HOUSEHOLD WATER SECURITY E-CONFERENCE AND VIRTUAL FORUM

ORGANIZED BY UNICEF, WHO AND HTN
OCTOBER 14 TO NOVEMBER 1, 2002

FINAL REPORT

Household Water Security E-Conference
October 14 to November 1, 2002

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1. Introduction

Organized by UNICEF, WHO and HTN, the Household Water Security E-Conference ran from October 14 to November 1, 2002. The objective was to facilitate partnerships and share experience on current practices and problems at the field level in the area of household water security. The e-conference was run concurrently as an email-based list serve and as a virtual forum on the Kyoto World Water Forum web site. The discussion from the e-conference will be used as an input to inform follow-up discussion at the World Water Forum itself.

The e-conference attracted great interest on a wide range of issues related to household water security and generated much praise from subscribers. Participant Ned Breslin summed up the spirit of the conference when he said near the end of the third week, "The conference has been great! I have learned a great deal and certainly had to rethink many of the assumptions we have been making here, and that is wonderful."

Of the 320 subscribers to the conference, 90 were active participants, writing a total of 204 submissions over the three weeks. (Submissions are numbered 1 to 204 and submission numbers are provided in brackets, for easy reference, when quoted here.) The full text of participant interventions during the conference are available on the e-conference Web page (www.unicef.org/programme/wes/econf.htm) and on the Household Water Security session on the Kyoto virtual water forum (www.worldwaterforum.org/for/en/fshow.1037). The weekly summaries by the weekly chairpersons (Mansoor Ali, UNICEF; Jamie Bartram, WHO; Erich Baumann, HTN) and the conference moderators (Greg Keast, UNICEF Consultant; Federico Properzi, WHO) are included in this report, below.

Participants included longstanding water and sanitation practioners, government, NGO and UN agency staff, activists, engineers, students, sociologists, scientists, writers, potters, manufacturers and administrators. They demonstrated a very wide diversity of background and knowledge (see the table below for a list of organizations represented by participants in the conference).

In the lead-up to the conference, there was some concern among the planners that the subject of household water security might be too general. In fact, the subject was broad enough to attract a wide range of participants with expertise on many specific WES topics while still encouraging insightful discussion on important related issues such as human rights and poverty alleviation. Conference participants debated both the theory and practice of household water security.

Organizations Represented by E-Conference Participants	
- Bombas de Mecate - Alliant International University - Australian National University - Association for Water and Rural Development - Blue Revolution - Cardamon Hill Research - Centers for Disease Control and Prevention - Cranfield University - SANDEC, EAWAG - Engineering Concern (Pvt) Ltd - Environment and Population Research Center - Fantsuam Foundation - Federal Government of Nigeria - First Water - Fonte D'Agua - Government of India, Midnapore - Gramalaya - HTN - Instituto Monteverde - Israel-Water Engineers Association - J. Cotruvo Associates - MLGRD&C, Bangladesh - Ministry of Public Health, Thailand - Misereor, German Catholic NGO	- Moshi Urban Water Supply and Sewerage Authority - Mvuramanzi Trust - Operation Clean Water - Potters for Peace - PT.Inco - Pump Aid - Rural Water Development (RWD) Programme, Kenya - Rural Water Supply Project, Chipata, Zambia - Sarar Transformación SC - SKAT - South African Medical Research Council - South Australian Dept of Human Services - Swiss Agency for Development and Cooperation - UNICEF - University of North Carolina - Water and Sanitation Program for South Asia - Water Resources Secretariat, Sri Lanka - WaterAid - WEDC - WHO - Winrock International

2. Conference Highlights

The wide ranging, intensive discussions during the three week conference period is best reviewed through the weekly summaries and the submissions themselves. The advantage of an email and Web based conference is that every word of each submission is captured and available on the e-conference Web page. Below is a summary of some of the key discussion threads.

Definition of household water security

Several participants emphasized the need to move away from an exclusive focus on drinking water towards a definition of household water security that includes the importance of water supplies for livelihoods and food security. Rupert Talbot (33) put the concept in the context of the twin threats of deteriorating quality and a shrinking fresh water resource base. Maggie Black (34) offered the following comprehensive definition: "the availability to a household of enough water of adequate quality year-round to assure its members' survival, health and productivity, without compromising the integrity of the environmental resource base".

Water quality

How much focus should there be on water quality? This was a central concern of the participants, many of whom agreed that the availability of sufficient amounts of water

continues to be of a higher priority than water quality alone, despite the emergence of serious water quality problems world-wide. Some participants stressed the need for a holistic approach. Andrew Trevett (28), for example, said that to "conclude that one intervention has greater health benefits over any other is a far too simple approach". In any case there was considerable discussion on specific water quality issues including – notably – treatment and testing technologies (see more below).

Hygiene and sanitation promotion
The issue of water contamination between point of collection and use was introduced early on by Ngoni Mudege (05). The issue of inadequately stored household water led to a rich discussion of the importance of promoting sanitation and hygiene behavioral change in all programmes – including those focused on schools.

Technology and technology choice
Technologies were an important theme in the conference discussions. There was agreement among participants that no technology was perfect and that different technologies were appropriate under different circumstances. Rob Quick (20) recapped the view of many participants when he said, "New technologies need to be proven in the lab first, but then in the field, in terms of sustained performance; acceptability to the target populations; ease of use; compatibility with local values and beliefs; and compatibility with local needs". He suggested a "catalogue of interventions, that would include a technical description, cost, results of evaluations, locations where they are in use, implementation approaches and contact information". Henk Holtslag (201) said that the Dutch Practica Foundation is working on just such an inventory. Several participants questioned whether handpumps were an appropriate technology and there was discussion on the merits of different handpump types.

Many participants advocated strongly for household level water treatment solutions, citing their sustainability and ease of maintenance. Effective solutions described in the conference included point-of -use systems such as household water filters (including low-cost ceramic filters and sand filters), chlorination, and solar disinfection systems such as SODIS. The need for filters to remove fluoride and other contaminants was also discussed. A number of participants promoted the inexpensive H2S test for bacteriological contamination.

Rainwater harvesting was also discussed by a number of participants, many of whom pointed out that it remains an under-utilized technique in many regions.

Sustainability, community participation and water resource management
Several participants stressed the link between sustainability and community choice and control over technologies and management systems. Several participants stressed that technologies alone are not enough and Mathias Saladin (170) called for long-term monitoring, improvement and adaptation of innovative technologies to ensure they continue to be appropriate and effective – and what people and communities want.

Affordability is an aspect that affects sustainability. Many participants stressed the need for inexpensive technologies. However as Paul van Beer (178) pointed out, "Sustainability has a lot to do with quality and not with cheap only".

The issue of locally appropriate management models was raised by many participants. The general view of the conference was that supply chains and logistic solutions have to be in place to allow communities to fulfill their roles. But it is essential that communities take possession of their water systems. As Mohammed Kamfut (157) put it, "On the issue of sustainability the role of community management cannot be over emphasised. Experience from the field has shown that projects are better managed and sustained where communities are organised and have a sense of ownership".

Raza Ali Gandapur (166) noted that "How we manage our rivers, and even larger reservoirs of fresh water, is likely to become one of the major technical and political concern of the next few decades." S. Damoran suggested (162) "organising a summit on water security" and Martin Beyer (181) raised his concern about "the matter of water resources, their quality and availability on a long-term basis". Rupert Talbot (192) echoed the same concern, noting that "sustaining the fresh water resource is, without doubt, the greatest challenge ahead of us. I think we have to come back to this point in our household water security agenda: the major users - and polluters - of fresh water are the farmers, the industrialists and the ever increasing urban centres".

Water as a right/The role of the private sector

A number of participants addressed the issue of whether or not water should be considered a human right. This was often discussed in relationship to ownership of water resources. Kathryn Kelly (96) said, "I think there is no doubt that water, as THE fundamental necessity for life, must be considered a human right. I think it follows from this, that privatization of water resources is not ethically acceptable."

King'ori Wathobio (144) responded that "The argument that water should be a free 'human right' is only true when water is in its natural course. To 'move or improve' on it from that natural course, involves a cost, which has inevitably to be met by someone." Others pointed out the obligation of governments to ensure access to water by the poor.

While many participants agreed that water should be a human right and did not support the privatization of water, Maggie Black (116) described the complexity of the situation: "Attractive as it would be to establish a human right to water, it is very problematic. There are two issues: right of access to the resource; right to a minimum amount of safe water. The former is embroiled with property rights. [The latter] is a service issue… If a company is granted a license to sell [all] the water in a resource such as a river and run all services based on it, then this amounts to ownership for all practical purposes".

Poverty alleviation

A number of participants analyzed the relationship between water security and poverty. Jeremy Ockelford (70) asked, "Does one household's water security compromise the security of other, poorer, households? This is especially important in the context of the

Demand Responsive Approach… DRA allows people to choose their levels of service according to ability to pay. To me, it does not satisfactorily deal with the problem of limited resources, where one community' s or household' s ability to pay for higher levels of service may reduce the resource available to poorer communities or households, now and in the future".

Maggie Black (92) cautioned that "Until we begin looking at [water] holistically, and adopt a corresponding integrated resource management/integrated use management approach, we will not be able to interconnect water provision and poverty reduction… If water is an economic good, its conservation will henceforward be driven by market principles, and by pricing… Poor people's 'willingness to pay' for services has in some cases been willfully misconstrued: where they pay they invariably have no choice, which is a strange way of looking at 'demand'".

Othniel Habila (155) said "countries need to plan development programmes within the framework of the poverty reduction strategy papers" and there is a "need to ensure a synergy between the PRSPs (as overarching frameworks) and the sectoral strategic frameworks".

HIV/AIDS

Several participants raised the issue of water and sanitation security in the context of HIV/AIDS. Mark Henderson (173) noted the "critical role of safe water, sanitation and improved hygiene in mitigating the impact of the HIV/AIDS epidemic and supporting strategies for positive living with HIV and AIDS". He asked participants to emphasize this fact with the donor community. Samuel Mawunganidze (196) asks for a paradigm shift in the sector to support an "HIV/AIDS based approach to WES programming".

In conclusion, as stated by Vanessa Tobin (203):

"Of course this exercise has neither answered all of the questions nor shown us the definitive way forward. But it has brought people together and perhaps helped to create new and lasting partnerships. And most importantly, it has yielded a rich and varied set of ideas and experiences that, because of the nature of the e-conference (submissions have been saved and remain accessible), should continue to be a resource in the future".

3. Weekly Summaries

Week One Discussion Summary

The conference participants have debated both the concept and practice of household water security through a range of discussion threads. The summary below does not pretend to capture the full richness of the discussion, it simply describes some of the highlights. All interventions have been captured and recorded in the participants own words, and are available as a record on the virtual water forum.

Several participants, moving from the chairperson's introduction and the background reading material, offered their own definitions and views of household water security. Rajindra de S Ariyabandu (04) defined it as "adequacy, reliability and timely availability of good quality water" while Sam Mawungan idze (14) portrayed it as a struggle between the differing priorities and values of politicians, technologists/managers and society as a whole. Rupert Talbot (33) contextualised household water security from the perspective of the twin threats of deteriorating quality and a shrinking fresh water resource base while both he, Michael Lea (23), Maggie Black (34), Han Heijnen (42) and others stressed the importance of moving away from an exclusive focus on drinking water towards a definition that includes the importance of water supplies for livelihoods, and especially, food security. Maggie Black (34) offered a comprehensive definition of household water security as "as the availability to a household of enough water of adequate quality year - round to assure its members' survival, health and productivity, without compromising the integrity of the environmental resource base" and went on to define a series of parameters within the definition. She and other participants discussed the need for better water resource management, while several participants took up Vincent Uhl (18) point on the serious impact on water security of over pumping for irrigation. S. Damodaran (31) from south India emphasized the need for locally-based conservation of water supplies.

Sally Sutton (03) introduced a series of basic questions into the discussion at an early stage. One of these was the question of what priority is placed on water by people. This was addressed by several participants including George Katumba (36) who described a participatory process in Uganda that led to the ranking of water among the highest priorities for national poverty reduction. What priority people give to the quality of their water supplies was a related subject of debate. Mohammed Kamal Sarwat (02 & 07) described a poor awareness of the importance of water quality. While David Chapman (08) doubted this and Thomas Walder (13) mentioned that people will only choose contaminated water if there is no other choice , several other participants including Sally Sutton (10) reinforced the idea. Jan Willem Rosenboom (30) gave the example of Bangladesh where people continue to drink from red-painted handpumps and pointed out that a key issue is the low perceived level of risk of disease and death both from pollutants such as arsenic as well as bacteriological contamination.

The water quality/quantity debate entered the discussion with some participants suggesting that the more effective route to improved health is through more plentiful water and higher levels of service rather than too strong a focus on water quality alone. Guy Howard (11)

pointed out that different interventions have different effects on health depending on the "dominant route of disease transmission within a particular population at a particular point in time" and that programmes of intervention should be planned and implemented on a case-by-case basis. In another intervention (41), Guy Howard discussed the importance of revising microbiological indicators because thermotolerant bacteria are "not wholly reliable when estimating health risks". Thomas Walder (13) stressed that "it remains important to help people get the best quality under the particular circumstances". Andrew Trevett (28) taking up the thread emphasised that diarrhoeal transmission is a complex process and that to "conclude that one intervention has greater health benefits over any other is a far too simple approach".

Ngoni Mudege (05) introduced the issue of water contamination between point of collection and use. Sally Sutton (09) cited studies from Zambia suggesting that such contamination may be less serious than expected in some cases, while Andrew Trevett (28) gave a research example from Honduras showing that such water quality deterioration was substantial and cited WHO's Managing Water in the Home for more examples of increased microbiological contamination from inadequately stored household water. The effect of population densities on the mobility of faecal coliform was raised while the question of which other factors play a role was left as an open question. This and other discussion threads lead to several participants raising the issue of the incomplete picture that conventional coverage statistics give of the availability of "safe" water. In this vein, Soungalo Togola (17) cited a UNICEF study in Chad that showed that access to safe water may be much lower than published coverage figures.

Several participants, including Sam Mawunganidze (14), Margaret Westaway (15), Soungalo Togola (17) and others referred to the importance of promoting sanitation and hygiene behavioural change in all programmes. Rupert Talbot (33) cited India's 400,000 child deaths a year to stress that "helping people become aware of the risks from an unhygienic life style is everyone's priority".

Participants also discussed the need for a greater emphasis on locally-appropriate management models during the first week of the conference. George Saquee (24) in Sierra Leone described a specific problem related to community management of a water system and Maria do Carmo Zinato (37) offered suggestions based on her experience in Brazil that combined community mobilisation and advocacy for the creation of national/regional enabling policy environments.

In the discussion on the role of the private sector there was some agreement that small local entities are more likely to sustainably serve the requirements of poor people. Joseph Cotruvo (21) discussed the need to create incentives to solve problems locally through the private sector while Lee Hersh (22) questioned the track record of for-profit entities in developing countries. Leendert Vijselaar (32) and other participants discusses the need for pubic oversight and effective regulatory and tarrifing systems. Jan Willem Rosenboom (27) described the successful private sector model in Bangladesh where the major players are "artisans with their 'office' under a tree by the side of the road".

Technologies and technology choice was an important theme in the discussions. Three participants (Henk Alberts (06), Thomas Walder (13) and Andrew Travett (28)) cited the efficacy and success of the rope pump. Other discussions in this area raised the debate on household vs. community-based technologies, with a number of participants suggesting that household based systems are more sustainable in the long run. David Proudfoot (16) cited the success of Zimbabwe's family well programme and he, Rajindra de S Ariyabandu (04) and Han Heijnen (42) discussed the efficacy of rain water harvesting systems. Point-of-use systems, and especially household water filters were discussed by many. Participants including Gérard Pankert (19) discussed the need for filters for the removal of fluoride and other contaminants. Reid Harvey (20) described work in the area of low-cost ceramic filters which sparked a debate among several participants including Joseph Cotruvo (21), Simon Collin (39) and Lee Hersh (40) on the efficacy of different types of filtering technologies and their testing and evaluation. Mohammed Kamfut (45) presented a Nigerian case study on household sand filtration units. Guy Howard (41) cited the Bangladesh's move towards establishing a national environmental technology approval process and stressed the importance of non-technical issues in household water treatment including affordability, ease of use and sustainable delivery mechanisms.

Week Two Discussion Summary

Quotes of the week:

"… There was so much else happening. Thinking about it now, I wonder if we could have done much, given the compelling technological fix we were in." Raj Kumar Daw (69)

"…I fail to see how we move forward without some hard questions about our past support that at the very least informs our future work." Ned Breslin (119)

Water quality indicators, health risk assessment, sanitary inspection:

"…the issue of the need for care in interpreting results from testing for indicator microorganisms. Source of faecal contamination is an important consideration." David Cunliffe (55)

"From my experience in working in different developing countries there is still generally a fixation about drinking water quality above hygiene/sanitation matters. I think this comes from blind faith in the so called "scientific" bacteriological indicators." John Pinfold (60)

"Water quality monitoring programmes have too often focused only on water supplies and not on the whole water chain…Linked to this is the very low priority given to sanitary inspection…Sanitary inspection is frequently far more useful than water quality tests as the data obtained provide an indication of likely ongoing risks of contamination, gives an overview of effectiveness of O&M and water handling hygiene, allows causes of contamination to be identified and helps identify remedial action." Guy Howard (68)

"I also wish to remind participants of the importance in documenting the microbial efficacy of water treatment technologies by reducing not only the commonly measured indicator bacteria, such as fecal coliforms and E. Coli, but also viruses and protozoan parasites." Mark Sobsey (84)

"Monitoring quality control is not easy, especially in rural areas, for the following reasons: requires expertise, many water-management associations are unable to pay for water analysis, some rural areas are quite isolated." G. Nkusi (103)

"…the need to evaluate the impact of novel technologies on the health of target populations. Improvement in health is, after all, the principal motivation for the interventions that are being discussed." Rob Quick (106)

"The water quality community world-wide is recognising the fundamental weaknesses in over-reliance on indicator bacteria and are promoting approaches that deal with the overall system of water supply from catchment to consumer, concentrating on good design, construction and operation and maintenance." Guy Howard (111)

Community participation:

"We looked at what happens when people are not told that their traditional water sources are dangerous and need to be replaced, but ask them to look at the positives and negatives of several technological alternatives from their perspectives." Sally Sutton (59)

"Many organisations jump in with their 'perfect' ideas, but they forget an important step. They don't ask the people for their input along the way…The target audience is the losers in the end." Joseph Hogan (80)

Hygiene education, sanitation promotion:

"Open defecation and concept of safe drinking water cannot go together in any environment." M. V. Rao (52)

"Hygiene promotion is no simple task. Communities usually receive a lot of advice about all sorts of things and from many different sources, but are usually, and rightly, selective of what they might take notice of." John Pinfold (60)

"Unless personal hygiene practices are not followed, water is bound to get contaminated" Shunmuga Paramasivan (71)

"It is important to consider how much time a particular community has to listen to the hygiene messages…I therefore recommend to combine the promotion of hygiene messages with the period at which the communities collect water." Sam Godfrey (91)

"We need to preserve the emphasis on water quality for drinking purposes, but avoid implying – as is the case in the industrialised world – that high quality water is needed for everything including e.g. sanitation and horticulture." Maggie Black (92)

"The issue of water sec urity can not be guaranteed by safe household storage/treatment alone. Like wise the improvement in sanitation and hygiene issues…We must bridge the existing gap between the Scientists/Engineers and the end users of the technologies by planning educational and promotional programmes of activities geared at behaviour change of our people." Joseph Swai (105)

"A small intervention {in hygiene promotion} tried this year in Nizamabad district in Andhra Pradesh brings up the evidence of remarkable reduction in gastroenteritis cases." Lalit Mohan Patra (110)

"I have recently become aware of the significant advantages of composting toilets as a means of handling human wastes with very low use of valuable water resources." Lee Hersh (109)

"{It is important to} "p opularize indigenous safe practices…" Lalit Mohan Patra (113)

Poverty alleviation:

"{Poverty} is the reason these programs do not sustain without the backup support of the provider" Mohammed Kamal Sarwat (58)

"Demand Responsive Approach allows people to choose their levels of service according to ability to pay. To me, it does not satisfactorily deal with the problem of limited resources, where one community's of household's ability to pay for higher levels of service may reduce the resource available to poorer communities or households, now and in the future." Jeremy Ockelford (70)

"Until we begin looking at {water} holistically, and adopt a corresponding integrated resource management/integrated use management approach, we will not be able to interconnect water provision and poverty reduction" …"If water is an economic good, its conservation will henceforward be driven by market principles, and by pricing" …"Poor people's 'willingness to pay' for services has in some cases been wilfully misconstrued: where they pay they invariably have no choice, which is a strange way of looking at 'demand'." Maggie Black (92)

"Isn't very likely that safe drinking water with reduced incidence of mortality and morbidity from waterborne disease has real value and may contribute to improvement in economic conditions for individuals?" …"Market based incentives tend to be effective ways for people to set priorities" Joseph Cotruvo (93)

"I would like to share some information from Latin America that indicates that WATER IS A MONEYMAKER"... "If technologies are available, "attractive" and cheap enough poor families will buy it" Henk Holtslag (101)

"Public -health surveillance of water supply requires the collection of data on the cost, continuity, coverage and quantities of water used in addition to quality. In my experience poverty can and should form a key component in the surveillance strategy development… More information on this approach is available at www.lboro.ac.uk/watermark" Guy Howard (102)

Right to water, privatisation:

"Water, "human need" or a "human right"?" Michael Lea (94)

"Whether water should be considered a human right has been addressed by Peter Gleik of the Pacific Institute. see The Human Right to Water at www.pacinst.org …I think there is no doubt that water, as THE fundamental necessity for life, must be considered a human right. I think it follows from this, that privatization of water resources is not ethically acceptable." …"The public ownership of water is essential in a world of global water scarcity if global poverty is to be reduced through constraints on the power of multinationals and if water is to be made available as a human right. Kathryn Kelly (96)

"Water is life. It is as important as CLEAN AIR. Therefore, no individual or organizat ion should abuse the use and access of this important resources." Mohammed Kumbakumba (97)

"I am not an ardent advocate of the use of private companies to run water supplies, but would make two comments. First, the continued large number of household lacking access even to an improved communal water source let own having a water supply at their home is hardly a ringing endorsement of Government provision…Secondly, in urban and peri - urban areas, the real private sector is micro-level." Guy Howard (102)

"P rivatization of water should be a violation of a Human Right…I say this because about 2 months ago I got a strange e-mail from a German Company that asked if I had any "Water Reserves" for sale." Ron Rivera (104}

"Attractive as it would be to establish a human right to water, it is very problematic. There are two issues: right of access to the resource; right to a minimum amount of safe water. The former is embroiled with property rights. {The latter} is a service issue, and very quickly debate descends to the level of what the minimum amount would be and its degree of safety, and we are right back to the same old mind-set which thinks that all poor people need to do is to drink and to wash their hands." Maggie Black (116)

"One of the reasons for some of the water intervention to fail in rural communities is under estimating the total water needs of a household." Rajindra de S Ariyabandu (99)

"If a company is granted a license to sell on the water in a resource such as a river and run all services based on it, then this amounts to ownership for all practical purposes." Maggie Black (116)

Emergencies:

"So far little discussion about how to deal with an emergency situation, such as is now being experienced in the Yucatan peninsula…The extensive flooding h as caused severe contamination of local water supplies" Ron Sawyer (107)

"My experience is that under conditions where access to the affected population is difficult adequate water treatment is not as problematic as adequate distribution." …"I've been thinking about the use of SODIS in an emergency context" Julian Jones (112}

"All emergency responses are different and therefore what works in one situation does not work in another. For example, in Angola the use of SODIS was not applicable as most households do not posses more than one water container." Sam Godfrey (114)

"The concrete household slow sand filter (BSF) as been successfully used in several of "MedAir' s" (humanitarian) emergency relief situations. Also, the Pan-American American Health Organization' s disaster info website describes the filter with further contact information: http://www.disaster-info.net/col-ops/saludambiente/guia-filtros.htm" Michael Lea (122)

Technology choice:

"The technology has to be Cheap, Cheap, Cheap" Henk Holtslag (78)

"For WHO to accept or promote a water treatment technology, it not only should be effective in reducing microbial contaminants in water, it should also reduce waterborne disease among users…Despite the availability and use of many effective and poten tially promising technologies for home water treatment and safe storage, relatively few have been rigorously tested in such studies. In the report* I conclude that the treatment and storage systems best documented for effective performance are: (1) home chlorination with storage in a safe container (with a protective lid and a way to dispense water through a spout or spigot and not by the use of potentially dirty hand or dippers) and (2) the solar disinfection systems using clear (or painted on one side) bottles (such as SODIS). Other effective or potentially effective systems, such as boiling, solar disinfection in opaque containers (such as "solar cookers"), UV irradiation using lamps, ceramic filters and combined systems (tablets or sachets with chemicals to coagulate-flocculate and chlorinate the water) also are effective, although somewhat less well-documented based on health outcome data." Mark Sobsey (84) *
http://www.who.int/water_sanitation_health/Documents/WSH0207/managingwater.htm

"Simple, inexpen sive, and effective household based water quality interventions have a distinct role in trying to meet the preventive health needs of the underserved populations

while we await the implementation of the needed infrastructure interventions." Rob Quick (106)

Technology choice: Ceramic filters:

"Local ceramic materials in general, when given an appropriate permeable structure and saturated with silver, will tend to remove 100% of fecal coliforms... Our hope will be to put together a book which details alternatives for ceramics so that project planners in various parts of the world may be able to make choices that are appropriate in their milieu." Reid Harvey (54)

"A short compendium of appropriate ceramic media for water purification: 1. The Filter Bucket…2 . The Terafil (terracotta filter)…3. The Penguin Filter…4. The Permeable Pottery Filter Medium" …"Note also that with a view towards protecting the small potteries intended to produce this type of filter medium there are several international patents pending on the technology." Reid Harvey (57)

"Ceramic Filters. It is likely that if they are made consistently and with very good quality control they can provide water quality benefits from physical remove of larger organisms, and perhaps some biocidal action from silver coatings when used. Part of the key is the pore size range and its consistency/reproducibility across multiple units in production. However…it is clear that much of the supporting performance information is from short term studies (e.g. 3 run volumes in some cases)…Based on what I have seen it is not appropriate for claims of 100% removal to be made because the influent contamination was usually relatively low for testing purposes, so that the statistical significance of numerical results is limited. Also, virus removals will be questionable." …"My conclusion is that well made ' local industry' ceramic filters are probably beneficial and can be made at low cost." Joseph Cotruvo (63)

"I do not agree with your {Cotruvo's} statement that "cl aims of 100% removal should not be made." For my part every such assertion of 100% removal should be taken in the original context of earlier submissions, that I am reporting results of lab tests…To be sure, if I am correct a few of his laboratory filters may have proven less than 100% effective. But my impression is that these were filters that had less than adequate silver and should have been regarded as experimental." Reid Harvey (67)

"1. Concern that Katadyn may invoke patent protection of silver -impregnated ceramics is unfounded…2. Katadyn is cautious to make statements about the microbiocidal effects of silver because these effects depend very much on the exact conditions under which the microbes encounter the silver." Simon Collin (81)

"Our opera tional respons and tools: We recently improved an existing cheap Italian small TAP, that can now be reliable fitted to any locally made PVC bucket (preferably a "paint" bucket, of course with a cover)…Or, the other option, on the tap -bucket we place another cheap and locally made PVC (transparent) bucket with one or more ceramic filters that

drips the now safe water into the tap-bucket.
http://www.jiscmail.ac.uk/files/SODIS/Kisii_Bucket.jpg"Paul van Beers (83)

"Putting a sprout/tap on a water storage fac ility to avoid dipping, for example, reduces the extent of contamination appreciably. By using simple filters that are locally made (e.g. ceramic). Then with two pots arranged one on top of the other making simple column of water, which could, filtered collected at the bottom-using simple water tap." Alfred Mvungi/ Beda Lyimo (109 bis)

Technology choice: Sand filters:

"Slow sand filters (see http://www.cawst.org) known as BioSand or the Canadian - Bangladesh filters, typically provide 90% to 99% removal (documented in published studies) of fecal coliform." Lee Hersh (40)

"If it is true that these remove pathogens at between 90 to 99% efficiency this is certainly preferable to the percentages I indicated {see (29)}, but I would think that if held to the kind of peer review standard of which you {Lee Hersh} speak this system should not be claiming greater than the lower end of the range, i.e. 90%." Reid Harvey (53)

"The Biosand filter (BSF) is a slow sand water filter which is specifically designed for intermittent use…Average fecal coliform removal rate of 93%." Michael Lea (65)

"Similar sand filters {Biosand filters} are being used in parts of Orissa and are found to be effective." Shunmuga Paramasivan (73)

"MIT has an excellent submission, prepared by He ather Lukacs, entitled "Appropriate Drinking Water Treatment: A Framework for Point-of-Use Technology Evaluation, May 2002". It can be found at: http://web.mit.edu/11.479/www/submissions.html" Michael Lea (86)

"We will conclude a 3 year research on a hous ehold based water filter in April 2003…It consists of a roughing filter and a slow sand filter. No problem with intermittent use. The maximum capacity per day is 480lit. drinking water at a flow rate of 0.1m/hr. The filter can cope with very polluted and turbid water." Urs Schaermeli (87)

Technology choice: Chlorination:

"Oxfam GB initiated a point source chlorination in collaboration with local community members to encourage community based water quality monitoring. The result was the development of a cost effective chlorination process of more than 400 wells that provided "safe" water to more than 25,000 people (see http://www.lboro.ac.uk/wedc/conferences/27contents.htm)" Sam Godfrey (62)

"I would like to share Madagascar's experience with SUR'EAU, which is a solution of sodium hypochloride of 0.4%. It is easy for communities to use and cheap." G. Nkusi (103)

"{JIK} is a solution of 3.5% sodium hypochlorite produced by Reckitt Benkiser and is readily available in many countries in sub-Saharan Africa. {We} have chosen not to use JIK for 2 reasons: it is relatively expensive, and it is difficult to use at the household level because its rather high concentration requires use of a dropper to avoid using too high a dose." Rob Quick (120)

Technology choice: SODIS:

"The concept is very simple - all it requires are clear plastic bottles and sunshine. All you have to do is fill the raw water in plastic bottles and place them in the sun for a day (ok, it's a little more complicated than that, but not much!)… Of course it also has its limitations, such as the limited amount of water that can be treated this way. If you want to learn more about the technology, please check out the main SODIS website: http://www.sodis.ch" Matthias Saladin (66)

"EAWAG/ SANDEC recently published a manual for the application of Solar Water Disinfection: Solar Water Disinfection - A guide for the application of SODIS {http://www.sodis.ch/files/SODIS_Manual.pdf}" Regula Meierhofer (90)

Technology choice: Rainwater harvesting:

"It has been quite difficult to find low cost and appropriate technologies to remove the high content of iron and we are presently considering going into rain water harvesting on a large scale." Tokunbo Ogbe (47)

"The investigations found no measurable differences in rates of gastrointestinal illness in children who drank filtered disinfected mainswater that was fully compliant with Drinking Water Guidelines versus children who drank rainwater." David Cunliffe (55)

"Utilising the non-conventional water sources, like rainwater harvesting, ground water recharge can make a difference in the water availability." Rajindra de S Ariyabandu (88)

Technology choice: Fluoride mitigation:

"Findings from this study {UNICEF fluorosis mitigation project in Rajastan}: 1. Nalgonda Technique, is not very popular and acceptability is poor. 2. Activated Alumina Technology, due to ease of handling and user friendly method, model is very popular." Nadarajah Moorthly (79)

Iron, groundwater quality, acceptability:

"Gradually we beg an to comprehend that groundwater quality was not static situation, that we understood very little of groundwater chemistry and microbiology of our project area and that we were in an "aggressive" groundwater area, of which little was known." Raj Kumar Daw (69)

"The GI raiser pipes being used in the India Mark II hand pumps in most places are really becoming the source for iron contamination…The change from GI to HDPVC is the solution…" Shunmuga Paramasivan (74)

"It would be prudent not to raise scare on use of GI pipes…{we should look at} the quality assurance of GI pipes…and the chemical composition of the borewell water… However, the use of non metallic pipes as conveyance system for water is worth exploring taking into account the long term impacts on health." Shiva Narain Singh (95)

H2S water quality testing method:

The simple and proven test for bacteriological contamination (H2S test) is available for the last 3 to 5 years, but no one is strongly promoting it. This is the cheapest option available and could really be implemented by the community themselves and highly sustainability. Why we are not promoting and demonstrating? Sampath Kumar (48)

"Our experience with the use of H2S based bacteriological test has been excellent…" Arun Kumar Mudgal (98)

"I strongly urge all those interested in this test to read the report* by Mark Sobsey available from WHO." … "There are many environmental micro -organisms that can provide a positive result in the H2S strip" …"Communities will benefit more from tol ls such as sanitary inspection, improved training in O&M, hygiene education and sanitation promotion rather then promoting a water quality test of debatable value." Guy Howard (111) * http://www.who.int/water_sanitation_health/Documents/H2S/WSH02.08.pdf

"In the UNICEF/IRC-sponsored e-conference on School Sanitation and Hygiene Education (April to June 2002), Dr. Donald Sharp from WHO in Fiji described the use of H2S to promote handwashing in schools." Greg Keast, moderator (info 08)

Week Three Discussion Summary

Tools

During the week the question of water quality was slowly exhausted. Rupert Talbot (167) quoted data from India (nearly 45% of households consumed contaminated water). Chander Badloe (182) put some light on the case in Vietnam and responded to Simon Collins query.

The effectiveness of ceramic water filters and the use of colloidal silver as appropriate technology for water treatment was again a topic. Reid Harvey (141, 151, 202) and Guy Howard (145) went deeper into the subject and explained their views.

Ron Sawyer pointed us to software tools (163) and ecological sanitation (149)

Choice of Technology

Many of the participants advocated strongly for the household level solutions. Their sustainability and ease of organizing maintenance was often quoted. The technologies mentioned were bucket and rope, rope pump, cheap handpumps in Pakistan. These technologies offer the potential that supply chains for goods and services can be relatively easily established. It was also pointed out that existing commercial mechanisms should be used with as little interference into the market as possible.

Affordability was a key issue and some participants insisted on "Cheap, Cheap, Cheap", "..i.e. that the simpler the lifting device ..the better"

In relation to the water quality the majority of participants appeared to be of the opinion "that the first priority should be the availability of sufficient water and the question whether the water is absolutely pure is of secondary importance". "..perhaps the le ss SAFE from a microbiological point of view but more SUSTAINABLE lifting devise is more appropriate."

However the quality aspect was also raised and it was also pointed out that these choices need to be physically possible. As Ned Breslin (187) pointed out "it's insane to talk of protected wells with windlass and bucket in areas where the borehole goes 100 metres underground".

However the point was reinforced that after all the range of choices should be as wide as possible. In my personal view we did not tackle the point enough how to make sure that the users have a fair choice i.e. can make an informed decision without being pushed towards the solution "WE" want to promote. But I guess this would merit another conference.

And, as usual, the question whether handpumps are an appropriate technology was raised several times. The wide range of options was highlighted by Ludo Jacobs (165) "What about if the local people ONLY WANT mechanized pumps?" The answer to this question was again that it is not always possible to provide the desired level of service since especially in Africa it is difficult drilling high yielding boreholes.

Ned Breslin summed the matter up "There are no perfect technologies, no matter how hard we try".

Rob Quick (200) recapped the view of many participants when he said "New technologies need to be proven in the lab first, but then in the field, in terms of sustained performance;

acceptability to the target populations; ease of use; compatibility with local values and beliefs; and compatibility with local needs". He went on to ask for "a catalogue of interventions, that would include a technical description, cost, results of evaluations, locations where they are in use, implementation approaches, and contact information. Henk Holtslag (201) said that in fact the Dutch Practica Foundation is working on such a inventory.

Sustainability

Sustainability depends on three factors: technology development, management and finances. And Rupert Talbot (192) added a fourth dimension to it "While technology can be made to last through careful design and proper management, the environment can be harmed by its very use. …While properly developed technology has an essential place in water and sanitation programmes, there is not and never will be, a perfect technical solution." The technology solutions have to be constantly improved and adapted to what people actually want. Affordability is an aspect that affects sustainability. However as Paul van Beer (178) pointed out "Sustainability has a lot to do with quality and not with cheap only." The general view of the conference was that supply chains and logistic solutions have to be in place to allow the communities to fulfil their roles. But very important is that the communities truly take possession of their water systems, as Mohammed Kamfut (157) put it "On the issue of sustainability the, the role of community management cannot be over emphasised. Experience from the field has shown that projects are better managed and sustained where communities are organised and have a sense of ownership."

Water Resource Management

Linked to sustainability is very much the resource management, Muhammad Raza Ali Gandapur (166) illustrated "How we manage our rivers, and even larger reservoirs of fresh water, is likely to become one of the major technical and political concern of the next few decades." S. Damoran suggested (162) "why not we could think of organising a summit on water security" and Martin Beyer (181) raised his concerns about "the matter of water resources, their quality and availability on a long-term basis." He asked "how much is there of co-operation and co-ordination between the implementers and users of water and sanitation facilities, and the institutions studying and the water resources?" Rupert Talbot (192) and Mathias Saladin (170) called for long term monitoring tools for innovative technology.

Ron Sawyer (148) pointed out that "Water Security should not be measured on a year-round cycle,…but rather in terms of what we will be leaving to th e future generations."

Water as a Human Right

King'ori Wathobio (144) pointed out that "The argument that water should be a free "human right" is only true when water is in its natural course. To "move or improve" on it from that natural course, involves a cost, which has inevitably to be met by someone." Kathryn Kelly (154) agrees only partially "Where people can afford to pay, even if it is

only a minimal charge, I think it is useful for a fee to be charged for water as that will assist in water conservation and paying for the water infrastructure etc. However, if people are destitute then I think there is an obligation on the government to still provide them with water access as a human right (to life). "

Water for livelihood creation (production, job creation)

Meghan Smith (147) suggested that "Rather than focusing on individual technologies to provide water security it makes sense to develop a framework for providing water security." Maggie Black (150) emphasised the economic aspects "The role of w ater in livelihood provision is not adequately recognised." And Othniel Habila (155) supported that "..countries need to plan development programmes within the framework of the poverty reduction strategy papers…but the indications from my country are that , the development of these does not always take into cognisance the need to ensure a synergy between the PRSPs (as overarching frameworks) and the sectoral strategic frameworks."

HIV

In the context of HIV/AIDS (a subject originally raised by Ngoni Mudege in week one), as highlighted by Mark Henderson (173) and Ian Thorpe (177), water and sanitation security is indeed essential; "the critical role of safe water, sanitation and improved hygiene in mitigating the impact of the HIV/AIDS epidemic and supporting strategies for positive living with HIV and AIDS." Simon Collins (174) re-emphasises this point "Mark is absolutely correct in his statements concerning the susceptibility of people living with HIV or AIDS to waterborne pathogens…" Samuel Mawunganidze (196) asks for a paradigm shift "Unfortunately, we do not have many supporters in the sector for a HIV/AIDS based approach to WES programming but the change has to happen from those with the resources…"

4. Full list of Submissions

No.	Submission	Name
Info	Household Water Security: Welcome	Moderator
1	Introduction from the Chairperson: Week 1	Mansoor Ali
2	Scarcity and Quality Problems in Pakistan	Mohammed Kamal Sarwat
3	Basic questions	Sally Sutton
4	The concept of household water security	Rajindra de S Ariyabandu
5	Water quality in the home	Ngoni Mudege
6	In the eve of Kyoto	Henk Alberts
7	RE: Basic questions	Mohammed Kamal Sarwat
8	Re Submission 07: Basic questions	David Chapman
9	Re: submission 05 - Water quality in the home	Sally Sutton
10	Re: Submission 08 - Basic questions	Sally Sutton
11	Benefits of Water Supply on Health	Guy Howard
12	Re: Submission 10 - Response on Basic Questions	David Chapman
13	Low cost treatment to eliminate fluoride? ...	Thomas Walder
14	Political-Technological-Social defined	Sam Mawunganidze
Info	References and Attachments	Moderator
Info	Resource Panel	Moderator
15	Re: Submission 14 - Political-Technological...	Margaret Westaway
16	Re: Submission 04 - The concept of household ...	David Proudfoot
17	Need for broad understanding of the water ...	Soungalo Togola
18	"extent and repercussions of water ...	Vincent W Uhl
19	Low cost solution for defluoridation	Gérard Pankert
20	tech and social aspects- an intro	Reid Harvey
21	Re: submision 20 - tech and social aspects...	Joseph Cotruvo
22	Re: submission 21 - tech and social aspects...	Lee Hersh
23	Networking Resources	Michael Lea
24	Re: submission 18 "extent and repercussions...	George Saquee
25	Re: 22 ... tech and social aspects...	Joseph Cotruvo
26	Perceptions of Water Quality	Rajindra de S Ariyabandu
27	Water security and the private sector--Bangladesh	JW Rosenboom
28	Household drinking water quality & health	Andrew Trevett
29	Re: submission 21 ... tech and social aspects...	Reid Harvey
30	Water security and arsenic	Jan Willem Rosenboom
31	Care, conservation and wastage	S. Damodaran
32	Re: submission 25 ... tech and social aspects...	Leendert Vijselaar
33	Ground Water Based Drinking Water Programmes	Rupert Talbot
34	Household Water Security	Maggie Black
35	Re: submission 28- Household drinking water quality & health	S. Sutton
36	Re: Sally Sutton' s questions	George Katumba
37	Re: submission 24 ...extent and ...	Maria do Carmo Zinato
38	Re: submission 33 - Ground Water Based ...	Emmanuel Alhassan
39	Re: submission 21 ... tech and social aspects...	Simon Collin
40	Re: submission 29 - ... tech and social aspects...	Lee Hersh
41	Household water treatment	Guy Howard

No.	Submission	Name
42	Water availability and security	Han Heijnen
43	Sharing best practices and experiences for common good	M.V.Rao
44	Re: submision 43 - Sharing best practices...	Lee Hersh
45	Household Sand Filtration	Mohammed Kamfut
46	Week One Overview and Summary of Discussions	Mansoor Ali
47	Water Quality and Quantity	Tokunbo Ogbe
48	Water Quality	Sampath Kumar
49	Water Scarcity	Sampath Kumar
50	Re: submission 49 - Water Scarcity	Vaughan Davidson
51	Re: submission 39...tech and social aspects...	Ron Rivera
52	Customs, Beliefs, Human Behaviour & Safe Drinking Water	M.V.Rao
53	Re: submission 40...Lee Hersh on Documented Tests and SSF	Reid Harvey
54	Re: submission 39...Simon Collin on Ceramic Filter Media	Reid Harvey
55	Rainwater tanks	David Cunliffe
56	Introduction from the Chairperson: Week 2	Jamie Bartram
57	A compendium of appropriate ceramic water filters	Reid Harvey
58	Pakistan experiences	Mohammed Kamal Sarwat
59	Re: submissions 49 & 56 Trying smaller steps in technology	S. Sutton
60	Hygiene promotion, water quality and cross contamination	John Pinfold
61	Point of intervention	Beda Lyimo
62	Re: submission 61- Point of intervention	Sam Godfrey
63	Re: submission 61- Point of intervention	Joseph Cotruvo
64	Re: submission no. 59 - trying smaller steps...	Ron Rivera
65	Biosand Water Filter Technology	Michael Lea
66	A cheap water treatment option at the household level	Matthias Saladin
67	Re: Submission 61- Ceramic Filters	Reid Harvey
68	Indicators and sanitary inspection	Guy Howard
69	Orissa Rural Water Project Experience	Raj Kumar Daw
70	Security, water resource management, and poverty	Jeremy Ockelford
71	Re: submission 60 - Hygiene promotion, ...	Shunmuga Paramasivan
72	Re: submission 66 - A cheap water treatment...	Shunmuga Paramasivan
73	Re: 65 - Biosand Water Filter...	Shunmuga Paramasivan
74	Re: 58 - Pakistan experiences	Shunmuga Paramasivan
75	Re: 64 & 59 - trying smaller steps...	Shunmuga Paramasivan
76	Re: 70 - Water security and poverty	Michael Lea
77	Re: painting bottles	Matthias Saladin
78	Call for update of low cost options	Henk Holtslag
79	Household Defluoridation Filters	Nadarajah Moorthy
80	Re: 72 & 66 - A cheap water treatment...	Joseph Hogan
81	Silver, ceramics and patents	Simon Collin
82	Re 77 ... painting bottles	Joseph Cotruvo
83	Kisii water filters	Paul van Beers
Info	H2S Test	Moderator
Info	Additional Info on Solar Disinfection	Moderator
84	Household Water Treatment and Storage	Mark D. Sobsey
85	Re: 66 - Solar Dis and Low Cost	Reid Harvey

No.	Submission	Name
86	Point-of-Use Technology Evaluation	Michael Lea
87	BARISOT Water filter	Urs Schaermeli
88	Use of green water	R. de S. Ariyabandu
89	Solar Water Disinfection	Regula Meierhofer
90	SODIS Manual	Regula Meierhofer
91	Re: 70 & 60 - Hygiene promotion	Sam Godfrey
92	Water and poverty - Re: 70, 76, and others	Maggie Black
93	Re: 92 - Water and poverty ...	Joseph Cotruvo
94	"human need," or "human right?	Michael Lea
95	: Re: 74 & 58 - Pakistan experiences	Shiva Narain Singh
96	Water Security - water as human right	Kathryn Kelly
97	Water Is Life	Mohammed Kumbakumba
98	Tools for Mitigation	Arun Kumar Mudgal
99	Re: 92 on Water Poverty	R. de S. Ariyabandu
100	Message from the Chairperson	Jamie Bartram
101	Water reduces poverty	Henk Holtslag
102	Water, poverty & health	Guy Howard
103	Re: 91 etc. - Hygiene promotion	G. Nkusi
104	Re: 100 - Message from the Chairperson	Ron Rivera
105	Promotion and Social Marketing	Joseph Swai
106	Evaluation of health impact	Rob Quick
107	Emergency water treatment	Ron Sawyer
108	Re: submission 103, on use of sodium hypochloride	Reid Harvey
109	Sanitation Issues	Lee Hersh
109(2)	Way forward	Alfred Mvungi
110	Re: 91... Hygiene promotion	Lalit Mohan Patra
111	H2S strips	Guy Howard
112	Re: 107 - Emergency water treatment	Julian Jones
113	Hyg Promotion Appropriate Technology...	Lalit Mohan Patra
114	Re: 112 & 107 - Emergency point source chlorination	Sam Godfrey
115	Solar disinfection	B. Lyimo/ A. Mvungi
116	Water rights and ownership	Maggie Black
117	Re: 107 - Emergency water treatment	Simon Collin
118	Re: 103 ... Hygiene promotion	Peter Wurzel
119	Sustainability	Ned Breslin
120	Re: 118 Sodium hypochlorite	Rob Quick
121	Re: 112 & 107 - Emergency water treatment	Ron Rivera
122	Emergency Relief	Michael Lea
123	End of Week Two	Jamie Bartram
Info	H2S for Handwashing Promotion	Moderator
124	Re: Info 08 - H2S for Handwashing Promotion	Rupert Talbot
125	Alternative technologies	Stewart Dallas
126	Re: 119 - Sustainability	Reid Harvey
127	Rights and Sustainability	Rajkumar Daw
128	Re: 120 & 118 - Sodium hypochlorite	Peter Wurzel
129	Stimulating children, handpump model	Henk Holtslag

No.	Submission	Name
130	Re: 127 - Are they really sustainable?	S. Damodaran
131	Re: 130 - Ideas to Increase sustainabilty	Henk Holtslag
132	Introduction from the Chairperson: Week 3	Erich Baumann
133	Mechanized pumps	Ludo Jacobs
134	Re: 129 - Stimulating children...	Peter Wurzel
135	Re: 130, 127, 119 - Methods of Sustainabilty	Sam Godfrey
136	Re:108 & 103, on use of sodium hypochloride	Lalit Mohan Patra
137	Re: 132 Introduction from the Chairperson - Week 3	K M Minnatullah
138	Re: 92, 119, 127, 130 on sustainability	Joep Blom
139	Flood Management	Michael Lea
140	Week Two Overview	Jamie Bartram
141	Re: Ceramic filters and colloidal silver	Reid Harvey
142	Questions for Consideration	Oluwafemi Odediran
143	Access to Safe Water and Sustainability - 1	King' ori Wathobio
144	Access to safe water and sustainability - 2	King' ori Wathobio
145	Treatment performance	Guy Howard
146	Re: 142 - Questions for Consideration	Farooq Khan
147	Frameworks for security	Meghan Smith
148	Ecological sanitation	Ron Sawyer
149	Ecological Sanitation Publications	Ron Sawyer
150	Re: 147 - Water security	Maggie Black
151	Re:145 - Treatment performance	Reid Harvey
152	Use of nanoscale alumina ceramic fibers...	Allan Hoffman
153	Practice of water security	R. de S. Ariyabandu
154	Water as a ' human right'	Kathryn Kelly
155	Impact of WES on the Poor	Othniel Habila
156	Technology, health and the environment	Rupert Talbot
157	Sustainability	Mohammed Kamfut
158	Re: 138 .. and the Handpump Option	Peter Wurzel
159	Re: 147 - Frameworks for security	Bilqis Amin Hoque
160	Re: 158 Water Security and groundwater extraction	Sam Godfrey
161	Experiences in Rural Sanitation	M.V.Rao
162	E-conference on water security	S. Damodaran
163	Hygiene education	Ron Sawyer
164	Re: 144 - Access to safe water...	Muhammad Raza Ali Gandapur
165	Reaction to Peter Wurzel - no.138	Ludo Jacobs
166	Blue Revolution	Muhammad Raza Ali Gandapur
167	From the Pump to the Pot....	Rupert Talbot
Info	Information on PHAST	Moderator
168	Re: 161 - The poor can pay	Henk Holtslag
169	Re:142 - Questions for Consideration	Mohammed Kumbakumba
170	Re: 156 - Long term monitoring protocols	Matthias Saladin
171	Re: 161 - India experience	Abul Kalam
172	Reminder - End of Conference	Erich Baumann
173	HIV and AIDS	Mark Henderson
174	Re: 173 - HIV and AIDS	Simon Collin

No.	Submission	Name
175	Enemies to safe drinking water	M.V.Rao
176	Re: 165 - Reaction to Peter Wurzel...	Saul Arlosoroff
177	Aids and Pump Aid in Africa	Ian Thorpe
178	Sustainability of water supply	Paul van Beers
179	Multi sectoral approach as key to sustainable...	Henk Alberts
180	Re: 173 - HIV and AIDS	Rob Quick
181	Last minute reflections: Water resources monitoring...	Martin Beyer
182	Re: 117 - Emergency water treatment	Chander Badloe
183	Re: 169 ...Questions for Consideration	Farooq Khan
184	HIV/AIDS + community siting of wells	Anna-Marie Ball
185	Re: 173 ... HIV and AIDS	Moses Gava
186	Re: 165 - boreholes and handpumps	Peter Wurzel
187	HIV/Aids and watsan	Ned Breslin
188	Sustainable Development	Muhammad Raza Ali Gandapur
189	Blue Revolution	Muhammad Raza Ali Gandapur
190	Follow-up to 186	Peter Wurzel
191	Re: 178 - Sustainability of water supply	Henk Holtslag
192	Whose water is it anyway?	Rupert Talbot
193	Re: 163 - Hygiene education	Sally Sutton
194	A Blueprint	Urs Schaermeli
Info	Distributing email addresses	Moderator
195	Final Comments	Guy Howard
196	HIV AIDS	Samuel Mawunganidze
197	water TAP requested	Paul van Beers
198	Water and ICT	John Dada
199	Re:194 - A Blueprint	Ron Rivera
200	Sustainability and the need for an evidence base ...	Rob Quick
201	Catalogue with updates on water technologies	Henk Holtslag
202	Appropriate Water Purification and HIV/AIDS	Reid Harvey
203	Interesting and useful discussion	Vanessa Tobin
204	Week Three Overview	Erich Baumann

5. List of Resources Mentioned During the E-Conference

E-CONFERENCE WEBSITE
http://www.unicef.org/programme/wes/econf.htm

WHO

WHO Water, Sanitation and Health Website
http://www.who.int/water_sanitation_health/index.html

On-line documents from WHO (the documents below are all available at: http://www.who.int/water_sanitation_health/watonline6.htm) :

- Managing Water in the Home: Accelerated Health Gains from Improved Water Supply (WHO, 2002)
- Guidelines for Drinking-Water Quality - Second Edition - Volume 3 - Surveillance and Control of Community Supplies (WHO, 1997)
- PHAST Step-by-Step Guide: A Participatory Approach for the Control of Diarrhoeal Disease (SIDA - UNDP - WB - WHO, 2000)
- The PHAST Initiative - Participatory Hygiene and Sanitation Transformation: A New Approach to Working with Communities (UNDP - WB - WHO, 1997)
- Sanitation Promotion (SIDA - SDC - WSSCC - WHO, 1998):
- United Nations Synthesis Report on Arsenic in Drinking-Water (WHO, 2001)

Other documents from WHO, available from the Protection of the Human Environment documentation centre (WHO, Av. Appia 20, 1211 Genève 27, Switzerland, Tel. +41 22 791 3872, Fax +41 22 791 4123, E-mail bravardf@who.int):

- Fact Sheets on Environmental Sanitation (WHO/EOS/96.4, 1996)
- Towards an Assessment of the Socioeconomic Impact of Arsenic Poisoning in Bangladesh (WHO, 2000)

UNICEF

UNICEF Water, Environment and Sanitation Website
http://www.unicef.org/programme/wes/

Online articles and resources from the UNICEF Web site:

- UNICEF Guide to water quality on the web
- Global Water Supply and Sanitation Assessment 2000 Report (jointly published by UNICEF, WHO and WSSCC)
- Facts for Life
- Child Info Web site, including a comprehensive WES database
- Children in the New Millennium: Environmental Impact on Health
- Learning from Experience: Water and Environmental Sanitation in India
- UNICEF Strategies in Water and Environmental Sanitation
- UNICEF Water Handbook
- UNICEF Manual on Communication for Water Supply and Environmental Sanitation
- UNICEF Hygiene Promotion Manual
- UNICEF/IRC School Sanitation and Hygiene Education Website
- WaterFRONT: UNICEF newsletter on WES

HTN

Network for Cost-effective Technologies in Water Supply and Sanitation (HTN)
http://www.skat.ch/htn/

On-line documents from HTN and SKAT (the documents below are all available at: http://www.skat.ch/db/frameset_doc.htm)

- Series of Manuals on Drinking Water Supply
- Working Papers on Water Supply and Environmental Sanitation
- Aguasan Workshop Reports
- HTN Workshop Proceedings
- General Water and Environmental Sanitation Publications

E-CONFERENCE SUBMISSIONS

Attached to submissions and available on the Virtual Forum web-site

- HHSandfiltration.doc
- SODIS in Nepal.doc
- AA Filters.doc

Linked to web-sites

- Appropriate Drinking Water Treatment: A Framework for Point-of-Use Technology Evaluation, Heather Lukacs, May 2002: http://web.mit.edu/11.479/www/submissions.html
- BioSand filters: http://www.cawst.org, http://www.disaster-info.net/col-ops/saludambiente/guia-filtros.htm
- Colloidal silver: http://www.silver-colloids.com
- Composting toilets: http://oikos.com/library/compostingtoilet
- Ecological sanitation: www.laneta.apc.org/sarar, http://www.ecosanres.org/PDF%20files/Ecological%20Sanitation.pdf
- Filter buckets: http://www.jiscmail.ac.uk/files/SODIS/Kisii_Bucket.jpg
- H_2S method: http://www.who.int/water_sanitation_health/Documents/H2S/WSH02.08.pdf
- Information about monitoring and sanitary inspection: manuals that can be downloaded at www.lboro.ac.uk/watermark or www.who.int/water_sanitation_health
- Participatory Planning for Integrated Rural Water Supply and Sanitation Programmes: Guidelines and Manual. http://www.lboro.ac.uk/departments/cv/wedc
- Point source chlorination: http://www.lboro.ac.uk/wedc/conferences/27contents.htm)
- Rainwater tanks: http://www.health.sa.gov.au/pehs/publications/monograph-rainwater.pdf
- Ropepumps: www.ropepump.com
- School sanitation and hygiene education: http://www.irc.nl/sshe
- SODIS manual: http://www.sodis.ch/files/SODIS_Manual.pdf
- SODIS: http://www.sodis.ch
- SOLAR disinfection of coliform bacteria in hand-drawn drinking water, V Meyer and RH Reed: http://www.wrc.org.za/wrcpublications/wrcwatersa/wsa0011c.htm
- The Human Right to Water, Peter Gleik: www.pacinst.org
- The New Economy of Water, Peter Gleik: www.pacinst.org
- World Food Day: http://www.fao.org/wfd/index_en.asp

Others

- Ahmed M. Feroze, Alternative Water Supply Options for Arsenic Affected Areas of Bangladesh., 2002, ITN/BUET and WSP-SA, Contact: Shafiul Azam Ahmed, World Bank/WSP-SA, wspsa@worldbank.org
- Alexander van Geen et al., Promotion of well-switching to mitigate the current arsenic crisis in Bangladesh, Bulletin of the WHO 2002, 80 (9): 732-737.
- Almanza G., Iriarte M., Efecto del método SODIS sobre la
- Bolivia, 2002.
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6. List of Participants

First	Last	Email	Country	Organisation
Henk	Alberts	ropepump@ibw.com.ni	Nicaragua	Bombas de Mecate
Ilan	Adler	ilan@cablevision.net.mx	Mexico	Alliant International University
Emmanuel	Alhassan			
Mansoor	Ali	mali@unicef.org	USA	UNICEF
Rajindra de S.	Ariyabandu	wrsrds@sltnet.lk	Sri Lanka	Water Resources Secretariat, Sri Lanka
Saul	Arlosoroff	sarlo@inter.net.il	Israel	Israel-Water Engineers Association
Chander	Badloe	cbadloe@unicef.org	Vietnam	UNICEF
Anna-Marie	Ball	amball@zamnet.zm	Zambia	Rural Water Supply Project, Chipata
Jamie	Bartram	bartramj@who.int	Switzerland	WHO
Erich	Baumann	erich.baumann@skat.ch	Switzerland	HTN/SKAT
Martin	Beyer	martin.beyer@sympatico.ca	Canada	UNICEF (retired)
Maggie	Black	maggie@black.win-uk.net	UK	Writer
Joep	Blom			
Theechat	Boonyakarnkul	tchat@health.moph.go.th	Thailand	Ministry of Public Health, Thailand
Ned	Breslin	wateraid-mz@teledata.mz	Mozambique	WaterAid
David	Chapman			Operation Clean Water
Simon	Collin	simon.collin@virgin.net	UK	First Water
Joseph	Cotruvo	joseph.cotruvo@verizon.net	USA	J. Cotruvo Associates
David	Cunliffe	david.cunliffe@dhs.sa.gov.au	Australia	South Australian Dept of Human Services
John	Dada	johndada@fantsuam.com	Nigeria	Fantsuam Foundation
Stewart	Dallas		Costa Rica	Instituto Monteverde
S.	Damodaran	try_gramlaya@sancharnet.in	India	Gramalaya
Vaughan	Davidson	vaughan@awod.com	USA	
Raj Kumar	Daw	rdaw@unicef.org	India	UNICEF
Muhammad Raza Ali	Gandapur	gomalzam@bluerevolution.net	Pakistan	Blue Revolution
Moses	Gava		Uganda	
Sam	Godfrey	s.e.n.godfrey@lboro.ac.uk	UK	WEDC
Othniel	Habila	ohabila@unicef.org	Nigeria	UNICEF
Reid	Harvey	pottery@wlink.com.np	Nepal	Ceramic industrial designer
Han	Heijnen	whosani@citechco.net	Bangladesh	WHO
Mark	Henderson	mhenderson@unicef.org	USA	UNICEF
Lee	Hersh		USA	
Allan	Hoffman	ahoffman@winrock.org	USA	Winrock International
Joseph	Hogan	minesota@myrealbox.com		
Henk	Holtslag	holtslag.dapper@wxs.nl	The Netherlands	
Bilqis Amin	Hoque		Bangladesh	Environment and Population Research Center
Guy	Howard		UK	WEDC

First	Last	Email	Country	Organisation
Ludo	Jacobs	ludo@award.org.za	South Africa	AWARD: Association for Water and Rural Development
Julian	Jones	julian.jones@skat.ch	Switzerland	SKAT
Abul	Kalam	abkalam@unicef.org	India	UNICEF
Mohammed	Kamfut	mkamfut@unicef.org	Nigeria	UNICEF
George	Katumba			
Greg	Keast	gkeast@ica.net	Canada	Consultant
Kathryn	Kelly	Kathryn.Kelly@anu.edu.au	Australia	Australian National University
Farooq	Khan		Pakistan	UNICEF
Sampath	Kumar		Ethiopia	UNICEF
Mohammed	Kumbakumba	mkumbakumba@unicef.org	India	UNICEF
Michael	Lea	mikel@scilink.org		Independent water practitioner
Beda	Lyimo	serviceplan@ud.co.tz	Tanzania	
Samuel	Mawunganidze	smawunganidze@unicef.org	Mozambique	UNICEF
Regula	Meierhofer	regula.meierhofer@eawag.ch	Switzerland	Dept. of Water and Sanitation in Developing Countries (SANDEC), EAWAG
K M	Minnatullah		India	Water and Sanitation Program for South Asia
Nadarajah	Moorthy		India	UNICEF
Ngoni	Mudege		Zimbabwe	
Arun Kumar	Mudgal	amudgal@mudgals.com	India	Consultant
Alfred	Mvungi	serviceplan@ud.co.tz	Tanzania	
G.	Nkusi		Madagascar	UNICEF
Jeremy	Ockelford	jockelford@aol.com	UK	Consultant
Oluwafemi	Odediran		China	UNICEF
Tokunbo	Ogbe		Nigeria	Federal Government of Nigeria
Jean - Gérard	Pankert	pank@misereor.de	Germany	Misereor, German Catholic NGO
Shunmuga	Paramasivan	waindia@satyam.net.in	India	WaterAid
Lalit Mohan	Patra		India	UNICEF
John	Pinfold	instdev@agni.com	Bangladesh	Local Government Division, MLGRD&C
Federico	Properzi	properzif@who.int	Switzerland	WHO
David	Proudfoot		Zimbabwe	Mvuramanzi Trust
Rob	Quick	rxq1@cdc.gov	USA	Centers for Disease Control and Prevention
Imran	Ramdani	ramdanii@inco.com	Indonesia	PT.Inco
M.V.	Rao	mv_rao@hotmail.com	India	Government of India, Midnapore
Ron	Rivera	ronriverat@yahoo.com		Potters for Peace
Jan Willem	Rosenboom		Bangladesh	UNICEF
Matthias	Saladin	this@ic4life.net	Switzerland	
George	Saquee	gsaquee@unicef.org	Sierra Leone	UNICEF
Mohammed Kamal	Sarwat	ecpl@super.net.pk	Pakistan	Engineering Concern (Pvt) Ltd

First	Last	Email	Country	Organisation
Ron	Sawyer	rsawyer@laneta.apc.org	Mexico	Sarar Transformación SC
Urs	Schaermeli	urs.schaermeli@bigpond.com.kh	Cambodia	Cardamon Hill Research
Shiva Narain	Singh		India	UNICEF
Mark D.	Sobsey	Mark_Sobsey@unc.edu	USA	University of North Carolina
Sally	Sutton	sally@ssutton.fsbusiness.co.uk	UK	Consultant
Joseph	Swai	josephswai@yahoo.com	Tanzania	Moshi Urban Water Supply and Sewerage Authority
Rupert	Talbot	rtalbot@unicef.org	India	UNICEF
Ian	Thorpe	ianthorpe@pumpaid.org	UK	Pump Aid
Vanessa	Tobin		USA	UNICEF
Soungalo	Togola		Chad	UNICEF
Andrew	Trevett		UK	Cranfield University
Vincent W.	Uhl	vuhl@vuawater.com	USA	Professional Hydrogeologist
Paul	Van Beers	rwd@africaonline.co.ke	Kenya	Rural Water Development (RWD) Programme, Kenya
Leendert	Vijselaar		Somalia	UNICEF
Thomas	Walder		Honduras	Swiss Agency for Development and Cooperation
King'ori	Wathobio	indepth@nbnet.co.ke	Kenya	Consultant
Margaret	Westaway		South Africa	South African Medical Research Council
Peter	Wurzel	pwurzel@unicef.org	Kenya	UNICEF
Maria do Carmo	Zinato		Brazil	Fonte D'Agua