smartphones to facilitate an innovative voucher-based program for disease treatment

In the Democratic Republic of Congo, we're testing a new device to take high-resolution images of blood cells from patients in rural areas to send via mobile phone to experts for diagnosis

Critical Assistance to Communities in Need

In Jordan, we helped established community-owned micro-clinics to enable people to better manage their diabetes

In Nigeria, we're improving emergency obstetric care facilities to reduce maternal mortality rates

Mobile Services and Technologies for the Poor

Health information management is the biggest part of the output-based aid program, and it needs to be done well. – World Bank Independent Reviewer

The expansion of wireless networks creates a unique opportunity to develop applications and services that help the poor by providing existing services more cheaply and by facilitating new services.

Projects supported by the Blum Center focus on hardware, software, and service delivery business models to extend low-cost connectivity. Once connected, Blum Center researchers work to deliver large-scale, sustainable results. Healthcare is the initial focus (telemedicine applications, mobile phone networks to improve access to health care and "smartphones" to bolster health information systems): finance and education will be next.

Among the projects supported by the Blum Center are Smartphones for Better Health; CellScope for Disease Diagnosis; and Bodas for Life.

Smartphones for Better Health

Dr. Eric Brewer, Electrical Engineering and Computer Science

This project uses the data and communication capacity of mobile phones to support an innovative voucher-based program for disease treatment in East Uganda. In the voucher program, health care providers are reimbursed directly after the patient has received services. This project deploys "smartphones" as a health information platform, with the dual goals of reducing claim processing time and improving communication between the health care providers and the financing program. Our collaborating partners are enthusiastic about expanding the project to other related areas.

Photos: Melissa Ho

***Above**: Smartphones team member Melissa Ho training staff of a rural health clinic to use Claim Mobile, enabling them to enter claims on a Palm Treo and submit them via the GPRS internet connection available through the local mobile phone network.*

***Left**: A newborn baby and her mother in the health clinic where Claim Mobile fieldwork was being conducted. In the expanded HealthyBaby program, patients like these will also receive subsidized pre-natal care and deliveries supported by the Claim Mobile system.*

Mobile Services and Technologies for the Poor

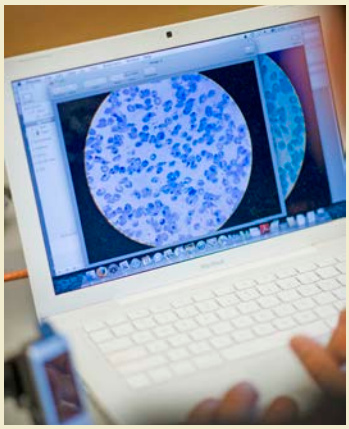
Your device could have a tremendous impact on health care in the developing world.

– Lyn Lusi, founder and director of Heal Africa, located in Goma, DR Congo

CellScope for Disease Diagnosis

Dr. Daniel Fletcher, Bioengineering

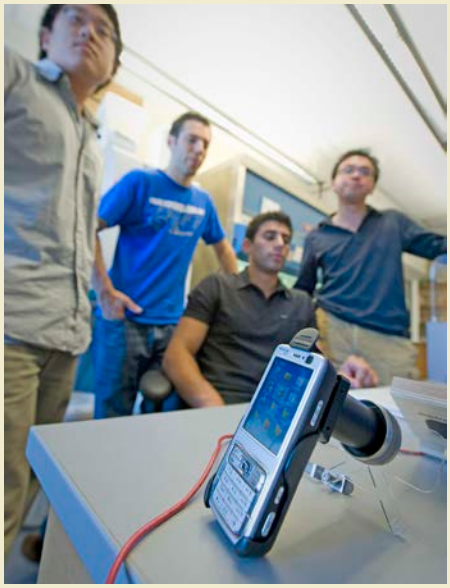
A team of Berkeley experts has developed a modular, high-magnification microscope attachment for cell phones. The innovation will enable health workers in remote areas to take high-resolution images of a patient's blood cells using the mobile phone's camera, and then transmit the photos to experts at medical centers. This device can reduce both the cost and time of performing critical disease diagnoses, as well as provide early warning of outbreaks in poverty-stricken regions in the world.



Microscopy is the gold standard for diagnostics, and this device could make it accessible to everyone.

– Lynda Moore, of Heal Africa and Medecins Sans Frontieres

Malaria in a blood sample can be identified by the dark blue spots in the centers of some blood cells.



Photos: Bart Nsgel

CellScope (in foreground), in development by a team of students in bioengineer Dan Fletcher's lab, would facilitate diagnosing disease through high-quality microscopic images.

Bodas for Life

Dr. Kristiana Raube, Haas School of Business

Mobile phones are a key component of this new service to assist people in remote areas access transportation services in both routine and emergency medical situations, thereby lessening the risk of life-threatening complications and improving long-term health outcomes. Local "boda boda" (motorcycle) drivers equipped with cell phones are trained as first-responders to take appropriate action when medical transportation is needed.

Photo: Amanda Oudin

Bodas for Life driver with first aid kit and passenger.

Safe Water and Sanitation

The small scale of this technology gives us the flexibility to go to many places, and the user acceptance has been amazing. – UC Berkeley student

Fermin Reygadas, lead researcher on the UV Tube Project

Lack of access to safe water and poor sanitation practices are fundamental causes of debilitating disease and death in developing countries. The Blum Center is developing the next generation of effective and affordable point-of-use (POU) water treatment technologies that remove biological and chemical contaminants. Our innovations are specifically designed to respond to the needs of users in developing countries. Our efforts incorporate cross-cutting methodologies — including needs assessments, consumer preference/marketing studies and epidemiological impact assessments — that guide the technology development and business plans necessary to bring the technologies to scale.

In the past year, the Blum Center provided support for innovations in Ultraviolet Tubes; Accelerated SODIS; Q-H2O: Antimicrobial Surfaces; Electrochemical Arsenic Removal (ECAR); and Arsenic Removal Using Bottom Ash (ARUBA); the Shuar Health Project and the Haath Mein Sehat Project.

Ultraviolet Tubes: Water Disinfection for Rural Communities

Dr. Kara Nelson, Civil and Environmental Engineering

This project focuses on the improvement of production techniques of a low-cost ultraviolet (UV) water treatment system, and incorporates rigorous evaluation of its sustained use. The UV Tube combines effective disinfection technology with an attractive user interface, removing contaminants rapidly without impacting water taste. During the first year, 175 test units were installed in homes in Mexico with the initial user response being very positive. Our current focus is to develop strategies for sustainability and scale.

Photo: Fermin Reygadas

Setting up water quality testing procedures.

Accelerated Solar Disinfection (ASODIS)

Dr. Kara Nelson, Civil and Environmental Engineering

Solar disinfection, or SODIS, is a low-cost, point-of-use technology for treating drinking water. Exposing contaminated water to full sunlight in transparent plastic bottles can destroy pathogens and reduce diarrheal diseases. However, the technique has several limitations that negatively impact the effectiveness and adoption rates of SODIS. We are working to evaluate the effectiveness of SODIS additives to inactivate a range of pathogens, and are conducting extensive field trials in communities where conventional SODIS programs are already underway.

Photo: Mike Fisher

School children displaying displaying their SODIS bottles at Escuela Villa Alicia, Chirapaca, La Paz Department, Bolivia

Safe Water and Sanitation

For me personally, traveling to the villages and interacting with the local community, especially with the children, had a big impact. This experience underlined the urgency of the arsenic problem. – UC Berkeley chemistry undergraduate student

Electrochemical Arsenic Removal (ECAR)

Dr. Ashok Gadgil, Lawrence Berkeley National Lab, UC Berkeley Energy & Resources Group

This project focuses on the use of electrochemical processes to remove arsenic from water. Prior research demonstrates that Electrochemical Arsenic Removal (ECAR) can remove high concentrations of arsenic from groundwater using only small amounts of iron and electricity as inputs. ECAR has many advantages: it can be used affordably, rapidly disseminated, easily maintained and produces little waste. Project members are focusing on fine-tuning ECAR while taking into account the economic and technical requirements to function successfully in remote areas.

Photo: Susan Amrose

Team member Kristin Kowolik taking tubewell measurements in a Bangladeshi village near Dhaka.

Photo: Shefah Qazi

Arsenic Removal Using Bottom Ash (ARUBA)

Dr. Ashok Gadgil, Lawrence Berkeley National Lab, UC Berkeley Energy & Resources Group

We are designing a device and process that utilizes bottom ash to quickly, effectively, and inexpensively remove arsenic from drinking water. Our arsenic-removal system prototype (called ARUBA, Arsenic Removal Using Bottom-Ash) is being field-tested in Bangladesh, where we are exploring ways to scale-up production and create a sustainable business plan for a community-scale arsenic removal.

William Babbitt measures the arsenic concentration of a tubewell in Matlab Upazila before interviewing the well owner about the value his family places on clean drinking water.

Safe Water and Sanitation

You need an education program that can partner with the technology to teach topics like safe water storage or hand washing or transmission of disease.

– Emily Kumpel, HMS Project Director, MS/PhD student, Civil and Environmental Engineering

Student-Led Project: Shuar Health

The Shuar are an indigenous nation living in the Ecuadoran Amazon region. Their access to safe water and appropriate sanitation is very limited and is a principal cause of many diseases. Moreover, public health education and knowledge of hygiene practices are minimal. This student-led project empowers the Shuar to improve their health by providing knowledge and expertise.

Photo: Phillip Denny

Cement rain water storage tank built in a roadside community.

Photo: Jazmine Garcia

Latrine inauguration in Etza (roadside community where the first latrine was piloted.) The engineers are explaining the latrine model and the concepts behind it.

Student-Led Project: Haath Mein Sehat ("Health in Your Hands")

This student-led project is working in slum communities in India to promote health education. The team partners with local community groups to train workers to hold health and hygiene workshops in their community centers and schools. UC Berkeley students are also reaching out to local university students in Mumbai who have responded enthusiastically to their project. Together they are working to standardize the education materials and are currently compiling an education kit that can be distributed and used by other organizations. The project includes a monitoring and water quality testing program in order to understand the demand for water treatment technologies.

Photo: Courtesy Justin Shih

In flooded areas of Mumbai, students are working to promote health education.

Energy Efficient Technologies

With the Blum Center's support, we created a unique online marketplace that connects individuals to projects that fight climate change while reducing poverty and protecting ecosystems.

– Matt Evans, MBA student, Haas School of Business, co-creator of Live Climate

Lack of access to safe, affordable energy is one of the greatest challenges in developing countries. Options available for light, heat and cooking can be expensive and often involve considerable negative health and environmental impacts. The Blum Center supports innovative technological solutions to help the poor with their energy needs in a way that is both efficient and environmentally conscious. Projects include: Lumina/LED Lighting; Live Climate; and multiple cookstove projects in Darfur and Tanzania.

Lumina: LED Lighting

Dr. Evan Mills, Lawrence Berkeley National Laboratory
Dr. Arne Jacobson, Humboldt State University

This project is a global effort to replace kerosene lighting with low-cost, energy-efficient LED (light-emitting diode) lights. Compared to electric lighting, kerosene lighting (widely used by the poor) is inefficient, expensive and unhealthy. LED lights are an attractive option, but disparities in quality have disappointed consumers. Our goal is to develop a unified system for product rating and labeling to increase consumer confidence and to enable the reliable quantification of carbon offsets.

Photo: Peter Alstone

Poor households spend up to 30% of their income on fuel for lighting, often low-quality kerosene which adversely affects indoor air quality. The Blum Center supports the development of white light-emitting diodes, which are 500 times more effective in generating light.

Live Climate: Connecting Voluntary Carbon Markets to Community Development

Live Climate — http://www.liveclimate.org — enables individuals to support carbon offset projects that have positive impacts in developing countries. Live Climate supports these projects via an online marketplace where positive "co-benefits" are fully valued by socially and environmentally minded donors who seek to offset their carbon emissions. LiveClimate.org, a direct internet sales channel, connects potential buyers to individual projects by focusing on the people and the story behind each carbon offset. The user interface includes detailed information about the project, community and quantitative and qualitative impacts.

Energy Efficient Technologies

The opportunity to work on this project has changed my life. I have seen the power of a small technical solution to alleviate suffering, and that has set the bar for everything else I will ever do. – Susan Amrose, Team Member, Ph.D. Student, Physics

Darfur Stoves

Dr. Ashok Gadgil, Lawrence Berkeley National Lab,
UC Berkeley Energy & Resources Group

Photo: Garry Tan

This project focuses on the development and distribution of the Berkeley-Darfur Stove (BDS) in the Darfur region of Sudan. The BDS is 75% more fuel-efficient than the traditional 3-stone fire that the refugees use and has the advantage of being able to be assembled in Darfur, creating economic benefit in the region. Other advantages include: its durability in the harsh climate, its relatively low cost (the World Food Programme is currently disseminating a similar stove from Germany that costs almost twice what our stove costs) and its new flat pack design allows stove kits to be more easily transported. Project members are focusing on carbon emissions testing for a future carbon credit program, slight modifications to the stove based on testing results, and development of a large-scale supply chain and NGO partnerships.

Cook Stove Dissemination in Tanzania

Dr. Dan Kammen, Energy and Resources Group

The Tanzania Cook Stove Dissemination Project is developing and testing cost-effective methods to disseminate improved cook stoves – looking at the role of information in household purchasing decisions. The results will be used to increase the diffusion of stoves in Tanzania.

Photo: Niels Tomiijima

Colleague using the KUUTE stove to cook "ugali". Dar es Salaam, Tanzania.

Cook Stove Technology Transfer Methodology: Zambia

Professor Sebastian Teunissen, Haas School of Business

This Haas team is working to: 1) identify a stove design that meets the needs of rural Zambia (initially exploring an adaptation of the Berkeley-Darfur Stove), 2) develop and implement a marketing survey that measures current cooking habits, fuel usage, and willingness to pay, and 3) develop a business plan that outlines a replicable stove manufacturing and distribution process. The resulting benefits include environmental conservation, improved air quality within the home, enhanced nutrition, and reduced time and effort searching for fuel.

Richard C. Blum Center *for* Developing Economies

The University of California, Berkeley
F402 Haas School of Business
Berkeley, CA 94720-1930
510-643-5316
blumcenter@berkeley.edu
http://blumcenter.berkeley.edu/

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UNIVERSITY OF CALIFORNIA

UCSF
University of California
San Francisco

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