

# **PROJECT BRAVO**

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**Prepared by**



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# 1.0 INTRODUCTION

On June 19 and 20, representatives from 12 organizations from Haiti, the Dominican Republic, Canada and the USA, met in the Dominican Republic to initiate a water and sanitation project which we have named Project BRAVO, (BioSand Review, Advancement, Validation and Optimization). The participants attending this research seminar were as follows:

Luis Rosado	Falconbridge Dominicana	Commercial Business
Dr Gloria Ortiz	Jayaco Community Health Clinic	Community Health, DR
Dr Jose Baez	Provincial Health Director	Government of DR
Bob Hildreth	Rotary Club, Puerto Plata	Voluntary Organization
Mark Hofmeister	Peace Corps, DR	Voluntary Organization
Kevin Wheeler	Peace Corps, DR	Voluntary Organization
Lisana Stamos	Peace Corps, DR	Voluntary Organization
Michael Merisier	Service National D'Eau Potable, Haiti	Government of Haiti
Dawn Johnson	Hospital Albert Schweitzer, Haiti	Community Health
Renold Estime	Hospital Albert Schweitzer, Haiti	Community Health
Tal Woolsey	Clean Water for Haiti	NGO
Heather Lukacs	MIT, Massachusetts, USA	Research Institution
Dr. Mark Sobsey	University of North Carolina	Research Institution
Christine Stauber	University of North Carolina	Research Institution
Lorna Smith	Mount Royal College, Calgary	Training Institution
Camille Dow Baker	CAWST	Training/Consulting Org
Diana Frost	CAWST	Training/Consulting Org

Although not present at the meeting, Petro Canada, a Canadian oil and gas corporation, is also a contributor to Project BRAVO.

The purpose of Project BRAVO is the evaluation of an alternate model for implementation of small community scale water and sanitation projects on a national level; a model which concentrates on supplying the tools and creating the environment for communities to take responsibility for their own water and sanitation needs. It focuses on cultivating a community driven approach to water and

sanitation (W&S) on a widespread basis. This is in contrast to the project focused approaches which have been the core of water and sanitation programs to this time. Project BRAVO is multi-phased.

The project:

- Focuses on a particular household water treatment process- the Biosand filter followed by chlorination.
- Assesses the degree to which poor communities, with the appropriate training and tools, can implement water and sanitation programs incorporating this process by themselves, with minimal intervention from outside parties.
- Evaluates the feasibility of a proposed dissemination model to achieve successful use of the process, at the national level in both Haiti and the Dominican Republic (DR).

## **2.0 PROJECT RATIONALE**

### **2.1 Need for Water & Sanitation Worldwide**

There is an undeniable need for clean water throughout the developing world.

- Every year there are 1.7million deaths related to unsafe water, sanitation and hygiene, mainly through infectious diarrhea.
- The vast majority of these deaths are children under the age of 5.
- An estimated 4 billion cases of diarrhea annually means that poor water, sanitation and hygiene is one of the leading causes of death and disability worldwide. This is preventable.
- 1.1 billion people lack access to any form of improved water supply within 1 km of their homes.
- Although exact numbers are currently unavailable, it is believed that more than 50% of the world's population lack access to publicly supplied, safe or potable water.
- Waterborne disease is a major threat to millions who are displaced or otherwise affected each year by conflicts and disasters.

(1) *WHO Network to Promote Household Water Treatment and Safe Storage*

### **2.2 Potential Impact**

Provision of adequate water & sanitation is so important that Michael Camdessus, a former managing director of the IMF, has stated that no other millennium development goals can be met unless we meet the millennium W&S targets of halving the number of people without access to clean water by 2015. (Economist, July 19,2003).

Improved water, sanitation and hygiene contribute to human development by:

- Reducing the health burden of waterborne and water washed diseases.
- Reducing the time taken off work (or school) by ill people and their carers.
- Improving nutrition due to reduced loss of nutrients through diarrhea.
- Reducing the time and effort spent, normally by women and children, to carry water from distant sources.
- Hence making time for other activities such as children's school attendance and adults' income generation.

- Improving people's self worth and social status.
- Improving privacy and dignity, especially for women.

(2) *World Water Council*

## 2.3 Historic Results of W&S Projects

Given the importance of water and sanitation in alleviating poverty worldwide, providing the services necessary has been a focus of the international development industry for more than 25 years. In 1978, the United Nations declared the 1980's as the 'International Drinking Water Supply and Sanitation Decade.' *Yet the problem persists.*

Past initiatives can generally be divided into two major groups- large scale projects, designed to impact thousands or tens of thousands and individual community initiatives.

Recent reports from the World Bank indicate that, in general, the large projects have been unsustainable.

They cite numerous reasons for this disappointing result, such as use of inappropriate technology, lack of human or institutional capacity and/or insufficient financial resources to operate and maintain the systems once built.

A better record on sustainability has been achieved with small projects conducted by smaller or locally based organizations, such as community associations and local governments. As compared to the large scale projects, the World Bank has attributed the success of these individual projects to:

- *Meaningful involvement of local institutions and users in the planning, implementation and operation of Water & Sanitation (W&S) systems.*
- *Social intermediation and education at the community level.*
- *Delivery of services that users want and for which they have developed a sense of ownership e.g. through cost sharing and/or participative decision making.*

*Davis & Iyer, 2002*

However, the impact of these small community projects has, in general, been limited. The ability to accomplish these on a large scale has proven elusive.

We believe that the fundamental reason for the failure of large scale projects is essentially the same as that underlying the inability to scale up community projects to regional or national levels- an approach whereby the drivers of the initiatives lie outside the community. In the words of a World Bank employee: *By the 1990s, it had become clear that the success or failure of low cost water and sanitation programs was principally determined by consumer demand. Emphasis was placed on demand driven decision making based on using community preferences and on the expression of a community's 'willingness to pay' for given service level. It was believed that only if people attached a quantifiable value to the service, which could be factored into costs, would there be any kind of guarantee that the service would be sustained or sustainable* (Sara 98). A joint World bank-UNDP study of 125 water projects conducted in '96 –'97 found that employing a demand responsive approach at the community level significantly increased the likelihood of system sustainability (Sara & Katz 98). But it also indicated that very few projects worldwide were yet managing to implement this approach

For large scale projects, it has been very difficult to find a level of service for which all users will pay. This has been possible at the individual, small community level, with much assistance from outside the community. The resources required to achieve these individual successes using this 'top down' or 'outside to inside community' approach are extremely high. In El Salvador, a program encompassing 80 rural W&S systems benefiting more than 130,000 residents was implemented by the NGO CARE. Whereas the 80 installed systems were, by all accounts, quite successful, one member of the review team felt that 'the costs of making them sustainable were prohibitively high to think about taking the approach to any sort of scale.' (Davis and Iyer). It is clear, even from the language used by the World Bank above; "*involvement of local institutions*", "*social intermediation at the community level,*" that the drivers of the initiatives lie outside the communities themselves. Project implementers talk of special participatory processes to involve the members of each community. The World Bank discussion paper speaks of "scaling up" water and sanitation projects rather than replicating individual community initiatives.

## **2.4 Alternative Approach**

An alternative approach to implementing small scale water and sanitation projects on a widespread basis is clearly needed. But creating the consumer driven approach, that almost everyone has identified as being the key to success, on a widespread basis, has been difficult to accomplish because:

- Water supply needs to meet the required regulatory standards.
- Water and sanitation services require technical input.
- Water sources vary from community to community, and therefore, W&S solutions are site specific.
- The capacity of individual, local communities to manage their own W&S systems varies considerably.

We believe, however, even with these challenges, that it is possible to create a system which promotes a more pro-active community involvement in water and sanitation. What is required? The Department for International Development, UK (DFID 98) and others have identified several of the required parameters:

### **2.4.1 Product and Service Development.**

Developing a consumer market means that service providers have to provide a menu of services and products from which consumers can choose. Moreover, these services need to match the potential market in price, appeal and technology. The choices also need to be understandable so that the average consumer is capable of making appropriate decisions.

### **2.4.2 Education**

For communities to initiate demand for water and sanitation, they need education in four major areas.

1. They need to understand enough about the alternative water supply options available that they can make decisions regarding levels of service, location of facilities, and recovery of operation and maintenance costs etc.
2. They must learn how to operate, maintain and monitor system performance.



3. They need to understand the positive impact that the systems have on their lives because for services to be consumer driven, demand must reach a point where there is significant public appreciation of the value of the services- their contribution to convenience, health and quality of life.
4. Hygiene education is an important part in any water and sanitation project because the majority of waterborne disease is due to faecal contamination of water.

### **2.4.3 Continuous Service Supply**

To create and sustain demand, one needs to build familiarity with the products and make them continuously available, so that consumers and communities have the option of acquiring them when they are ready to do so. Many consumers, especially consumers (Wall 73) rely on observation as a learning tool. Furthermore, the desire for higher social status or for what other people have, are two of the primary motivations for acquisition of a product or service (Ott 92). Demonstration and continuous availability of services are therefore a key factors in creating demand. Markets cannot be made to function according to a pre determined administrative plan

### **2.4.4 Structured Learning**

Developing a consumer market around water and sanitation requires the shifting of responsibilities for planning, implementation and management of services from centralized public agencies to local and community agencies. But, as more emphasis is placed on decision making at the lowest possible levels, there is a larger number of variables which affect the success or failure of a project. It becomes harder to identify common indicators of success and more difficult to synthesize experiences and institute a structured learning process. Inconsistencies are heightened when large numbers of intermediaries, including NGOs are involved in implementation. Furthermore, standardization of equipment and parts is a crucial part of any strategy to achieve sustainability and replicability (DFID 98). The challenge is to provide a system with enough flexibility to allow for changing conditions at the community level within a framework which promotes consistency, standardization where appropriate and structured learning. In the words of one water and sanitation practitioner, “ In a country like India, ‘it is not possible to describe one process by which rural water supply will be improved in all states. At the same time, some degree of standardization is essential

to establish a national program. Flexibility is thus essential and problematic to scaling up.”(Davis and Iyer, 2002)

### **2.4.5 Financing Flexibility**

Water is a basic need. All human beings **should** have access to clean water at an affordable price. However, without adequate cost recovery, water supply and sanitation will not be sustainable. Furthermore, no community is homogeneously poor or homogeneously wealthy. Within each community there is always stratification. The ideal system should:

- Subsidize the poorest.
- Extract the maximum that each individual homeowner is willing to pay for a given level of service.
- Inculcate trust in service providers. Willingness to pay is tied to household budgets but it is also linked to the legitimacy and effectiveness of agencies responsible for service delivery.
- Enable communities to obtain funding for community projects directly.
- Have as few intermediaries as possible in the financing chain.
- Direct funding to reliable, trustworthy institutions rather than to specific projects. This will enable longer term planning and reduce the onerous coordination and reporting requirements currently associated with individual project funding. It will also enable a continuous service supply and reduce the focus on quick results. Development is rarely speedy and simple.
- Direct funding to W&S education and program and service development.

### **2.4.6 Collaboration**

Any national level initiative requires the cooperation and collaboration of numerous organizations. A lack of cohesiveness of implementing institutions has been identified as one of the key obstacles to regional or national initiatives. (Davis & Iyer, 2002). Foreign funding accounts for a large share of NGO funding in some countries which places the NGO sector somewhat at odds with the State. Furthermore, NGOs often see each other and the public sector as competitors for scarce donor funding, rather than as cooperators in a quest to alleviate poverty; which makes it inherently difficult for them to cooperate with each other. Any framework for national level initiatives must

encourage collaboration between the government and NGOs. while allowing individual initiative by organizations.

This requires clearly defined roles and responsibilities. The World Bank has broadly summarized the recommended roles of the various organizations as follows: As far as possible, local communities should manage, implement and finance their own W&S projects.

- Communities- express demand, finance part of the services, manage the project implementation, own, operate and manage the W&S services
- Governments- act as a facilitator, set policies and strategies, provide legal framework
- Service providers- Disseminate information, train, supervise, provide various consulting services, monitor and evaluate.

#### **2.4.7 Institutional Home**

To be technically sustainable, the water and sanitation support needs to reside in sound institutional homes. These institutions must be responsible for

- Providing appropriate training.
- Enforcing quality standards,
- Encouraging local experimentation. Local innovation and experimentation with the basic technology results in better understanding and acceptance by the locals as well as lower costs (Islam 92),
- Keeping the information base. NGOs frequently complain that information is typically unavailable and when available, it is typically in a format, which is difficult to interpret and apply to conditions on the ground (Smout and Parry-Jones 99).

#### **2.4.8 A Customer Focus**

Performance evaluations need to focus on the customer and enable performance improvement by reaching new customers, offering better services and operating more efficiently. Meeting this objective requires more detailed information on clients. (Rhyne 89). The traditional performance measures used in NGO-government type programs- training, monitoring, evaluations and audits, though standard good practice, are costly and time consuming and often do not yield the desired

results. Instead finding tasks and structures that produce these results without the expenditure of time and funds is a better investment. (Tendler 89)

## **3.0 THE OPPORTUNITY**

### **3.1 Household Water Treatment**

Household water treatment offers an ideal opportunity to initiate a consumer driven approach. In recent years, the effectiveness of several household treatment options have been proven to the satisfaction of regulatory organizations such as the World Health Organization. In February 2003, the WHO formed a network to promote safe household water treatment and storage. They are quoted as saying: “Recent research demonstrates that simple, acceptable, low-cost interventions at the household and community level are capable of dramatically improving the microbial quality of water stored in the home and reducing the risk of diarrhoeal disease.” (Sobsey,2002). “Moreover, research on cost-effectiveness indicates that these interventions can avert much of the burden associated with diarrhoeal diseases at low cost.” (World Health Report 2002).

W&S solutions which incorporate household water treatment are ideal for development of a bottom-up approach because:

- Decisions can be made at the lowest possible level- the family or household
- Education can be directed at families, including children in schools
- Community organization requirements are not as complex as with piped, community systems
- They are generally lower cost than community alternatives. Therefore efforts can be directed towards the poorest, most needy communities.
- They represent the initial building blocks in the journey to more complex systems i.e. it offers us the opportunity to learn using the simplest systems first.

### **3.2 BioSand Filter**

Project BRAVO has chosen to focus on one of these household water treatment technologies, the BioSand filter. This filter has been readily accepted by consumers throughout the world.

In the early 1990s, while at the University of Calgary, Dr David Manz developed a low cost, effective water treatment, the BioSand Filter (BSF) technology. Concrete BSFs are household water treatment devices that can be used by individual homeowners to treat water in their own homes.

These filters have proven effective in both laboratory and field tests in removing large percentages of the disease causing micro-organisms in the water. They cost between \$12 and \$30 US to construct with little or no recurrent costs required for operation and maintenance. They are built by locals using locally available materials.

During the late 90s, Dr Manz instituted filter construction and implementation procedures that could be used consistently by numerous people in diverse places. He trained a host of individuals and organizations, primarily international NGOs doing water projects in developing countries in proper filter construction and use. He encouraged the lateral transfer of the technology from organization to organization.

***The net result of this effort was that, by the end of 2001, there were over 50,000 BSFs in use in over 40 countries worldwide.***

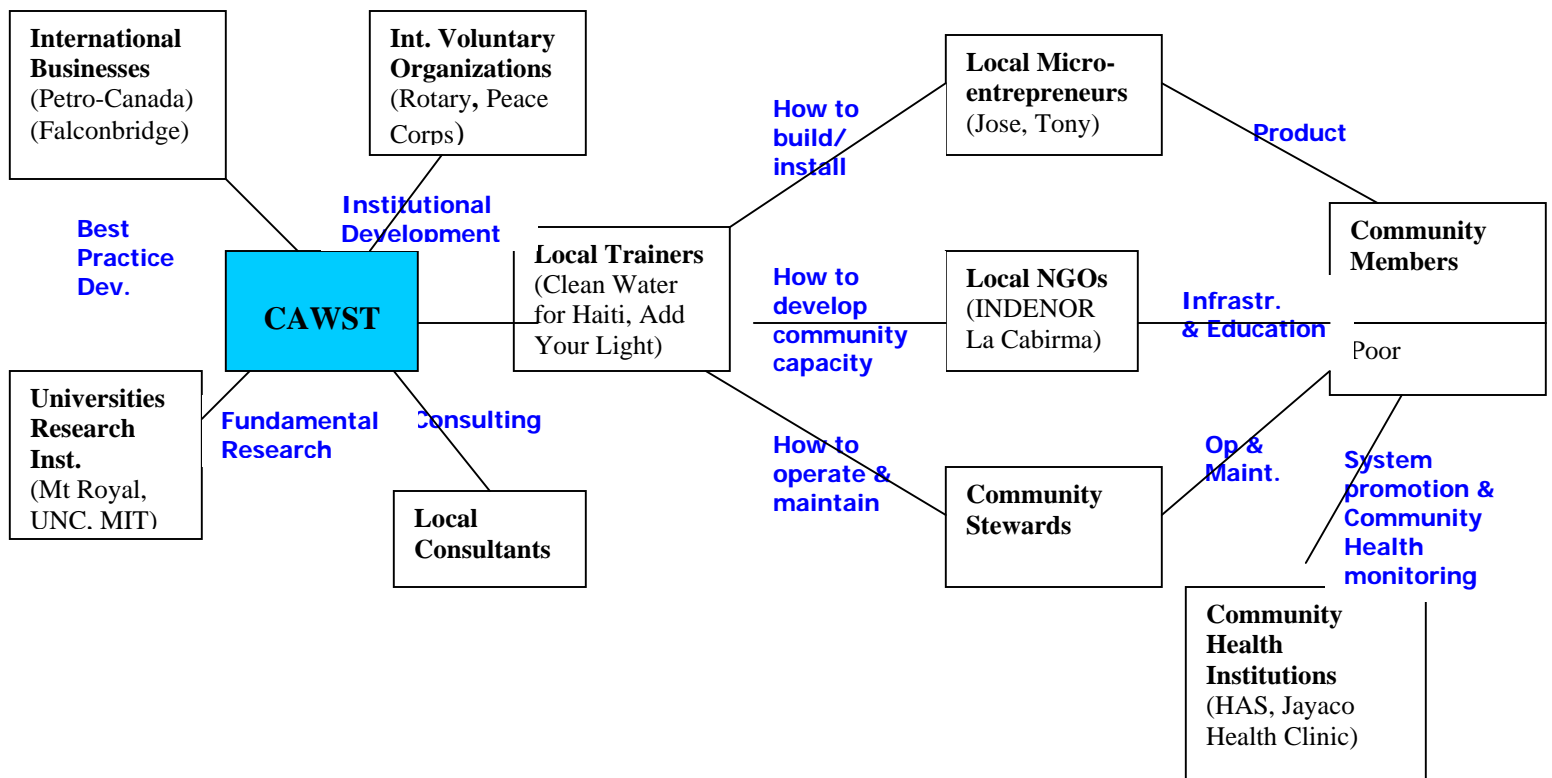
Furthermore, there was evidence that there were several aspects of the BSF technology that made it an excellent candidate for community driven water projects that could be implemented on a national scale. These included:

1. High customer satisfaction and user appeal, worldwide, because of the improved physical characteristics of the water- look, taste and smell.
2. Effective treatment of water from a wide variety of water sources.
3. Its almost foolproof nature, in that it is very difficult for users to use incorrectly. And, because it is understandable, it is easy to teach users how to use it correctly.
4. The volume of water produced is high as compared to other household filtration technologies. This encourages improved hygiene through availability of clean water for washing and bathing as well as drinking.
5. Local construction to the degree required at the village, district or regional level.

# 4.0 TECHNOLOGY TRANSFERENCE FRAMEWORK

As a result of the open distribution of the BSF technology, distribution systems developed in several countries, including the Dominican Republic, Haiti and Nepal. CAWST integrated several elements of the distribution systems with some upstream elements to arrive at the framework presented below:

**Technology Transference Framework**



We believe that this framework meets the criteria discussed in Section 2.4. The model encompasses all of the essential characteristics required for a national, community driven program.

1. Development of appropriate products and services by CAWST working in conjunction with research institutions, international voluntary organizations and international corporations.
2. Delivery of education, training, training tools and materials on a continuous basis, within a framework that promotes structured learning.
3. A network of organizations including businesses, NGOs and governments and educational institutions working independently, but towards the same end.
4. A pathway for obtaining and directing customer feedback.
5. Opportunities to finance different institutions for different purposes;- training institutions, implementation institutions, small businesses, health institutions.
6. Separation of responsibility for service delivery from regulation.



## 5.0 VALIDATION OF PROPOSED FRAMEWORK

### 5.1 Feedback from the Dominican Republic and Haiti

The model was presented to local NGOs and Government representatives in Haiti and the Dominican Republic, as part of a seminar on household water treatment. Their responses to the approach were all very positive and validated the proposed model.

1. By a significant margin, education was identified as the greatest challenge facing the water and sanitation industry in both countries. More specifically the participants identified the bottleneck as technical knowledge. They wanted training and training materials, to develop an understanding of the latest research results; to obtain information in language that they could understand; and to network and share information with others. The BioSand filter and other devices were seen, not only as water treatment tools, but also as tools for educating communities on water and sanitation. Appendix I provides a summary of the Haiti seminar results and activities.
2. All the participants had a very clear understanding of what was required to obtain community buy-in and plans for obtaining it. No individual or group indicated that this would be a major bottleneck. This is in direct contrast to the feedback obtained from those organizations implementing water and sanitation projects in the more traditional fashion. In their discussion paper, Davis and Iyer reported; *“Many respondents cited as a resource constraint the identification of sufficient social intermediation professionals who could motivate, organize and train community members to play an active role in service delivery.”*
3. There was a strong desire by both government officials and NGOs to support a more decentralized approach to water and sanitation delivery. This included support from senior members of large central water and sanitation authorities in Haiti. All agreed, however, that government authorities should continue to play a key role in ensuring compliance with regulations.
4. They did not view the model as being limited to only household water treatment programs. Although household water treatment was readily accepted by all, it was seen as the first step in alleviating the requirements of the most needy, and, the beginning of provision of safe piped water to the general population. There were many requests for training and support on community scale water treatment, on pipelining and on obtaining funding.

## **5.2 Feedback from Third World Water Forum, Japan**

The needs expressed, the recommended methods and the case studies presented at the World Water Forum confirmed the validity of the proposed distribution network and approach.

### **From the sessions on Research Dissemination:**

- Need to make knowledge accessible and tailor made for specific target audiences.
- Need intermediaries to translate knowledge for the intended user of the knowledge.
- Need to be able to judge the impact of the research.
- Need reproducible methods.
- Need training and learning onsite.
- Need research which is driven by the demands of the consumers.
- Need accessibility of research by small operators.
- Need to combine internet, web/ e-mail and decision support structures.
- Need to address political processes in the acceptance and use of new practices.
- Uptake of research is impacted by a host of issues related to the receptivity of the target audience.
- The rate of transfer of research to knowledge will depend on fluidity and transparency.

### **From the sessions on Knowledge and Learning Systems:**

- Knowledge empowers
- Allow recipients to re-live the knowledge creation process in their own context.
- Assist them to justify knowledge in terms of their own belief systems.
- Scan globally; reinvent locally.
- Provide collaborative working platforms to share knowledge and solve problems collaboratively.
- Do not take away the initiative from the learners.
- Progressive learning involves lecture notes-- reading--audio-visual—demonstration—discussion—practice--teaching others.
- Create communities of learning ;organize-- virtually keep in touch-- meet--provide feedback.

- Learning system design includes pre-courses, courses on site, individual studies or group works, alumni networks, an enabling environment to facilitate learning both ways.

### **From the session on Water, Education and Capacity Building**

- Need learning institutions that focus on output.
- Need to get the capacity factor organized.
- NGOs must be part of the education/capacity building/ training.

### **From the debate on the privatization of water services**

- Water is a public good and should be managed in the public interest.
- Sustainable water systems require separation of service delivery from regulation. The role of government in water regulation is undisputed. Such regulation should include price regulation where necessary, environmental regulation and drinking water inspectorates (technical audits and public health).
- Service delivery organizations need to be transparent, accountable, responsive to clients and strategic.

### **From the session on Water and Finance:**

William K. Reilly, the former leader of the World Wildlife Foundation and the US Environmental Protection Agency now heads an organization called Aqua. This is a private equity fund formed to invest in water projects in developing countries. It is funded 2/3 by the US government and 1/3 by private investors. His organization has invested almost exclusively in **product manufacture**- drip irrigation systems in India, manufacture of automatic remote meters, bottled water in Colombia, Israel and Poland, water tanks and desalination systems in the Middle East. He is currently looking to invest in household water treatment systems.

He also believes that provision of water services by the private industry will gradually decline given that it is a high capital, high risk industry with returns which will be subject to strong government regulation. In short, he sees private enterprise in the water and sanitation industry primarily focused on product manufacture, not on service provision.

## From Water and Dams

- Small is better than large- easier to manage and get buy-in. However, a multitude of small uncontrolled projects can cause the equivalent amount of damage as a single, large one.
- Principal mistakes were made in the insufficient evaluation of the needs and options available.
- Reduce intervention where possible.

## 5.3 Results from Alternate Techniques

Over the last five years, several organizations have used various models to disseminate household treatment technologies. Among these are:

Organization	Trade name	Treatment system
Centers for Disease Control (CDC)	Safe Water System(SWS)	Household chlorination
EAWAG	SODIS	Solar Disinfection
Potters for Peace	Ceramic Filters	Particle Filtration

**The results reported indicate that the greatest challenge facing the introduction of household water technologies is not whether or not the technology works in the field, but whether people will continue to use it, once introduced.**

On the CDC website, <http://www.cdc.gov/safewater/whatnotknows.html>, CDC provides the following listing on “What we don't know about the SWS.” It can be summarized as follows:

### “ 1. **How to sustain use for the long term**

Past experience has shown that high rates of SWS use are achievable in the short term or during disease outbreaks. However, we do not know yet how well use of the SWS will be maintained over the long term. Through the CARE/CDC Health Initiative (CCHI), we are currently studying the impact of community mobilization and social marketing on adoption of the SWS, and we will monitor continued use.

### 2. **How to ensure economic sustainability**

Maintaining long-term use of the SWS requires sufficient resources to continue project activities

such as social marketing, promotion, and product distribution. Full cost recovery is desirable, but if the prices of products are too high, target populations may not have access to them. If full cost recovery is not possible, donor support will be necessary for continuation of SWS projects. CDC is currently monitoring the economic progress of ongoing projects.

### **3. Optimal mix of SWS with other appropriate technologies (e.g., settling, filtering, flocculating)**

While the SWS is effective in improving the quality of water from a variety of sources, there are times when additional strategies are needed to augment the effectiveness of point-of-use treatment and safe storage. For example, some communities have very turbid water that must be filtered or allowed to settle before chlorination. CDC, in collaboration with public and private sector partners, is evaluating other promising point-of-use technologies that could be used in combination with chlorination.

### **4. Optimal behavior change methods**

One of the greatest challenges for SWS projects is encouraging people to modify their behavior to use the SWS on a regular basis. CDC, CARE, and the Medical University of South Carolina are implementing and evaluating promising behavior change methodologies such as motivational interviewing and community mobilization.”

The general consensus on SODIS is that sustained use requires ongoing visitation with the communities.

[http://www.sodis.ch/Text2002/Projects/SODIS\\_Thailand.htm](http://www.sodis.ch/Text2002/Projects/SODIS_Thailand.htm)

[http://www.sodis.ch/Text2002/Projects/SODIS\\_SriLanka.htm](http://www.sodis.ch/Text2002/Projects/SODIS_SriLanka.htm)

[http://www.sodis.ch/Text2002/Projects/SODIS\\_Nepal.htm](http://www.sodis.ch/Text2002/Projects/SODIS_Nepal.htm)

<http://www.sodis.ch/files/note15.pdf>

## **6.0 PROJECT HYPOTHESIS**

The BRAVO project hypothesis is: “Using the technology transference framework presented previously, and with the assistance of locally based NGOs, communities can implement and manage household water and sanitation programs, such that their continued performance meets guidelines that are acceptable to local regulatory authorities.”

## 7.0 SCHEDULE

The project will be divided into 3 phases:

Investigative Phase:	Sept to Dec 2003
Design Phase:	January to June 2004
Implementation Phase	June 2004 to ?

The investigative phase will be directed at identifying the issues and challenges, which should be considered in the pilot project design, and, at developing the tools and materials required for field implementation. It will be divided into four components, and, each of the components will be directed by a different organization.

UNC:	Lab and field testing of BSF pathogen removal capabilities
MIT:	Critical review of the Technology Dissemination Model
CAWST:	Development of Training Materials & Community Processes.
Mt Royal College:	Certification/ Accreditation

The design phase will more fully include all the partners in the project, national and international, in the design of 2 pilot projects. These pilot projects will be conducted in Jayaco, Dominican Republic and in the Artibonite Valley of Haiti. The design will include required health and hygiene impact assessments and other performance measures, including those required by national and international regulatory authorities.

The implementation phase will involve the field implementation of the design formulated above. The organizations which will be working directly with communities in the field will be the Hospital Albert Schweitzer in Haiti and La Cabirma and the Jayaco Community Clinic in the Dominican Republic.

The household water and sanitation program which will be introduced to the communities as part of Project BRAVO includes;

- Hygiene education
- Sanitation provision
- Water supply management from Source to Consumer including:

Water source selection

Household Water Treatment

Safe Water Storage

- Medicine to treat existing conditions such as parasites

### **Hygiene Education**

Hygiene education appropriate to each level in the dissemination chain will be developed and included in the training materials. Materials will also include tools that can be used in schools, health centers, community centers and churches. The community stewards will be trained to be active promoters of hygiene in the community.

### **Sanitation Provision**

Education on sanitation options will include low cost alternatives such as the VIP pit latrine and pour flush toilets.

### **Water Supply Management**

The communities will be educated on the advantages and disadvantages of the various water sources- rivers, ponds, rainwater and well water as well as the various household water treatment options. The treatment processes to be included will encompass filtration for particle removal followed by disinfection. The filtration options will include ceramic and Biosand filters. The options for disinfection will include chlorination and solar disinfection. In addition, options for storing the water in the home will be discussed. Individuals can choose the combination of source, treatment and storage which is most appropriate to their needs.

Communities will be taught how to monitor and evaluate the system effectiveness and to assess the beneficial impacts on the communities.

### **Medicine**

In conjunction with local health centers, medicine to treat existing waterborne diseases will be provided to project participants, so that an accurate assessment of the health impact of the intervention can be made.



## **8.0 INVESTIGATIVE PHASE**

### **8.1 Biosand Filter**

#### **Needs**

As part of this research project, it is necessary to prove that the BioSand filter is a legitimate water treatment device that can be recommended as part of a household water treatment process. The filter has been well accepted by consumers around the world and there have been a host of laboratory and field tests conducted to prove its efficacy and effectiveness in the removal of various water contaminants. (See Appendix II). The test results have consistently reported 99.9 to 100 % removal of parasites. However, the current test results are deficient in 3 ways:

1. There has only been one laboratory study on viral removal, and it has consisted of 4 data points with a wide variation.
2. Although the vast majority of tests on bacterial removal report results in the range of 90%, the range of laboratory bacterial removal reported has varied from 67% to 99% for reasons which can be partially attributed to laboratory testing errors.
3. There has been no study to determine the impact of the filters on the health of the users.

More definitive laboratory and field testing are therefore required if the BioSand filter is to be used in national or international level programs.

#### **Program**

The laboratory program will involve testing for bacteria, virus and parasite removal. The field program will involve water testing for removal of the same pathogens from filters used in individual households to determine whether homeowners can operate the filters with sufficient integrity to achieve removal rates that are comparable to laboratory removal rates. It may be possible to use some of the filters already in use in the DR and Haiti to test the pathogen removal. This will give us the advantage of assessing filters where homeowners have been using the devices for some time. The health and hygiene impact assessment will be a part of the Implementation Phase.

### **Lead Organization: University of North Carolina**

Dr Mark Sobsey and Christine Stauber, of the University of North Carolina will spearhead this portion of the research.

Mark Sobsey is a professor at UNC in the Faculty of Medicine - Public Health. His entire career has been directed toward better understanding of the risks of disease causing micro organisms in water, to improve their detection and to evaluate technologies to remove or kill micro-organisms in water and food. He became involved in international development in the '80s and assisted in the CDC safe water intervention to address a Peruvian cholera epidemic in the 90s. He is a consultant to the WHO and author of the WHO Report on household water treatment.

Christine Stauber is a PhD student at UNC. She has a Masters degree in environmental science, focused on heavy metals contamination. After working on the US/Mexican border, her focus shifted from chemical contamination to infectious diseases because she believes that clean water and food are bigger international priorities than heavy metal contamination. She plans to pursue a career in public health.

## **8.2 Technology Transference Model**

### **Needs**

The technology dissemination model also needs to be critically evaluated if the process is to be promoted for national level programs. There are several questions which need to be answered.

- What are the characteristics of the individuals or organizations that make the best trainers, micro-entrepreneurs, community stewards etc.? i.e. What is the target market?
- Can we develop the right measures to evaluate performance impact along each segment of the chain, over the long term?
- What data needs to be collected by whom?
- What other support systems may be required?
- What additional quality control measures need to be introduced?
- How can we facilitate establishment of cooperation between all of the participants in the long term?
- What factors contribute to success? How can we maximize the probability of success?

## **Program**

To answer the questions posed above, the planned program involves a critical review and analysis of:

- The analyses conducted on community W&S projects funded by organizations such as the World Bank where an externally driven approach would be more likely to be employed.
- Past and current BSF projects. There are several BSF projects currently being implemented by a partnership of the Rotary Club and the Peace Corps in the Dominican Republic. In Haiti, Clean Water for Haiti has trained several organizations in the field implementation of the filters and the Hospital Albert Schweitzer is active in distributing BSFs. There are therefore several BSF programs in both Haiti and the DR that could be critically evaluated.
- Alternative technology dissemination methods such as those employed by the CDC Safe Water System and by SODIS.

## **Lead Organization**

Massachusetts Institute of Technology (MIT)

MIT has assumed the role of lead organization with respect to this component of the research.

Heather Lukacs is a lecturer at MIT. Her interest in household water treatment began as a student under the direction of Susan Murcott in the civil and environmental engineering department of MIT. After looking at how systems which function in laboratory settings are implemented in various parts of the world, she began to understand that the technical aspects of W&S are just a one piece of the picture. Heather is evaluating the conduct of this research towards a doctoral degree in the department of Sustainable Management under the guidance of Dr Jennifer Davis.

## **8.3 Training Materials & Community Processes**

### **Needs**

Our analysis indicates that a community driven approach requires three key elements;

- Community assessment of their W&S options
- Local stewardship at the community level

- An increased community awareness of the potential benefits of clean water (Water Aid, 2002)

Furthermore, the major impediments to local stewardship, that have been observed, are:

- Effective and affordable means to monitor water quality
- Qualified personnel with the designated responsibility for stewardship.
- A 'can do' attitude by the community when faced with small obstacles.

## **Program**

### **W&S Program Development**

We will develop simple checklists and methodologies that can be used by communities to meet the needs identified above.

The water quality stewardship will integrate 3 components

- Water quality testing
- Health monitoring.
- Water system management from source to consumer

More emphasis will be placed on health monitoring and water system management than water quality testing for this target group. This is because water quality testing is expensive, requires relatively skilled personnel, and there are no simple test procedures for parasites which are the cause of several waterborne diseases. Health monitoring is more relevant to users than water quality and can be lower cost.

A continuous supply of clean water must rely on correct processes to produce the water, and qualified personnel to oversee the process. Training community representatives to assist homeowners will be part of this program development.

We will develop simple tools for communities to assess the impact of the water and sanitation interventions. These assessments will go beyond just health impact, to include socio-economic and other changes which may be more meaningful to the community.

Existing regulations and guidelines with respect to household water supply options will be reviewed. It is our intention to develop generic guidelines which are acceptable to the regulatory health and water authorities but which can be implemented and modified by the local communities as required.

### **Training Materials**

Training programs and materials for organizations in the dissemination chain will be developed in accordance with their needs. Programs are required for: local trainers, local NGOs assisting communities with implementation, community stewards and homeowners. Appendix III lists the proposed training content for each program.

### **Lead Organization**

CAWST will act as the lead organization for this portion of the project. Mount Royal College will be a core partner in the development of the training materials. CAWST's mandate includes the development of programs and services for use by poor communities. CAWST is also the overall coordinator for Project BRAVO. Appendix IV lists the qualifications of the CAWST staff directly involved in the project.

## **8.4 Accreditation and Certification**

### **Needs**

Accreditation and certification of people qualified to deliver training, manufacture products, implement projects and support the users in the community are required to ensure that certain standards are met.

This accreditation needs to occur through local institutions which can offer these services on an ongoing basis, in the native language, and in compliance with local, educational and regulatory standards.

## **Program**

Develop:

- An understanding of what elements of the certification process can be common to institutions globally and what elements need to be modified and developed to meet local requirements.
- Review of similar type programs in country and elsewhere.
- Understanding of legal ramifications.
- Appropriate relationships.
- Criteria for selecting appropriate certification institutions.

## **Lead Organization**

### **Mount Royal College**

Mount Royal College is a leading Calgary post-secondary institution. Internationalization is one of their key growth strategies, and, since 1988, they have developed more than 35 partnerships with institutions of higher education in many parts of the world. The training materials and training programs are being developed jointly by CAWST and curriculum developers employed by the faculty of Continuing Education and Extension of Mt Royal. At the request of Lorna Smith, MRC's Director of International Education, La Universidad de la Tercera Edad, a DR institution of higher education which specializes in the training and retraining of adults participated in the HWT seminar. Lorna Smith also actively participated in the group discussions held during the HWT seminar in the DR. She has developed a better understanding of the issues and challenges involved in Project BRAVO. MRC and La Tercera Edad will be continuing discussions as to a possible partnership for the delivery of the training.

## **9.0 IN-COUNTRY PARTICIPATING ORGANIZATIONS**

### **HAITI**

#### **Service National D'Eau Potable (SNEP)**

This is the major government, potable water regulatory and service provider for Haiti. They hosted the CAWST seminar on HWT for NGOs and government representatives in Haiti. They would like to collaborate with the NGO community in Haiti in the establishment of minimum guidelines, common rules and protocols for W&S implementation and management. SNEP's representative at the Project BRAVO meetings was Michael Merisier, a civil engineer, responsible for maintenance and operations of all the water systems in one of the districts in Southern Haiti.

#### **Hospital Albert Schweitzer**

The Hospital Albert Schweitzer is a major, well established Haitian health institution located in the Artibonite Valley. They have used BSFs as part of community health programs since 2000 and have built & distributed over 600BSFs. The hospital is a key participant in the health and hygiene impact studies that form a significant component of Project BRAVO. The hospital keeps detailed health records and has a water laboratory. They are also part of a Haitian health coalition. The individuals working directly on this project are Dawn Johnson, Assistant Director of Community Development and Renold Estime, who is in charge of the hospital's water program. Dawn is a geologist from the University of Colorado. Her specialty is international water shed management. Renold Estime is a biologist who studied at Port au Prince. He has worked in the water program developed at the Hospital since 1986 and grows more interested in water daily.

#### **Clean Water for Haiti**

Clean Water for Haiti (CWH) is a Canadian based NGO which has established permanent training facilities in Pierre Payen, Haiti. Since establishment in 2000, CWH has trained 18 technicians to manufacture BSFs in Haiti. Some of these have established micro businesses. This organization also provides support for well drilling and other related water and sanitation projects in the area. Several hundred BSFs have been built and distributed as a result of their operations. They are a key BRAVO partner in the evaluation of training materials and tools, and in understanding the issues related to establishment of successful micro businesses for product manufacture. CWH was formed

by Tal and Adele Woolsey of Vernon, B.C. because of their personal passion. Tal attended the BRAVO meetings in the DR.

## **DOMINICAN REPUBLIC**

### **Jayaco Community Clinic/ Provincial Health, DR**

The Jayaco community clinic serves nine rural communities in central DR close to the town of Bonao. They have identified clean water as a major health issue. Of the 277 patients examined at the clinic from May 24 to June 19, 2003, there were 31 confirmed cases of parasitic infections in children aged 1 to 4. The women in the community also suffer frequently from vaginal infections as a result of bathing in contaminated water. The Clinic is a key participant in the BRAVO health and hygiene impact studies. Dr Jose Baez is the provincial health director for the region in which the Jayaco Clinic is situated. It encompasses 10 community clinics. His organization will provide input into the health guidelines which may be required. Dr Pedro Ant. Jimenez S. is a government epidemiologist, based in Bonao who specializes in maternal and infant diseases. He will provide much input into the study design and interpretation on behalf of the Dominican government. Dr Gloria Ortiz is the current doctor at the clinic.

### **Falconbridge Dominicana**

Falconbridge Dominicana is a Dominican subsidiary of Canadian mining corporation. They have an excellent history of positive community intervention projects, and have been responsible for helping us to make connections with local government and health officials. Falconbridge hosted the HWT seminar in the DR. Sr Luis Rosado, Director Public Relations for Falconbridge has offered to make available their laboratory facilities and assist with the water testing for the project.

### **Asociacion de Fabricantes de Filtros (AFAFIL)**

This is an association of 4 BSF manufacturers in Northwestern DR who market, produce, install and provide after sales service for the filters. They have requested assistance in development of franchise-like programs for filter manufacturers. These include certification programs to ensure that the filters being produced by registered manufacturers are of a designated standard, marketing programs and systems etc. Development of these systems is one of the objectives of Project BRAVO.



Jose Rivas represented AFAFIL at the research seminar. Jose studied classical music in Santiago before working as a sales technician for several companies. In 1999, he was trained in BSF manufacture in a program initiated by Jan Tollefson and funded by the Rotary Club. With Jan's support, he has established a workshop and a successful business manufacturing filters.

### **Rotary Club**

The Rotary Club has instituted several BSF projects in both the DR and Haiti. In particular, they funded the training of micro entrepreneurs in the DR. This resulted in AFAFIL as described above. The Rotary Club has been impressed with the sustainability of the BSF projects in the DR. Earlier this year, the leadership of Rotary in the DR met, and each governor has committed to water and sanitation as a priority for Rotary in the DR. Other international Rotary clubs are evaluating water and sanitation as a principal agenda on a worldwide scale. Rotary is looking for a new international focus in 3 to 5 years. Bob Hildreth was the Rotary representative at the Project BRAVO meetings. Bob is the head of the Puerto Plata Rotary Club. He is currently spearheading some joint BSF projects with the Peace Corps. These projects could be used to assess current practices and requirements for technology dissemination, as part of the investigative phase of Project BRAVO.

### **Peace Corps**

The DR Peace Corps has implemented water and sanitation projects in the DR for several years. They are implementing BSF projects for the first time later this year. Mark Hofmeister, Kevin Wheeler and Lysana???? were the Peace Corps representatives to Project BRAVO. Mark has a personal interest in different household treatment alternatives and discovered the BSFs in his search for better technologies. Kevin has a background in Water Resource Engineering from the University of Colorado. The experience of the Peace Corps representatives with W&S projects of all types make them ideal participants in identifying needs and gaps in current BSF project practices and in the design of the field implementation of Project BRAVO.

**Petro Canada**

Petro Canada is a major Canadian oil and gas corporation with operations in several developing countries. Although, not present at the Project BRAVO meetings, Petro Canada is a key sponsor of Project BRAVO. They have contributed \$150,000 to the development of training materials.

## **10.0 PARTICIPANT COMMITMENTS**

At the conclusion of the 2 day seminar, the participants made the following commitments:

### **University of North Carolina**

- Draft description of the research plan
- Distribute it to everyone.
- Draft a budget
- Search for funding- look at possibility of joint submissions and proposals
- Would like to start data gathering right away.
- Would like to get a concrete filter to the lab and begin doing lab studies.
- Write thank you letter to Falconbridge.

### **Hospital Albert Schweitzer**

- Get the water lab up and running
- Will send Mark list of supplies and equipment in the lab.
- Check with the health department regarding the diarrheal rates in the community.
- Renold and Dawn will discuss with Herbe ethics and community practice.-randomization probably not an option.
- Scout potential sites for study
- Thank you letter to Falconbridge

### **Mt Royal College**

- Meeting with Universidad de la Tercera Edad on Saturday
- Will find small business and entrepreneurship materials and send to Tal and Jose.
- Gather up educational resources that others have developed that we may be able to use or modify.
- Meet with Julie and Ron and provide them with feedback on training materials.
- Check with brother re baseball player sponsors.
- Thank you letter to Falconbridge

### **Service National D'Eau Potable (SNEP)**

- Pleased to take part in discussions with eminent scientists
- Want CAWST to return to Haiti – in not too distant future
- Hospital Bonne Fait, similar to the Hospital Albert Schweitzer may be another place to conduct research.
- Will contact personnel at Hospital Bonne Fait
- Profound study on water based diarrheal disease will be welcome.
- Will send data available on water analyses, bacteriological studies, in English.
- Will like to introduce the BSFs to the City of Caille.
- Would like to contact any technicians in that city who have already been trained in BSF construction.

### **Massachusetts Institute of Technology (MIT)**

- E-mail MIT group coming to Haiti to advise them of project.
- Information gathering for social acceptability, surveys etc
- Obtain material currently used by Peace Corps for training.
- Collect actual numbers for costs of materials, etc from Tal, Jose and Dawn. Often difficult to get hard numbers for economics.
- Prepare document which asks specific questions, observations on specific projects.
- Make use of people with expertise.
- Pull ideas together before October.

### **Clean Water for Haiti**

- Work on training material with Lorna.
- Would like the business module once developed
- Could provide filter for the Hospital if required.
- Get information on cost of each piece for Heather
- Break down cost on mold.
- Establish training costs.
- Write thank you letter to Falconbridge.

### **Asociacion de Fabricantes de Filtros (AFAFIL)**

- Send information on what has been a success and what hasn't and reasons
- Get filters to people who need them.
- Preoccupied with study on quality of water produced from the filters.
- Demand is growing. Want to ensure good product and excellent service.
- Everyday filter technicians assist people with operations and maintenance and with hygiene.
- Ready to do anything needed to ensure success of the project and help our friends from Haiti.

### **Centre for Affordable Water and Sanitation Technology (CAWST)**

- Summarize results of seminars and direction ahead
- Refine definition of project
- Continue to develop training materials
- Seek project funding
- Keep in contact with participants to maintain momentum and enthusiasm
- Organize field trip later this year

## **11.0 FINANCING**

The biggest hurdle currently facing timely execution of Project BRAVO is the availability of funding.

- CAWST and Mount Royal College are planning a joint submission to the Canadian International Development Agency (CIDA).
- MIT is seeking out funding for their portion of the project.
- UNC is preparing their initial budget and evaluating funding alternatives.

In addition, CAWST is beginning a major fund development campaign, targeted at selected individuals and corporations. CAWST is a newly formed organization. Although our training, seminars and projects have been very successful, and our ideas have received the attention of respectable organizations, the reality is that funding from bilateral or multi lateral agencies for program development and/or pilot projects is non existent. Most of our resources are allocated to program development.

To date CAWST has been supported by volunteer help, a few key individual donations, corporations like Falconbridge and Petro Canada, and a very small core group that works for modest compensation. We do not have a fixed facility for training nor the ability to offer assurance of ongoing viability to our core staff.

CAWST believes that Project BRAVO can have significant impact throughout the world, and is prepared to obtain the resources necessary to ensure its completion.

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