

**World Water Forum College Grant Program  
2007 Grant Proposals**



**College**

Cal Poly San Luis Obispo

**Faculty**

**Project**

Bio-Sand Filtration and Curriculum for Public Schools

# CAL POLY

California Polytechnic State University  
San Luis Obispo, CA 93407-0035

Grants Development Office  
(805) 756-2982 • Fax (805) 756-5466  
www.calpoly.edu/~grants • e-mail: grants@calpoly.edu

December 11, 2007

Benita Lynn Horn, Project Coordinator  
Metropolitan Water District of Southern California  
700 North Alameda Street  
Los Angeles, CA 90012

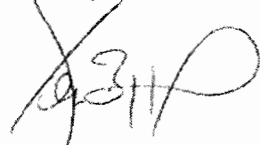
Dear Ms. Horn:

The California Polytechnic State University is pleased to submit the enclosed proposal for your consideration. Please note that there is a distinction between the Cal Poly awardee institution and the performing institution.

The proposal is submitted by the Cal Poly Corporation, on behalf of the University. The Corporation is a 501(c)(3) non-profit auxiliary organization established in 1940 to aid the University in its educational and extracurricular missions. The Corporation serves as the awardee institution and will execute the final contract and provide administrative support for the project. If the award a contract results from this submission, please send the proposed contract to this office at the above address. This office will then release the contract to the Cal Poly Corporation for final definitization and administration of the agreement between the parties.

The Performing Institution is the California Polytechnic State University. Technical questions about this proposal should be addressed to Dr. Seth Bush at (805) 756-2746 or [sbush@calpoly.edu](mailto:sbush@calpoly.edu). Please feel free to contact Patti Wilhelm at (805) 756-1450 or [pwilhelm@calpoly.edu](mailto:pwilhelm@calpoly.edu) if you have any other questions. Final negotiation, post-award contract and fiscal administration will be handled by the Cal Poly Corporation, Sponsored Programs Department. They can be reached at (805) 756-1123 or at [spnprog@calpoly.edu](mailto:spnprog@calpoly.edu).

Sincerely,



Xenia Bixler  
Director, Grants Development Office

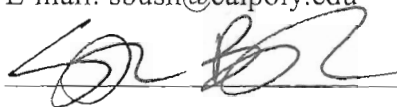
cc: Seth Bush, Chemistry and BioChemistry  
Patti Wilhelm/GDO proposal #08-160

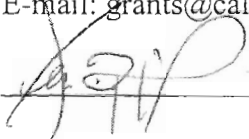
## PROPOSAL

**TITLE:** Bio Sand Filtration and Curriculum for Public Schools

**APPLICANT ORGANIZATION:** Cal Poly Corporation  
San Luis Obispo, CA 93407

**SUBMITTED TO:** Ms. Benita Lynn Horn  
Project Coordinator  
Metropolitan Water District of Southern California  
700 North Alameda Street  
Los Angeles, CA 90012  
Telephone: 888-429-2837

**PRINCIPAL INVESTIGATOR:** Seth Bush  
Chemistry and BioChemistry Department  
California Polytechnic State University  
1 Grand Avenue  
San Luis Obispo, CA 93407-0402  
Telephone (805) 756-2746  
E-mail: sbush@calpoly.edu  
 Date 12/12/07

**AUTHORIZED OFFICIAL REPRESENTATIVE:** Xenia Bixler  
Director, Grants Development Office  
California Polytechnic State University  
1 Grand Avenue  
San Luis Obispo, CA 93407-0035  
Telephone (805) 756-2982  
Fax: (805) 756-5466  
E-mail: grants@calpoly.edu  
 Date 12/14/07

**PROPOSED STARTING DATE:** 3/1/08

**PROPOSED DURATION:** 12 Months

**AMOUNT REQUESTED:** \$9,900.00

A.

|                        |   |
|------------------------|---|
| College                | California Polytechnic State University, San Luis Obispo      |
| Address                | 1 Grand Avenue  |
| City, State, Zip Code  | San Luis Obispo, CA. 93407                                    |
| Website                | <a href="http://www.calpoly.edu/">http://www.calpoly.edu/</a> |
| Make Check Payable To: |   |

B.

|                                 |           |
|---------------------------------|-----------|
| Applicant                       | Check One |
| First Time – Local Project      |           |
| First Time – Global Project     | X         |
| Existing Project – Local Focus  |           |
| Existing Project – Global Focus |           |

C.

|                           |     |
|---------------------------|-----|
| Student Project Manager   | N/A |
| Undergraduate or Graduate |     |
| Department                |     |
| School Address            |     |
| Telephone                 |     |
| Mobile Phone              |     |
| Email Address             |     |
| Home Address (optional)   |     |

D.

|                         |   |
|-------------------------|---|
| Faculty Project Manager | Dr. Seth Bush   |
| Department              | Chemistry   |
| School Address          | 1 Grand Avenue,<br>127 Faculty Offices East<br>(Bldg.25)<br>San Luis Obispo , CA. 93407 |
| Telephone               | (805) 756-2746  |
| Mobile Phone            |   |
| Email Address           | sbush@calpoly.edu   |
| Home Address (optional) |   |

E.

**Organizational Background (1-2 pages): Cal Poly**

Provide a brief history and overall description of your school and department(s) conveying a clear understanding of its mission and goals. This should include a brief description of other relevant projects developed (if applicable).

**About Cal Poly**

Cal Poly is a nationally ranked, four-year comprehensive public university located in San Luis Obispo California. The emphasis of the University is a "learn by doing" educational experience for its more than 18,000+ students. It draws high quality students from across the state of California with a median entering GPA of 3.71 and Median ACT score of 25 in 2007. The College of Science and Mathematics supports more than 2000 undergraduates with 191 full time faculty members.

**University Mission Statement**

Cal Poly fosters teaching, scholarship, and service in a learn-by-doing environment where students and faculty are partners in discovery. As a polytechnic university, Cal Poly promotes the application of theory to practice. As a comprehensive institution, Cal Poly provides a balanced education in the arts, sciences, and technology, while encouraging cross-disciplinary and co-curricular experiences. As an academic community, Cal Poly values free inquiry, cultural and intellectual diversity, mutual respect, civic engagement, and social and environmental responsibility.

**College of Science and Mathematics Mission Statement**

"It's All About Our Students" The College of Science and Mathematics promotes the learning, understanding, and appreciation of science and mathematics as a basis for creative endeavors, intellectual pursuits, careers, and critical consideration of issues confronting society. It provides the foundation for the polytechnic curriculum, offers a rich and distinctive general education program, and prepares students pursuing degrees in the College for post-baccalaureate education and careers. An excellent and committed faculty guides Cal Poly students in developing the interest and capacity for life-long learning by engaging their curiosities, imaginations, and critical and creative thinking skills.

**Department of Chemistry and Biochemistry Mission Statement**

The mission of the Department of Chemistry and Biochemistry, California

Polytechnic State University, San Luis Obispo, is to develop, promote and maintain an outstanding academic environment for the preparation of students as professionals in the fields of chemistry and biochemistry. In addition, the department provides an essential role in the science preparation and science literacy required by other curricula in our comprehensive, polytechnic university.

### **Relevant Projects**

The PI was hired by the Department of Chemistry and Biochemistry in the Fall of 2005 as a Science Faculty with an Education Specialty (SFES). He earned his Ph.D. in Chemistry From the University of California Berkeley in the 1999. His professional activities have primary focused on educational outreach. He is has leadership roles on a number of project including:

- **Co-Director of The Central Coast Science Project (CCSP).** The CCSP is funded through the California Science Project (CSP), a university-based professional development network for teachers of science at ALL levels. The CCSP provides year-long professional development activities for in-service K-12 teachers. The CCSP is a regional provider of services to teachers, schools and districts seeking to strengthen their science programs and science instruction consistent with the California Science Framework and the California Science Content Standards.
- **Co-PI for the Cal Poly Teacher Retention Initiative (TRI) Project.** This project is supported by the California Postsecondary Education Commission. The TRI Project has established professional learning communities amongst area science teachers and a Teacher Apprentice Program (TAP) that links Cal Poly Science majors with area K-12 teachers and classrooms.
- **Associate investigator California Math and Science Partnership project.** This project is supported by the National Science foundation through California Department of Education. It is a partnership between the Santa Maria-Bonita School District and the College of Science and Mathematics at Cal Poly San Luis Obispo. It supports year-long professional development activities for in-service K-12 teachers.
- **Co-PI and Intern Liaison for the Aspiring Science Teacher Research Pilot Project.** This project is supported by U.S. Department of Energy via Lawrence Livermore National Laboratory. At the behest of the Chancellor's Office, Cal Poly served as the CSU hub. It offers an eight-week pre-service science teacher institute.

In these capacities he has helped write and manage grants from both state and federal agencies.

## F. PROJECT DESCRIPTION

### BIO SAND FILTRATION AND CURRICULUM FOR PUBLIC SCHOOLS

#### PROJECT BACKGROUND (first-year applicant)

In 2006 Mr. David Mann, a high school teacher in the Santa Maria-Bonita School District and member of the a Professional Learning Community supported by Cal Poly San Luis Obispo, spent a summer as a research fellow at the University of California at Santa Barbara studying the effectiveness of Bio-Sand Filters at removing biological pathogens from potential drinking water sources. He found that an inexpensive Bio-Sand Filter (Figure 2), was able to remove E.coli bacteria (~90% reduction) and a total coliforms (97.5% reduction) from the lagoon water samples. This work was conducted through a Research Experience For Teachers (RET) program with funding from the National Nano Infrastructure Network, the Donald Bren School of Environmental Science and Management, and the National Science Foundation.

In the following year, Mr. Mann developed and implemented High School curriculum based on this study. Working with Mr. Mann, we propose to use his results to develop and disseminate an accessible, in-expensive "Clean Water" curriculum that uses Bio-Sand Filters for **primary school students and teachers**. Through strategic collaboration and leveraging of resources, it is our expectation that this hands-on curriculum will have a positive impact on water education regionally and it will have a tremendous impact on water quality and water education beyond our borders in developing nations around the world.

#### **Addressing Criteria A.2.**

***This proposal addresses item A.2. Global Initiatives For Developing Countries.*** Our proposal centers on the development and dissemination of an accessible, in-expensive "Clean Water" curriculum for elementary schools based on **Bio-Sand Filter** research carried out at UCSB. The initial curriculum development efforts are in **partnership with the Central Coast Science Project** at California Polytechnic State University at San Luis Obispo and the Santa Barbara County Office of Education. As this curriculum is proved effective, it would be extended to developing countries **through partnership with Seeds Of Hope International Partnerships**. By focusing on elementary school students, we can insure that this curriculum will have a broad impact on developing nations, where secondary education is not the norm.. We have submitted the following letters of support.

- The Santa Barbara County Education Office (For work with elementary school teachers as a curriculum strategy coach).

- Centre for Affordable Water and Sanitation Technology (For development and modification of curriculum to schools in Canada).
- Seeds Of Hope International Partnerships (For development and modification of curriculum for Mexico and Zambia, Africa).
- UCSB Department of Communications (For research on the effectiveness of the curriculum and how it affects career choices among students).

### **Addressing Criteria C.3.**

#### ***Strategy And Approach To Communicate The Need For Change***

Around the world, teachers affect change in their communities. We believe **elementary school teachers are an essential under-utilized resource in the effort to educate the American public about the need for clean water worldwide.**

Our strategy is to educate elementary school educators about the global need for clean water AND to give them hands-on scientifically-tested resources they can use to bring this information into their classrooms and ultimately into their communities. Regionally this will be accomplished using a series of coaching supported science activities supported by the Central Coast Science Project. Globally this will be accomplished through a partnership with The Seeds of Hope and the Centre for Affordable Water Sanitation Technology.

**Ultimately, our objective is to educate and assist elementary school teachers and students about the need for clean drinking water and show how inexpensive Bio-Sand filters can be used to clean dirty water and make it suitable for drinking.** This **proposal** seeks to develop "Clean Water" curriculum kits for elementary school classrooms that are self-contained, age appropriate and utilize **inexpensive Bio-Sand Filter**. By developing curriculum for elementary schools, the project will be easily transferable to developing countries. By first making the curriculum suitable for elementary schools, it will be easy to understand and easy to implement. By focusing on communication, the project is inexpensive to maintain with no additional capital needed continue the project once it is introduced to the developing countries.

We believe many elementary school teachers would use a simple self-contained teaching kit if it was readily available and they were shown how to use it. The **proposal** to develop curriculum water kits for elementary school teachers includes an **innovative** curriculum strategy coach component. This strategy to reach out to elementary school teachers component is modeled after **current Math and Science Partnership work with Santa Barbara County Education Office**. This strategy will allow the use of the Coast Science Project Summer Institute at Cal Poly SLO where teachers from all over California come to gain skills and teaching strategies on how to implement science curriculum into their classrooms. The transfer to developing countries will be carried out in

## **partnership with The Seeds Of Hope, and The Centre for Affordable Water and Sanitation Technology.**

The **innovation** in the **proposal** is that the "Clean Water" kits will allow elementary school teachers who do not have a science background to learn how to clean "Dirty Water" using a simple sand filtration device. The kits will include a PowerPoint presentation utilizing music and slides that will assist the teachers in making the need for clean drinking water and basic hygiene of children in developing nations more apparent to their students. The presentation will be done in a respectful yet powerful way and will communicate the need for change.

## **Background And Need For Education On Water Quality And Sanitation In Developing Countries.**

In December 2002 the United Nations launched the International Year of Freshwater in a bid to raise awareness and action to manage and protect clean water resources, with UN officials calling attention to its vital role in health, hygiene and development.

In her opening remarks to a panel discussion held at UN Headquarters in New York, the UN Deputy Secretary-General, Louise Fréchette, said freshwater issues were at the heart of humankind's hopes for peace and development in the 21st century. "If we continue with business as usual, it will take only a little more than two decades for two-thirds of the world's population to be living in moderate to severe water stress," she warned.

Many children in developing countries are forced to drink water that is not fit for human consumption. This proposal has the **water supply benefit** in that the **Bio-Sand filter** technology is simple. The **water supply benefit** is that there are no moving expensive parts to break. In addition, many times parts for water pumps are hard to get and water wells can sit idle because parts needed to fix the pump cannot be obtained. The simple easy to use bio-sand filter continues to work with a minimum amount of attention (Figure 1). **Additional water supply benefits** are that small cottage industries can be started by the construction of the filters at the local level. The **additional water supply benefit** is that the bio-sand filters remove 90% of the biological pathogens in the water. In addition, these children are many times forced to drop out of school and collect water for the family. This **proposal is innovative** because it goes beyond just supplying clean water, it has the **added benefit** and **anticipated outcome** of educating the children in developing countries in what kinds of things may be in water that appears to be clean but is not. Of **environmental significance** is the education of children in the need for good hygiene. Many children are unaware of the need to wash their hands and the importance of keeping their dirty hands out of the potential drinking water supply. Much of the time it is the female children that are forced to do the water collection. An additional **anticipated outcome** is the

education of these girls that have been historically deprived of the chance for an education.

The proposed curriculum once tested and found effective at the elementary school level, would be configured to meet the needs of those collecting water in developing nations, mainly, the children who many times do not know that there could be pathogens in water which other wise looks clean.

In response to this need, a reliable low maintenance point-of-use device such as the Bio-Sand Filter is proposed. The **innovation** is the addition of a **partnership** in curriculum to support the training and proper use of the filters that the Centre for Affordable Water and Sanitation Technology and the Seeds Of Hope International Partnerships are placing in developing nations.

Research at UCSB during the summer of 2006 confirmed the claims of the Center for Affordable Water and Sanitation Technology of 97% pathogen removal using the bio-sand filtration technique. The results of the research showed effective removal of E.coli bacteria size pathogens at the 90% level. Total Coliforms were removed at the 97.5 % level. (See Supplementary data below)

With the help of university scientists, the ability of the Bio-sand filter system (Figure 2) to remove micro size bacteria removal from drinking water was demonstrated to be effective beyond expectations. As a result, curriculum utilizing the research has been successfully incorporated into the science classroom instruction at Santa Maria High School. It is this curriculum that is the focus of my project proposal for the World Water Forum. As this curriculum is shared with elementary school teachers, an **anticipated outcome** is the increased awareness of the need for clean

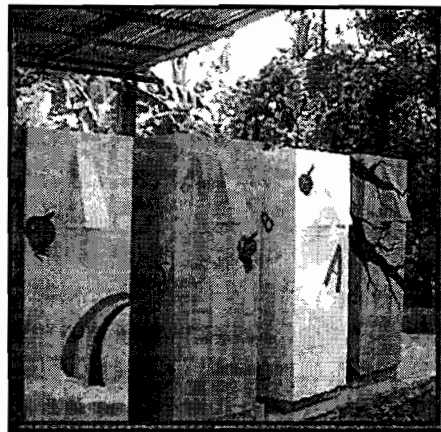


Figure 1 Bio-Sand filters ready for schools in Africa.

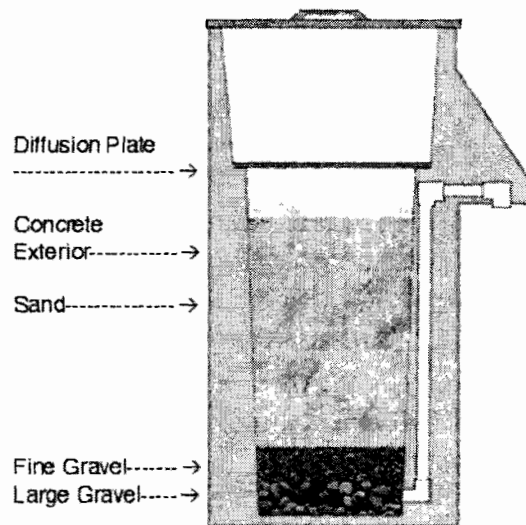


Figure 2: Cross section of Bio-Sand Filter

drinking water by children in America and abroad. A **partnership** with the Communications Department at UCSB has been established and research is underway to determine if the water curriculum is effective in communicating the need for safe water and if it is having any impact on career choices by high school students.

### Supplementary data.

The data in Tables 1 and 2 highlight the effectiveness of our Bio-Sand filters at eliminating common biologically active water contaminants. In Table 1, one can see a marked decrease in the total coliforms count of Lagoon water that has been treated with a Bio-Sand Filter. In Table 2, one can see a clear decrease in the E.coli counts of Lagoon water treated with a Bio-Sand Filter.

Table 1: Total Coliforms (Most Probable Number)

| Date Dilution       | Control Filter A | Filter B | Filter C | Filter D | Control Filter E | Filter F | Unfiltered Lagoon |
|---------------------|------------------|----------|----------|----------|------------------|----------|-------------------|
| 7-11-06<br>2ml/100  | 1986.3           | 4.1      | 1        | 1        | 1                | 88.0     | 25.6              |
| 7-11-06<br>2ml/100  | 2419.6           | 2        | 0        | 0        | 1                | 66.3     | 111.2             |
| 7-13-06<br>4ml/100  | 2419.6           | 4.1      | 0        | 3.1      | 15.8             | 16.7     | 70.3              |
| 7-13-06<br>4ml/100  | 2419.6           | 4.1      | 0        | 3.1      | 9.8              | 26.0     | 75.4              |
| 7-15-06<br>10ml/100 | 1011             | 21.8     | 50.4     | 35.4     | 22.3             | 30.9     | 148               |
| 7-15-06<br>10ml/100 | 1011             | 16.1     | 6.3      | 55.8     | 32.7             | 41.1     | 316.9             |

Table 2: E.coli (Most Probable Number)

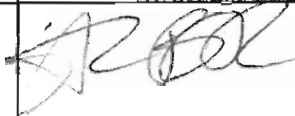
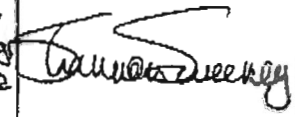
| Date Dilution       | Control Filter A | Filter B | Filter C | Filter D | Control Filter E | Filter F | Unfiltered Lagoon |
|---------------------|------------------|----------|----------|----------|------------------|----------|-------------------|
| 7-11-06<br>2ml/100  | 1986.3           | 0        | 1        | 0        | 1                | 0        | 0                 |
| 7-11-06<br>2ml/100  | 2419.6           | 0        | 0        | 0        | 1                | 0        | 4                 |
| 7-13-06<br>4ml/100  | 2419.6           | 0        | 0        | 0        | 0                | 1        | 13.2              |
| 7-13-06<br>4ml/100  | 2419.6           | 0        | 0        | 0        | 0                |          | 8.6               |
| 7-15-06<br>10ml/100 | 2419.6           | 4.1      | 1        | 2        | 0                | 38.8     | 86.7              |

## G. PROJECT MANAGEMENT TEAM

|   | NAME          | TITLE       | ADDRESS                                      | PHONE & EMAIL                       |
|---|---------------|-------------|--|-------------------------------------|
| 1 | David Mann    | Team Member | 270 Alder St.<br>Arroyo Grande, CA.<br>93420 | (805) 489-0613<br>dmann@smjuhsd.org |
| 2 | Dr. Seth Bush | Team Member | Cal Poly State University,<br>SLO            | (805) 756-2746<br>sbush@calpoly.edu |

### H.1. Project Budget

| REVENUE DESCRIPTION                     | AMOUNT   | NOTES                    |
|---|----------|--------------------------|
| GRANT FUNDS REQUESTED FROM MWD          | \$10,000 | NO GREATER               |
| ADDITIONAL SOURCE OF FUNDS CAL POLY SLO | \$ 2,500 | IN KIND (FACILITIES USE) |
| PROJECT TOTAL REVENUE                   | \$12,500 |                          |

|                              | NAME   | SIGNATURE  | DATE     |
|------------------------------|--|--|----------|
| Faculty Project Manager      | Cal Poly<br>Seth Bush  |    | 12/12/07 |
| Student Project Manager      | NA   |  |          |
| Member Agency Representative | Shannon Sweeney<br>Water Resources Mgr<br>City of Santa Maria<br>Utilities Dept.<br>2065E. Main St<br>Santa Maria, CA 93454<br>(805) 925-0951 x7416<br>ssweeney@ci.santa-maria.ca.us |  | 12/11/07 |



Bay 12, 2916 – 5<sup>th</sup> Avenue NE  
Calgary, AB T2A 6K4 CANADA  
Tel: +1 (403) 243-3285  
Fax: +1 (403) 243-6199  
E-mail: [cawst@cawst.org](mailto:cawst@cawst.org)  
Web: [www.cawst.org](http://www.cawst.org)

Saturday November 10th, 2007

Metropolitan Water District of Southern California

**Attention: World Water Forum, College Grant Proposals.**

Dear Selection Committee,

On behalf of the Centre for Affordable Water and Sanitation Technology (CAWST, Calgary), I am writing this letter in support of David Mann's initiative to further develop curriculum on the importance of clean water at the elementary school level within the local and international context. We feel that curriculum of this nature would give educators and health promoters the much needed skills and knowledge that would help make water knowledge become common knowledge.

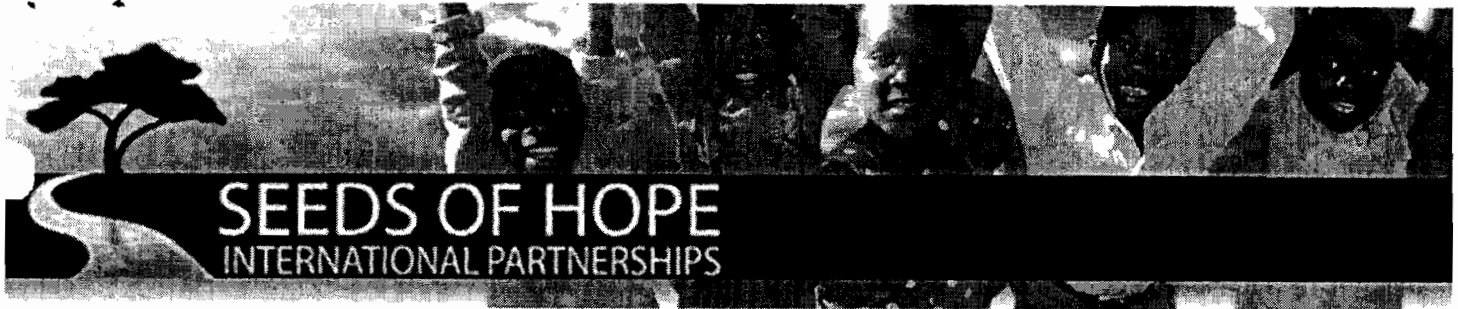
One of our objectives at CAWST is to develop curriculum and training materials appropriate for youth engagement. We have had requests for such educational materials from our client partners in several developing countries including Seeds of Hope International in Zambia, the Dahn Foundation in India, and A Single Drop in the Phillipines to name a few. In partnership with David Mann, we look forward to developing and transferring this material throughout our vast network of clients in over 49 countries. From a local perspective, the development of such curriculum will become part of our educational services and introductory youth workshops on the biosand filter. We look forward to working with David Mann to meet these goals.

If I can be of further assistance I can be reached at 403-243-3285 x 237.

Sincerely,

Mr. Michael Lafleur

*Michael Lafleur, B. Kin., B. Ed., M. Ed., C. ADR  
Education Program Developer  
Phone: 403-243-3285 x 237  
Fax: 403-243-6199  
Email: [mlafleur@cawst.org](mailto:mlafleur@cawst.org)  
Web: [www.cawst.org](http://www.cawst.org)*



November 29, 2007

Metropolitan Water District of Southern California  
Attention: World Water Forum, College Grant Proposals

Dear Selection Committee,

Seeds of Hope International Partnerships (SHIP) is a Christian community development organization based in Santa Maria, California. We are a 501(c)(3) non-profit organization in the US and a registered NGO in Zambia. Through our efforts so far we have brought clean water to over 160,000 people and we have the capacity with strong partners to do much more. SHIP is working mainly right now in Zambia, where we have trained teams of nationals who are leading our work there. SHIP's vision is to reach out to the poor and needy in the world with both spiritual and practical resources. Our goal is to walk alongside the poor with the knowledge and technology they need, giving them skills to take back to their communities. In Zambia, we have been able to establish a training center in Mapalo, an impoverished community of 65,000 people. We have begun to see hope restored to this community as a direct result of God's work through SHIP there. Disease transmission is being stopped by the education provided through hygiene training classes and by the clean water brought through the drilling of new wells, the training in repair of broken hand pumps, and the introduction of bio sand filters. In addition to these water-related areas, SHIP is also working with the people of Zambia on projects in literacy, agriculture, and small business ventures.

Seeds of Hope is very excited about the efforts of David Mann to develop curriculum on the importance of clean water and the use of the bio sand filters. This curriculum is a valuable tool in empowering youth both locally and internationally with knowledge and inspiring them to initiate positive change in the world. SHIP would love to see our efforts to bring clean water and hope multiplied in many more communities throughout Zambia and we feel the curriculum developed by David Mann could be an integral part in moving that vision forward.

Thank you for your consideration.

*Kirk Schauer*

Kirk Schauer  
Director Seeds of Hope International Partnerships  
[www.sohip.org](http://www.sohip.org)

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November 30, 2007

Metropolitan Water District of Southern California  
Attention: World Water Forum  
College Grant Proposals  
P.O. Box 54153  
Los Angeles, CA 90054-0153

Dear Metropolitan Water District:

This letter is in support of David Mann's grant proposal to the Metropolitan Water District of Southern California. Mr. Mann's chemistry curriculum educating and involving students in water purification methods is not only innovative, giving students hands-on exposure to critical water resource problems, but it teaches students that everyone can affect important solutions. His curriculum is a significant step toward gaining young people's participation in science and water resource issues.

David's objectives are closely aligned with my own research agenda, which examines student interests (and lack of interest) in science and mathematics. His water purification curriculum helps students understand the link between their classroom learning and solving real world problems. In fact, the field trip associated with his curriculum may be a critical turning point sparking long-term environmental interests in these high school students. Recently, David and I teamed up and we are collecting data from high school students to empirically test whether making these links through experiential learning improves students' interest and understanding. I am optimistic that our findings will inspire other teachers to make similar practical connections in the classroom.

In conclusion, I suggest David Mann's curriculum may benefit organizations such as yours by generating young peoples' interests in water-related issues, while at the same time improving student education and long-term interest and participation in science. I hope you will strongly consider David Mann's proposal.

Please contact me if I may be of further assistance.

Sincerely,

Karen K. Myers, Ph.D.  
Assistant Professor  
Department of Communication  
4840 Ellison Hall  
University of California, Santa Barbara  
Santa Barbara, CA 93106-4020  
[myers@comm.ucsb.edu](mailto:myers@comm.ucsb.edu)  
805-893-3278



## Santa Barbara County Education Office

4400 Cathedral Oaks Road, P.O. Box 6307, Santa Barbara, California 93160-6307  
(805) 964-4711 • FAX: (805) 964-4712 • Direct Dial: 964-4710 plus extension

Service and Leadership • [www.sbceo.org](http://www.sbceo.org)

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11/14/2007

Metropolitan Water District of Southern California  
Attention: World Water Forum, College Grant Proposals

Dear Sir or Madam:

David Mann has been awarded a competitive grant to actively participate as a Strategy Coach in the Santa Barbara County Education Office Team Coaching Grant Program. Our committee was very impressed with the performance, and high quality of David's work. I attended one of his presentations to an audience of elementary and secondary science teachers and saw first hand the sophisticated technical research and laboratory testing that he has carried out.

As part of the grant, David will be working with a team of science teachers in Santa Barbara County to train them in duplicating his Nano Technology Bio-Sand Water Purification Project. His participation will enable other teachers to provide this opportunity for their students to become actively engaged in a "real world" application of the important science topics that they are studying.

David's work encompasses so many of the traits of quality education; meaningful curriculum, authentic application of scientific principles, civic pride, service learning, *and* empowering students to make a significant contribution to their society.

The Santa Barbara County Education Office is proud to support David Mann in his efforts to promote and share his valuable curriculum.

Sincerely,

*Louise Fisher*

Louise Fisher  
Director, Teacher Programs  
Santa Barbara County Education Office  
(805) 964-4711 ext. 5281  
[lfisher@sbceo.org](mailto:lfisher@sbceo.org)



CENTRAL  
COAST  
SCIENCE  
PROJECT

December 13, 2007

Metropolitan Water District of Southern California  
Attention: World Water Forum, College Grant Proposals

To Whom it May Concern:

I am writing on behalf of Mr. David Mann. I am the Director of the Central Coast Science Project (CCSP), a collaborative professional development effort between Cal Poly State University faculty in the College of Science and Math, and local science teachers. We are funded by the UC Office of the President and we offer rigorous science workshops to local teachers. The CCSP is excited about collaborating with Mr. Mann and Dr. Seth Bush in their efforts to develop and disseminate age appropriate clean water curriculum and inexpensive hands-on activities to elementary school teachers. I have worked with Mr. Mann for several years now, he's attended many of our Summer Institutes and academic year workshops, and I applaud his efforts in this endeavor.

Please feel free to contact me if you have any questions about CCSP and how we will work with Mr. Mann and Dr. Bush.

Sincerely,

Grace Ann Neff  
Assistant Professor of Chemistry  
Director of Central Coast Science Project  
Cal Poly State University