World Water Forum College Grant Program
2007 Grant Proposals

College	UC Santa Barbara
Faculty	Dr. Mary Dinh
Project	A Holistic Approach to Education and Technology Transfer and a Plan for Sustainable Regional Expansion of Knowledge by Training Local Experts in the Southern Andes of Peru

Southern California World Water Forum College Grants Grant Proposal:

A Holistic Approach to Education and Technology Transfer and a Plan for Sustainable Regional Expansion of Knowledge by Training Local Experts in the Southern Andes of Peru

A.

College	University of California at Santa Barbara
Address	California NanoSystems Institute, University of California, Santa Barbara
City, State, Zip Code	Santa Barbara, CA 93106-6105
Website	http://www.engineering.ucsb.edu/~ewb-ucsb/index.php
Make Check Payable To:	'EWB at University of California, Santa Barbara' (All of EWB-UCSB funds are administrated via the office of student life at UCSB)

B.

Applicant	
First Time – Local Project	
First Time – Global Project	X- project exists but first time applying for this grant
Existing Project – Local Focus	
Existing Project – Global Focus	

C.

Student Project Manager	Vered Doctori-Blass
Undergraduate or Graduate	Graduate
Department	Donald Bren School of Environmental Science & Management, University of California, Santa Barbara
School Address	Donald Bren Hall, University of California, Santa Barbara Santa Barbara, CA 93106
Telephone	805-893-8485
Mobile Phone	805-284-4298
Email Address	vdoctori@bren.ucsb.edu
Home Address (optional)	5662 Calle Real #490, Goleta, CA 93117

D.

Faculty Project Manager	Mary Dinh
Department	Mechanical Engineering
School Address	Engr II Rm. 2355 UCSB Mechanical Engineering Dept. Santa Barbara, CA 93106
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E. Organizational Background:

Engineers Without Borders at University of California Santa Barbara (EWB-UCSB) is a student chapter of the non-profit 501(c)(3) national humanitarian organization Engineers Without Borders USA (EWB-USA), which is a member of the Engineers Without Borders International network. EWB-USA has over 200 professional and student chapters working on over 170 projects in 41 countries. EWB-USA strives to improve the quality of life for underserved communities through the implementation of environmentally and economically sustainable engineering projects while training internationally responsible students.

EWB-USA student projects include the design, implementation and outreach on projects involving water, waste-water, sanitation, energy and shelter systems. All projects are initiated by, and completed with contributions from the host community, which is trained to operate the systems independently without external assistance. The projects are conducted by groups of students under the supervision of faculty and professional engineering mentors. By involving students in every step of the process, the program maximizes their learning and awareness of the social, economic, environmental, political, ethical, and cultural impacts of the engineering projects.

EWB-USA provides the framework and oversight to assure that all chapter projects meet strict engineering standards and comply with their mission of sustainability in all aspects of the project. EWB-USA is devoted to meeting the United Nations Millennium Development Goals (MGDs) through capacity building, defined as "the building (or strengthening) of human, institutional and infrastructure capacity to help societies develop secure, stable and sustainable economies, governments and other institutions through mentoring, training, education, physical projects, the infusion of financial and other resources, and most importantly, the motivation and inspiration of people to improve their lives" (http://www.ewb-usa.org/).

EWB-UCSB (hereafter referred to as EWB) is a student-operated organization founded in October 2003. Our growing membership is open to all and currently includes about 70 active students, staff from 10 departments on campus and many on and off-campus collaborators for each project including the International Center for Materials Research, Technology Management Program, Rotary clubs, professional mentors, and local businesses. Our chapter has an interdisciplinary approach to problem solving. We make an effort each Fall to recruit students from all departments so that each team will have a multidisciplinary group with backgrounds that include engineering, geography, environmental science, physical sciences and social sciences. We even work with film students who traveled with the Peru team in 2005 and 2007 to document the project so that team members might see their project from someone else's perspective.

EWB creates internationally responsible students and professionals by giving them the opportunity to work on hands-on projects in developing countries. Members learn first-hand about global and local issues. Conferences and workshops further educate and provide networking opportunities for communication across chapters. Each international project is headed by a staff advisor and a project manager with prior EWB or leadership experience. New team members are given a background on prior EWB work, on EWB-USA structure and on our mission and guiding principles. Working with this information and the guidance of past project members and managers the team members initiate and complete all activities related to the project. These activities include finding professional mentors and collaborators for each aspect of the project, acquiring all funding sources, designing technology components, presenting and gaining approval for project activities through EWB-USA, creating and translating all educational and workshop documents, organizing travel and logistics, and developing communication strategies with project communities.

EWB is managed by student volunteers, allowing all donations to go directly to travel, equipment, and project supplies. The chapter's executive committee undertakes chapter

development and creates chapter unity among project groups through general meetings featuring speakers and events. The committee also fosters long-term relationships with collaborators and UCSB departments. Officers within the committee coordinate project fundraising with project teams, work throughout the year to recruit new members and collaborators through outreach and public relations, and oversee the activities of project groups to assure they meet all EWB-USA standards.

To date the chapter has completed a number of local projects and an international project in Thailand constructing school dormitories. The chapter is currently working on international projects related to water quality and quantity, sanitation, biofuels and solar-powered lighting in Peru, Mali, Kenya and Mexico. In recent years, our chapter has received several awards for its efforts in Peru: the *2007 EWB-USA Project of the Year Award*, *the 2006 EWB-USA Sustainable Legacy Award*, and the Thomas P. Waters Foundation Grant in 2006.

Each EWB project adheres to the principles of appropriate technology and sustainable development to shape the approach and technical design. Appropriate technology is described as being small scale, energy efficient, environmentally sound, labor-intensive, controlled by the local community, and simple enough to be maintained by the people using it. Sustainable development requires that resources are maintained while being used and that the project survives after the originators leave. For long-term success, an approach that encourages self-reliance, self-confidence, and responsibility in the community is essential. The water quality slow sand filtration project in the small village of Araypallpa, Peru (2004-Ongoing) is a great example of this approach.

Working within each community, EWB strives for project sustainability by allowing an economic, environmental and social perspective to guide all implementation decisions. The importance of indigenous knowledge is recognized and teams work to nourish a reciprocal transfer of knowledge between EWB and the communities. Using locally available materials enables the community to acquire replacement parts themselves instead of being dependent on EWB for out of country assistance. Community members accompany the team during the purchase of equipment and materials so that they know where to buy and the cost of parts and maintenance. Project teams communicate design options, material needs, required space allocations, and maintenance and operations requirements to the community and solicit feedback before finalizing implementation plans. Communication with the community is maintained throughout the year for continuity between visits. A holistic strategy for education is developed in each community involving education of all members of the community on the technology transfer and best practices for health and sanitation. Committee's are developed within the community structure to serve as experts for the transmittance of knowledge and technologies independently of EWB.

EWB seeks to exemplify sustainability and capacity building in all of our projects. In addition, to seeking sustainability in the designs and materials we choose for implemented technologies, our vision of sustainability involves a broader human perspective. Economic, environmental and social aspects are intimately tied to all engineering and knowledge transfer decisions to assure adaptability within a region. The Peru project is an excellent example of the way EWB works to promote sustainability and positive change for all community members.

F. Project Description:

Introduction

Araypallpa, Peru is a rural community of approximately 300 indigenous subsistence farmers in the Andean highlands of southern Peru, approximately 130 km south of Cuzco, Peru. The town is accessible via a four hour drive on a dirt road from Cuzco. The nearest health outpost is in the town of Colcha, 5 km beyond Araypallpa. The primary language spoken is Quechua. However, all but the oldest community members speak Spanish as well. In August 2003, the community requested the help of EWB to implement sustainable engineering projects that would help to improve health, education, and overall quality of life in Araypallpa.

In 2004 EWB's Peru Project began with an assessment trip to Araypallpa, Peru. At this time, EWB began a relationship with the community with the goal of improving their quality of life. This was approached through the development of an appropriate technology to meet their water quality needs and through the education of the community on proper sanitation and hygiene practices. The Peru project team has made implementation visits to the community, 2-5 weeks in duration, every summer since 2004. In addition, some extended stays and winter visits were conducted for continuity. The team also stays in contact with the community throughout the year via email and calls to liaisons in the nearby city of Cuzco. The EWB approach to communication has led to a continuous and trusting relationship between the community and EWB that facilitates the smooth transfer of technologies and knowledge. Outside of implementation and follow-up visits, EWB maintains communication with Araypallpa throughout the year via liaisons in Cuzco. The following write-up gives a summary of the previous work that EWB has done with the Araypallpiños related to water issues and education. It provides an overview of current and future plans for Araypallpa including a finalization of the technology transfer and the expansion of our communications strategy to a regional approach.

Assessment Trip 2004

EWB first visited the community for an assessment of water quality and sanitation needs in July 2004. By request, a photovoltaic lighting system was placed in the community's school. Household surveys and data from the health outpost showed that intestinal and skin infections were common, especially among children under 5. Likely causes include 1) poor water quality with total coliform counts of 13-18 cfu/100ml in the source water which exceeds the WHO standards for safe drinking water; 2) poor sanitation evidenced by animal waste in the streets and courtyards of houses; 3) a lack of basic hygiene habits such as hand washing with soap. The community lacks electricity and sewage, but each house has a single faucet with running water. Water is supplied via a gravity fed line from two reservoirs connected to spring sources. The town livestock runs freely in the fields and streets causing the abundant animal waste throughout the town, which was determined to be a possible source of water contamination. Industrial waste such as batteries and packaging was also common in the streets and courtyards.

Implementation Trip 2005

Slow sand filtration was chosen as the water purification strategy to use in Araypallpa for a number of reasons. The most essential components of the system—sand and gravel—are abundant and readily available. Gravity flow provides sufficient energy for consistent and effective operation of the system. Operation and maintenance do no require complicated apparatus that are impractical to maintain in a remote location, such as gas cylinders or electronic components. Using the wet-harrowing cleaning method, the filter sand does not need to be replaced. Thus, once the initial construction is completed, the system can be successfully maintained without the need for

additional supplies. That is, there are no consumables associated with the system, such as additional sand or chlorine in the case of chlorination. This reduces the cost of system operation as well as minimizing the risk of intermittent pauses in operation due to a lack of funds or means to obtain the consumables.

In order to assure that the filter would effectively remove bacterial contamination, the team installed a pilot system in the first phase of the project. Water tests were conducted on the pilot filter over the course of two years by EWB members and the community to get a long term record of the functioning of the filter. The Peru team maintained a presence of 2 months in the community for the implementation phase in order to establish a stronger relationship with community members and follow-up on filter operation, monitoring, and maintenance training of the water committee.

Significant levels of initial community involvement and participation are essential in order for ownership and operation of the project to be fully transferred to the community itself. Before beginning the implementation in 2005, the team traveled with representatives from the Araypallpa water committee to a Peruvian village in the jungle where slow sand filtration had been successfully employed to provide clean drinking water. During the visit, EWB members and community members were able to talk to the community and their supporting NGO about the logistics of building and maintaining a water filtration system. They were also able to taste the water and see that slow sand filtration system did not make the water taste bad. This trip allowed Araypallpa's community leaders to conceptualize the filtration project to be implemented in their town. All decisions regarding the filter construction were made jointly between EWB and community leaders. Achieving long-term success for the water filtration project requires a basic understanding of the system's function and it's impact on health. The EWB team recognizes that this understanding must be disseminated to all community member.

Working with EWB throughout the summer, the water committee was eventually able to perform these tasks without assistance. The second group focused on education and assessing the town members' awareness of the project by conducting individual interviews, which prompted the interviewees to describe their knowledge of the project. Household interviews were helpful in reaching those community members not represented at town meetings, and educating people in a less formal manner.

Follow-up and Education 2006

The Summer 2006 trip to Araypallpa was focused on follow-up and education. In addition a detailed report on the social and cultural information of the community was put together with help from a Peruvian anthropology student at the University of Cuzco, who also served as a translator. The previous year's assessment of the community's interests indicated that there was a strong desire for educational resources both general and technical for adults and children. To meet these needs a library was established in the town community center. A system for library management was put in place with a library committee in charge of a book coding system. By community decision the photovoltaic lighting system (installed in 2004) was moved from the school to the community center which is a public domain and not owned by the state. In the community center, the lighting could be used at night by all community members to read in the library and to hold group meetings. Many people are busy all day in the fields so are not available to use the educational resources except at night. Books for the library were purchased in Cuzco with the assistance of the library committee. Educational and reference texts for all ages and on a wide range of topics including, health, nutrition, agriculture, water and the environment were purchased.

The community also expressed a concern with water quantity so a water budget assessment was performed. It was determined that the water supply during the rainy season was adequate to

supply enough food for the town throughout the year with some additional crops to be sold for cash. However, the lack of diversity of food in the winter months leads to poor nutrition during these times. No new viable water sources were identified. By request a meeting was held to disseminate information regarding grey water recycling, and its viability as an extra water source for household gardens.

Due to state mandated regulations over the previous year, all reservoirs in the district were required to be chlorinated. However, the dispenser was simply a PVC casing with perforations. Chlorine was added to the dispenser at the beginning of the month releasing high levels of chlorine for the first week, and by the end of the month the chlorine residuals were very low. Community members complained about the bad taste of the water and sickness at the beginning of the month. Design of an improved chlorine distribution device was recognized as a priority for the next phase of the project.

Follow-up on the slow sand filter system included further water quality test to evaluate filter effectiveness. Refresher workshops on water quality testing and filter maintenance were also conducted with water committee members.

Implementation 2007

Summer 2007 visits were again conducted in two phases. The first group designed and implemented an improved chlorination device, a venturi system, which keeps the chlorination levels at a safe and constant level over time. The chlorination device was placed downstream of the filter system to add residual chlorine. As cracks in the pipeline may introduce contaminants, the residual chlorine helps to keep the water disinfected as it travels through the pipeline from the reservoir to the household taps. Additionally, a final assessment of the performance of the pilot slow sand filter was conducted. And, due to the interest at the previous year's information session on grey water, a one-day community grey water recycling workshop was given. The community worked together to construct a grey water recycling system for the community garden.

A concentrated effort was made to educate the entire community about bacterial growth and transmission. Interactive workshops were held for both adults and children. Adults were divided into groups of 10 people. EWB worked with a well-respected Araypallpa native, who now teaches in Cuzco, to develop and translate the workshops to Quechua. Flow diagrams and brainstorming were used to engage the adults to think about ways in which bacteria transmission can lead to sickness within Araypallpa. All community members were encouraged to view live bacteria from their water in a microscope. Seeing the live bacteria was an exciting experience for many members of the community and sparked much discussion. The adults were encouraged to create a list of ways to prevent bacterial consumption including keeping animals within corralled quarters, using toilets (some pour flush toilets exist in the community from a previous NGO but were never followed up on and remain unused), and washing hands. The children's workshop was conducted at night with many adults attending it as well. Children were engaged first through entertainment provided by EWB members. Topics similar to the adult workshop were covered but were accompanied by singing and clapping games. The EWB team performed a skit to illustrate possible avenues of bacterial transmission from animal waste in the streets to human food. Children were also allowed to view microbes through the microscope. The workshop was concluded with a craft to promote sanitation. Old plastic bottles which would otherwise end up in the streets were used to create fly catchers to hang within homes.

The second team that visited at the end of the summer in 2007 did a follow up of education objectives with interactive PowerPoint presentations and a showing of the documentary produced from 2005's filter installation. Results compiled from the first team's visit covering two years of

data collection demonstrated the proper functioning of the pilot filter. Samples taken from water entering and leaving the filter showed the filter to be effective at significantly reducing and, in many cases eliminating bacteriological contamination. In EWB's absence, samples were taken to a lab in Cuzco by community members. The second team worked with the community to expand the pilot into a full-scale filter system that covers one of the two water sources serving the community. This source provides 70% of the town with drinking water. In addition, they installed a venturi chlorination device at the second water source.

Implementation and Education 2008

EWB will complete the installation of a slow sand filter system for the remaining water source in Araypallpa in Summer 2008 and work with the Araypallpiños to introduce the technologies and education to other communities in the region. Our popularity in the region has grown immensely over the four years of the project. Many communities have expressed interest in having EWB come to their towns and have sent representatives to speak with us. One visit to the nearby town of Sankka by an EWB member and Araypallpa water committee members was done in Summer 2007. When asked questions regarding water issues, the EWB member introduced the Araypallpiños as resource personnel for slow sand filtration systems. The Araypallpiños were honored to receive this title and were eager to share with Sankka what they had learned and to advise them on water issues. This type of interaction is what EWB is planning to encourage and facilitate in 2008. Ideally, the Araypallpiños will be able to spread the technology and knowledge faster than we can with our yearly visits. Already community leaders were trained to pass information along within Araypallpa.

EWB is planning to conduct an official assessment trip to Sankka in summer 2008 with Araypallpan leaders. Official EWB-USA assessments include gathering information and conducting surveys on community structure, education, health, economics, social and cultural aspects, sanitation, energy and water resources among other things. This will be an excellent opportunity to work with the Araypallpiños on effectively communicating their knowledge to other communities. The assessment trip will include a full evaluation of available water supplies, uses and quality. The assessment also involves the collection of data relevant to technology implementation including percolation tests and local resource evaluation. The Araypallpiños will be trained to serve as a resource for Sankka and other neighboring communities.

Other current Peru project sub-teams include a filter team, education team, and water testing team. The filter team will be working to outfit Araypallpa's second water source with a filter system so that all members of the community will be supplied with clean water. The Araypallpiños will be doing much of the construction on their own with some oversight. The filter team is also working on publishing a troubleshooting guide that can be used in the absence of EWB and a simple filter operations manual, all of which will be in Spanish. The water quality team will be working to develop a comprehensive water monitoring plan that Araypallpa can conduct independently. The team will train community members to conduct the water monitoring in Araypallpa. A plan is also being developed for the long-term funding of the water testing to ensure sustainability of the monitoring plan.

The education team is creating several workshops, each targeting a different age group. The group will conduct an assessment to measure the effectiveness of last year's education campaign. Educational workshops will review and reinforce the lessons from last summer concerning bacterial growth and transmission and expand upon these ideas. New topics will include proper waste disposal, the use of toilets and dental hygiene. The team is working to develop an entertaining and hands-on curriculum which will involve skits, games and recycling community trash to make useful

crafts. The team is also researching recycling infrastructure in Peru and is investigating the environmental and hydrological aspects of citing a town dump.

Peru Project Team

This year's Peru team includes veterans who have been with the project since the beginning including staff advisor, Mary Dinh, who has two years of experience living in and working with rural communities in Ghana. Mary is a mechanical engineer and has four years of experience organizing and implementing technical projects. Mary traveled with the Peru project team in 2004, 2005, and 2007. Vered Doctori, the project manager since 2005, has prior experience in project management and has been with the project since fall 2004. She has a background in industrial engineering with technical expertise in waste management and is currently a PhD student in environmental science and management. Vered traveled with the project team in 2005 and 2007. Both Mary and Vered are familiar with all aspects of the project. The Peru group has formed close collaborations with a number of organizations, professors, departments, businesses and local professionals over the course of the project, some of which are represented in the letters of support. Each year, there is at least one technical mentor who works very closely to advise the group. Theresa Lancy, a water resources technician with the Water Supply Management Department for the city of Santa Barbara is serving as our mentor this year.

The sub-teams currently consist of 14 students at UCSB, both graduate and undergraduate, with educational backgrounds in engineering, physics, biochemistry, biology, hydrogeology, and environmental science and management. The group is also actively recruiting students in anthropology to join the assessment group. Five of the team members worked with the project in previous years. Returning members of the team have developed a working knowledge of slow sand filtration, water testing, chlorination devices and education through EWB workshops, mentors and advisors. Two people are fluent in Spanish and several have conversational Spanish skills. One member of the team has a certification in community based development and has done development work in Mexico. Two members have separate experience working with indigenous communities through South American NGOs. Multiple members of the team have experience in organizing, education, project management, design, construction and water testing.

EWB-UCSB's approach to providing clean drinking water for Araypallpa has been recognized by EWB-USA as a model for project sustainability. EWB-UCSB employed a repertoire of technologies to meet the water needs of the community including slow sand filtration, venturi chlorination, and grey water recycling. By involving the community in all aspects of the project and by emphasizing education, EWB-UCSB has developed a trusting relationship with the Araypallpiños. In Summer 2008, the vision of sustainable technology transfer will be expanded to further support the themes of clean water, sanitation and hygiene in towns beyond Araypallpa. This holistic approach to education and technology use will ensure the sustainability of the project for generations to come.

G. PROJECT MANAGEMENT TEAM

	NAME*	TITLE	ADDRESS	PHONE & EMAIL
1.	Vered Doctori-Blass	Project Manger	5662 Calle Real #490, Goleta, CA 93117	vdoctori@bren.ucsb.edu 805-284-4298
2.	Kimberly R. Kline	Budget and Grants Manager	320 West Sola St., Santa Barbara, CA 93101	kline@umail.ucsb.edu 570-765-1015
3.	Nicole Virgilio	Education sub-team leader	Donald Bren Hall, UCSB, Santa Barbara, CA 93106	nvirgilio@bren.ucsb.edu 858-414-0880
4.	Matthew Rowley	Filters sub-team leader	6763 Abrego Rd Apt #1, Goleta CA 93117	mrowley@umail.ucsb.edu 925-639-7803
5.	Jim Anderson	Assessment sub-team leader	198 N Skyline Drive #16, Thousand Oaks, CA 91362	andersonjima@netscape.net 805-338-7669
6.	Sarah Bumby	Water quality sub-team leader	555 Coronel Place, #13, Santa Barbara, CA 93101	sbumby@bren.ucsb.edu 520-818-4095
7.	Karen Setty	Water quality past sub-team leader	130 S. Roanoke Ave. Austintown, OH 44515	ksetty@bren.ucsb.edu 805-450-8405

* Each sub-team has 2-4 members working on design and implantation of that project aspect.

H.1. Project Budget

DESCRIPTION	AMOUNT	NOTES
Grant Funds Requested from MWD	$10,000	See table 2 for the detailed line items
Additional Source of Funds: International Center for Materials Research, UCSB	$4,000	For travel only , NSF grant, will be issued in June 2008
Additional Source of Funds: Team fundraising from family, friends, departments, and professors	$5,500	Ongoing
Additional Source of Funds: Annual gift - Rotary Club of SB Sunrise	$500	Will be issued in May 2008
Project Total	***$20,000***	

H.2. Itemized Budget - Grant Funds

LINE ITEM	AMOUNT	DESCRIPTION
Equipment / Supplies	$4,500	Two 5000-liter polyethylene tank, plumbing supplies, water testing kits
Material Transport in Peru	$300	For tanks and equipment: Cusco – Araypallpa
Lab Fees	$1,200	Filter evaluation: monthly water quality tests at Cusco lab for 1 year (4 samples per month)
Office Supplies	$300	For education workshops, printouts, postage for fundraising letters
Team logistics while in Peru	$700	Per diem for food and lodging, local transportation, first aid kit refill
Supplies for workshops	$500	Supply for prototyping and hands-on activities
Stipends	$2,500	Stipend for 10 traveling students ($250 each) to defray loss of income during project travel
*Total**	*$10,000*	

* The rest of the budget (10,000) will be covered from additional fund sources and includes international travel costs, attending national EWB conference, purchasing additional books for the community library, and supplies for the assessment portion of the trip

I. Signature Block

	Name	Signature	Date
Faculty Project Manager	MARY DINH		12/13/07
Student Project Manager	VERED DOCTOR-BLASS		12/13/07
Member Agency Representative	Rebecca Bjork Acting water Res. Manager		12/13/07
	Theresa Lancy City of Santa Barbara		12/13/07

City of Santa Barbara

Public Works Department

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Street Lights
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Permit Counter
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Transportation Planning
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Street Maintenance
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1115 Anacapa Street
Santa Barbara, CA
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Fax: 805.963.1542

Southern California World Water Forum Grant Sponsors
Metropolitan Water Districts of Southern California
PO Box 54153
Los Angeles, CA 90054-0153

Dear Sir or Madam,

This letter of support has been prepared for the University of California, Santa Barbara chapter of Engineering Without Borders (EWB) for their grant proposal for the World Water Forum Innovative Conservation Research and Technology College Grants for Universities and Community Colleges. I am serving as a mentor for this project, providing guidance on water quality issues. Specifically, EWB has solicited me for assistance with the following:

- training EWB students on choosing appropriate water quality tests and how to perform them
- interpreting results of water quality tests
- developing a water monitoring plan
- reviewing the evaluation plan for a chlorination system implemented last year.

These roles will be on an advisory basis in concert with other professionals and academics involved with the project. I have a B.S. in Chemistry and Marine Science, a Masters degree in Environmental Science and Management, specializing in water resources, and have extensive experience working both in a laboratory and field setting. Therefore, my background fits well with the needs of EWB on this project.

EWB has already put significant effort into this project and has accomplished a tremendous amount through their professional and technical approach. I have complete confidence that they will continue to meet their ambitious goals and am excited to participate.

I will serve as the primary liaison from the City of Santa Barbara. The City of Santa Barbara does not assume any liability from the impacts of this project. Participation is voluntary and no legal responsibility may be transferred to the City.

The work done by EWB at UCSB is truly worthy of this grant. I hope that you will reach the same conclusion.

Sincerely,

Theresa Lancy
Water Resources Technician
Water Resources Division
City of Santa Barbara

icmr

INTERNATIONAL CENTER FOR MATERIALS RESEARCH

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Santa Barbara, CA 93106-5121
Phone: 805-893-5850
Fax: 805-893-8797
http://www.icmr.ucsb.edu

December 12, 2007

To whom it may concern:

I am writing this letter in support of EWB-UCSB's proposal to the Metropolitan Water District of Southern California's College Grants Program.

I am the program coordinator for the International Center for Materials Research at UC Santa Barbara. One of the primary aims of the ICMR is to provide opportunities for young scientists and engineers to gain the experience and outlook to function productively in an international research and education environment. We have done this in several ways, including giving small grants to undergraduate and graduate students from EWB-UCSB to carry out engineering projects in Mali, Peru and Thailand.

The ICMR and EWB-UCSB have been partners for three years. Over the span of our partnership we have been pleased to see the progress of their work in Araypallpa, Peru. As a first step in providing safe drinking water for this Peruvian village, the team installed a pilot slow sand filter, verified its effectiveness in Araypallpa's climate and in purifying Araypallpa's water source. The community was trained to perform routine maintenance and water quality testing. The ICMR provided travel grants for the initial visit, and based on EWB's success, was pleased to continue support over subsequent years.

Not only have the students at EWB been a pleasure to work with, but they have also diligently kept us informed of their progress by providing frequent trip updates and annual reports. Also, they have assisted the ICMR by presenting their work at our NSF site visit. I highly recommend that they be supported through your grant to continue with their efforts, specifically, to place water filters on the town's second reservoir and to continue with the community education in filter maintenance and water health that they provide.

Please feel free to contact me if you have any questions.

Kind Regards,

Jennifer Ybarra

Jennifer Ybarra
Program Coordinator
International Center for Materials Research

Blue Future Filters, Inc.

www.bluefuturefilters.com

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College Grants Program

Metropolitan Water District of Southern California

Dear Sir or Madame:

I am writing to offer my enthusiastic support of the candidacy of the University of California, Santa Barbara chapter of Engineers Without Borders (EWB-UCSB) for a grant to be administered by your organization in 2008. I am a professional in the water-treatment industry, and have been involved in advising and working with this group since 2005. During this time I have had an opportunity to observe first-hand, on the ground during this group's water-treatment project in the village of Araypallpa, Peru, the level of commitment, competence, and professionalism that led to their receiving of the 2007 Engineers Without Borders Project of the Year Award for this continuing work.

My own field of work is in the design, production, and implementation of slow-sand filters (SSF) systems, and other appropriate-technology water-treatment technologies. I was asked by the members of EWB UCSB to accompany them to Peru in 2005, and consult on the installation of an SSF system for drinking-water treatment for the people of Araypallpa. During my time on-site, I was continually impressed not only with the group's enormous technical competence in my own field of specialty, but also their understanding of the cultural aspects of effectively implementing a technology such as this in a developing-world context. The group has continued to demonstrate the cultural understanding and the long-term vision and tenacity that are necessary in making a success of work such as this.

Since the time of my participation on-site, the group has independently completed a full-scale SSF treatment system for the village. I have every reason to believe that Engineers Without Borders, UC Santa Barbara will continue to succeed in its project-goals, and that the group is an ideal candidate for your organization's grant.

Sincerely,

Peter C. Blackburn, Manager of Operations, BFF Inc.

Rotary Club of Santa Barbara Sunrise

P.O. Box 50355 Santa Barbara, CA 93150

Meets
Wednesdays 7:00AM
Santa Barbara Club
1105 Chapala Street
Santa Barbara, CA

Metropolitan Water District of Southern California
College Grants Program

December 11, 2007

Re: Reference: Engineers Without Borders, UCSB

I am writing on behalf of the members of the Rotary Club of Santa Barbara Sunrise in reference to Engineers Without Borders at the University of California Santa Barbara. Four years ago, through a chance meeting with one of our club members, the EWB-UCSB advisor arranged to make a presentation to the Sunrise Rotary Club's international committee. As a result, committee members, impressed by the presentation and the projects of EWB-UCSB, decided to support the students. Since that time, the EWB-UCSB advisor has become an ex-officio member of the international committee and regularly attends our monthly meetings.

Each year since 2004, the Rotary Club of Santa Barbara Sunrise has awarded a small grant to the EWB-UCSB towards their projects, most specifically in Peru. Students have made annual reports on their accomplishments during their recent visits to the project site and have been the program at club meetings, showing photographs of their activities. We have closely followed the project developments in Araypallpa, Peru, as the EWB-UCSB team has provided clean water through filtration systems to expanding areas of the community. We have been impressed by the inclusion of students from other disciplines who reinforce the work of the engineering students to secure the community's full support to and participation in the project.

Members of the Sunrise Rotary's international committee have also attended presentations by the EWB-UCSB on campus and have provided feedback and advice to the group on various aspects of their activities. We have observed that the students approach their work seriously, conscientiously and with professionalism, following through on project plans from year to year. Under difficult and primitive circumstances, they have undertaken tasks on site in Peru with enthusiasm and commitment to improving the living conditions of the indigenous population of Araypallpa.

The EWB-UCSB chapter is very fortunate to have two outstanding staff advisors to provide guidance, stability and continuity to their projects. One of the advisors has been selected by our Rotary District 5240 to represent us as a young, non-Rotarian professional on the four-member Group Study Exchange team that will be spending a month in India in January 2008 on a vocational and cultural exchange, all expenses paid by Rotary.

Without reservation, we highly recommend Engineers Without Borders at UCSB to the grants committee of the Metropolitan Water District of Southern California for serious consideration of financial support.

Sincerely,

Janet V. Napier
Rotary Club of Santa Barbara Sunrise
Past President 2002/03
International Committee Member

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PROF. ARTURO A. KELLER, SCHOOL OF ENVIRONMENTAL SCIENCE AND MANAGEMENT

SANTA BARBARA, CA 93106
http://www.bren.ucsb.edu/

December 10, 2007

TO: Metropolitan Water District of Southern California
College Grants Program

FROM: Arturo A. Keller

RE: Engineers Without Borders UCSB Student Chapter

To whom it may concern:

I began serving as an advisor for Engineers Without Borders UCSB in 2004. I was approached by the group to mentor the water quality team relating to the Peru project. Over the course of three years the group has grown from a small group of students working on one project to a very active student organization sponsoring speakers on campus and managing four international projects and a few local projects. I have seen a growing number of students from the School of Environmental Science and Management involved with this group over the last couple years. I believe students greatly benefit from the opportunity to participate in all aspects of EWB projects.

Working within the EWB-USA guidelines, the Peru project has been run professionally and has offered sustainable and effective solutions to help the community of Araypallpa obtain clean drinking water. The group is never shy to seek technical advice from experts on campus and in the community. I have worked with the group on technical issues relating to the development of water testing methods and interpreting water testing results.

A unique aspect of EWB-UCSB is its ability to attract students from a wide diversity of educational backgrounds. It is often the case that students join the group without skills in water testing or water treatment technologies. To make sure that the students working on international projects are well prepared, the group holds workshops and training sessions. The students themselves initiate and organize these workshops.

The group also maintains an active committee of students which provides a unifying structure for all of the projects and oversight on logistical and financial issues. These students are dedicated to their cause and work to make EWB-UCSB a well-known group on campus through outreach, education and sponsoring events on campus.

I highly recommend EWB-UCSB and their project in Peru to be considered for the MWD grant. I am fully confident in their ability to complete the proposed projects. Please do not hesitate to contact me with any question you may have.

Sincerely,

Arturo A. Keller, Ph.D.
Professor
School of Environmental Science and Management
University of California-Santa Barbara

Phone: (805) 893-7548 • Fax: (805) 456-3807 • Email: keller@bren.ucsb.edu • Web: www.bren.ucsb.edu/~keller