



Safe Water Access & Training Consultants

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Safe Water Access & Training Consultants ESRI White Paper for:

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Describing

The Republic of Zambia

“5-Year Potable Water Delivery and Training Program”

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United States

Organization

*Safe Water Access & Training Consultants
Safe Water Access & Training Consultants
ResourceLinC
EMG-Africa
SecureState, LLC*

Republic of Zambia

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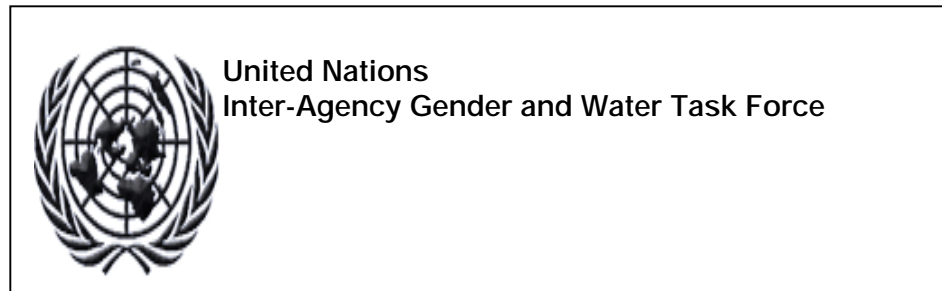
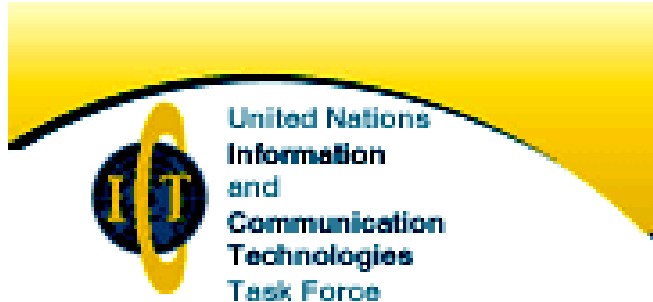
*Tropical Disease & Research Centre
Central Statistical Office
University of Zambia, School of Medicine*

Four thousand children die every day from diseases caused by bad water and sanitation. Some 1.8 million people, mostly children, are killed by diarrhea alone each year. An understanding of basic hygiene would cut the number of these deaths by almost half.



© UNICEF Sudan/2004
These village residents may not understand the danger of drinking contaminated water. Better education is essential to save lives

*Safe Water Access & Training Consultants
Proud Members of the Following Associations:*



Abstract:

The Safe Water Access and Training Consultants team will use GIS and ICT technologies to locate and provide access to safe drinking water and training for point of use water treatment in the Republic of Zambia. GIS mapping will provide knowledge of the health concerns to address illnesses, deaths, trending and strategic planning for healthcare resource deployment. Worldwide four thousand children die every day from diseases caused by bad water and sanitation.

Our team represents experts in public health, ICT, patient record security, ecosystem science, and education. GIS as a tool will monitor, track and map safe drinking water sites, treatments, the spread of diseases and improvements/ cures associated with waterborne and infectious diseases.

We will track health improvements using data and GIS-based Telehealth technologies. Emphasis is placed on (a) integrating local, regional and national observations into a coherent information framework. Health improvement results be available over the Internet.



His Excellency - President Levy P. Mwanawasa, SC being Presented with Safe Water Abstract by James Ingraham



FACTS

Population: 11 million (UN, 2005)

Capital: Lusaka

Area: 752,614 sq km (290,586 sq miles)

Major language: English (official), Bemba, Lozi, Nyanja, Tonga

Major religions: Christianity, indigenous beliefs, Hinduism, Islam

Life expectancy: 33 years (men), 32 years (women) (UN)

Monetary unit: 1 Kwacha = 100 ngwee

Main exports: Copper, minerals, tobacco

GNI per capita: US \$380 (World Bank, 2003)

Internet domain: .zm

International dialing code: +260

The Safe Water Access & Training Consultants Program – a Multi-Prong Approach

- *EduTeleCenters – 2 Per Province*
- *Point of Use Water Treatment Training*
- *Village Water Delivery Systems*
- *Free Medicine Distribution for 25% (400K) Children Between the Ages of 4-5 Years Old*
- *Disbursement of 2,000,000 Malaria-treated Mosquito Nets*
- *Disbursement of 2,000,000 Safe Water Carrying Vessels*

Safe Water Access & Training Consultants Driving Forces

Lack of Access to water supply and sanitation

- * In 2000, 2.4 billion people lacked access to improved sanitation*
- * 81% of these were in rural areas.*
- * In 2000, 1.1 billion people lacked access to improved water sources*
- * 86% of these were in rural areas.*

Coverage for both improved water supply and sanitation lags behind in the poorest communities - in rural areas and in urban/peri-urban slums.

The sanitation gap

- * Only 53% of the sub-Saharan population is served with sanitation services*
- * In South Central Asia only 38% of the population is served with sanitation services.*
- * Access to sanitation in rural areas is much worse than in urban areas.*
- * 930 million people live in slums and most population growth is expected to occur in urban areas.*

Justification for Need of a Safe Water Access & Training Program:

86.1 percent of urban households had access to safe water compared with only 29.5 percent of rural households where 65% of the population of Zambia resides.

Source: Republic of Zambia - 2000 CENSUS OF POPULATION AND HOUSING

WaterAid Case 4: Life before clean water

“This is where we used to collect all of our water from”, explains Agnes Mwiling from Choobana village. “When we drank it people were sick with diarrhea. But it wasn’t only diseases that were a problem – it used to take at least two hours to collect water from here. Depending on the time of year, we had to dig down. Sometimes the pits would be as tall as I am but then animals would push the sides in and we had to re-dig them every day.”



“We could never bathe our children then. We had to economise with our water. Our 20 litres had to last between our family for all our drinking, cooking and cleaning. Sometimes even a month would go by before we could wash our children. The women here used to suffer a lot; they used to walk a long way just to collect this dirty water. Now though things are different.”

Credit: WaterAid/Jon Spaul

Safe Water Facts – Did You Know?

diarrhea

- * 1.8 million people die every year from diarrheal diseases (including cholera); 90% are children under 5, mostly in developing countries.
- * 88% of diarrheal disease is attributed to unsafe water supply, inadequate sanitation and hygiene.
- * Improved water supply reduces diarrhea morbidity by 21%.
- * Improved sanitation reduces diarrhea morbidity by 37.5%.
- * The simple act of washing hands at critical times can reduce the number of diarrheal cases by up to 35%.
- * Additional improvement of drinking-water quality, such as point of use disinfection, would lead to a reduction of diarrhea episodes of 45%.

Malaria

- * 1.2 million people die of malaria each year, 90% of whom are children under 5.
- * There are 396 million episodes of malaria every year, most of the disease burden is in Africa south of the Sahara.
- * Intensified irrigation, dams and other water related projects contribute importantly to this disease burden.
- * Better management of water resources reduces transmission of malaria and other vector-borne diseases.

Safe Water Facts – Did You Know?

schis·to·so·mi·a·sis

n. pl. schis·to·so·mi·a·ses [-s z]

Any of various generally tropical diseases caused by infestation with schistosomes, widespread in rural areas of Africa, Asia, and Latin America through use of contaminated water, and characterized by infection and gradual destruction of the tissues of the kidneys, liver, and other organs. Also called *bilharziasis*, *snail fever*.

Schistosomiasis

- * An estimated 160 million people are infected with schistosomiasis.
- * The disease causes tens of thousands of deaths every year, mainly in sub-Saharan Africa.
- * It is strongly related to unsanitary excreta disposal and absence of nearby sources of safe water.
- * Basic sanitation reduces the disease by up to 77%.
- * Man-made reservoirs and poorly designed irrigation schemes are main drivers of Schistosomiasis expansion and intensification.

*The **5-Year Potable Water Delivery and Training Program for the Republic of Zambia** is a joint effort comprised of strategic public and private alliance partners to support the objective of reducing the needless deaths and illnesses associated with the lack of access to Safe drinking water. The Partners are as follows:*

- *Ministry of Health*
- *Central Statistical Office*
- *Tropical Disease and Research Center*
- *Women's Clubs Association of Zambia*
- *University of the Republic of Zambia School of Nursing*
- *Center for Disease Control (CDC)*
- *World Health Organization*
- *Safe Water Access & Training Consultants*
- *EMG-Africa*
- *SecureState, LLC*

The goal of this team is to come together to develop a comprehensive, robust and effective safe water system and training program solution for the people of Zambia regardless of their physical location by utilizing the added values of GIS and ICT

Safe Water Access & Training Consultants will implement Edu-TeleCenters which represents a multi-functional center.

Each EduTeleCenter is planned to have on staff at each site,

- *3 Nurses*
- *3 administrative support personnel*
- *6 computers with Internet connectivity*

Each Nurse will be provided with:

- *laptop computer loaded with ARCVIEW GIS Software*
- *portable printer*
- *portable projector*
- *Internet connectivity*
- *Global Positioning Technology*
- *and a computer case on wheels to hold all of the items.*

Women's Clubs Association of Zambia has committed:

- *1,500 volunteers to serve as district peer Safe Water Advisors to assist the nurses*
- *this translates into 20+ volunteers per district who will reach out to the remote villages*
- *each volunteer will be trained in the use of Chlorine for point of use water treatment*
- *the volunteers will provide point of use safe water treatment and Chlorine sales/ training*

In order to ensure countrywide coverage for the safe water training and implementation, there will be 2 Edu-TeleCenters in each of the 9 Provinces, which will be co-located with an identified Ministry of Health Provincial Hospital.

The Districts located in the Province will be equally divided and assigned to either of the Edu-TeleCenters for safe water support, training and medical assistance.

*This medical assistance and training Will be provided using the resources and expertise of **EMG-Africa, our medical, informatics, information and communication Technology partner.***





EMG Africa
A Medical Informatics and Telehealth Company
Sustainable Capacity Building for Africa

Mission or Vision Statement

- *Sustainable capacity building for Africa*
- *Medical informatics, information and communication technology for Africa*
- *Sustainable health care delivery systems throughout Africa*



EMG Africa
A Medical Informatics and Telehealth Company
Sustainable Capacity Building for Africa

- *Formed with the goal of implementing ICT & GIS solutions/ benefits for healthcare*
- *Balance the increasing healthcare needs with the scarce medical resources*
- *Replace the “aid-as –philanthropy” approach with “aid-as-development*
- *To focus on the potential role of medical informatics, ICT & GIS for healthcare in Africa*
- *Collaborate with the Ministry of Health to Focus on their National Strategic Health Plan*
- *Training of local medical specialists*
- *Continuing education of clinicians*
- *Consultation and support to analyze the epidemics and deploy resources as appropriate*
- *Provision of distance learning capability in healthcare*
- *Improvements of Health Information Systems*



EMG Africa
A Medical Informatics and Telehealth Company
Sustainable Capacity Building for Africa

The Lack of Medical Resources in Zambia/ Africa is Real

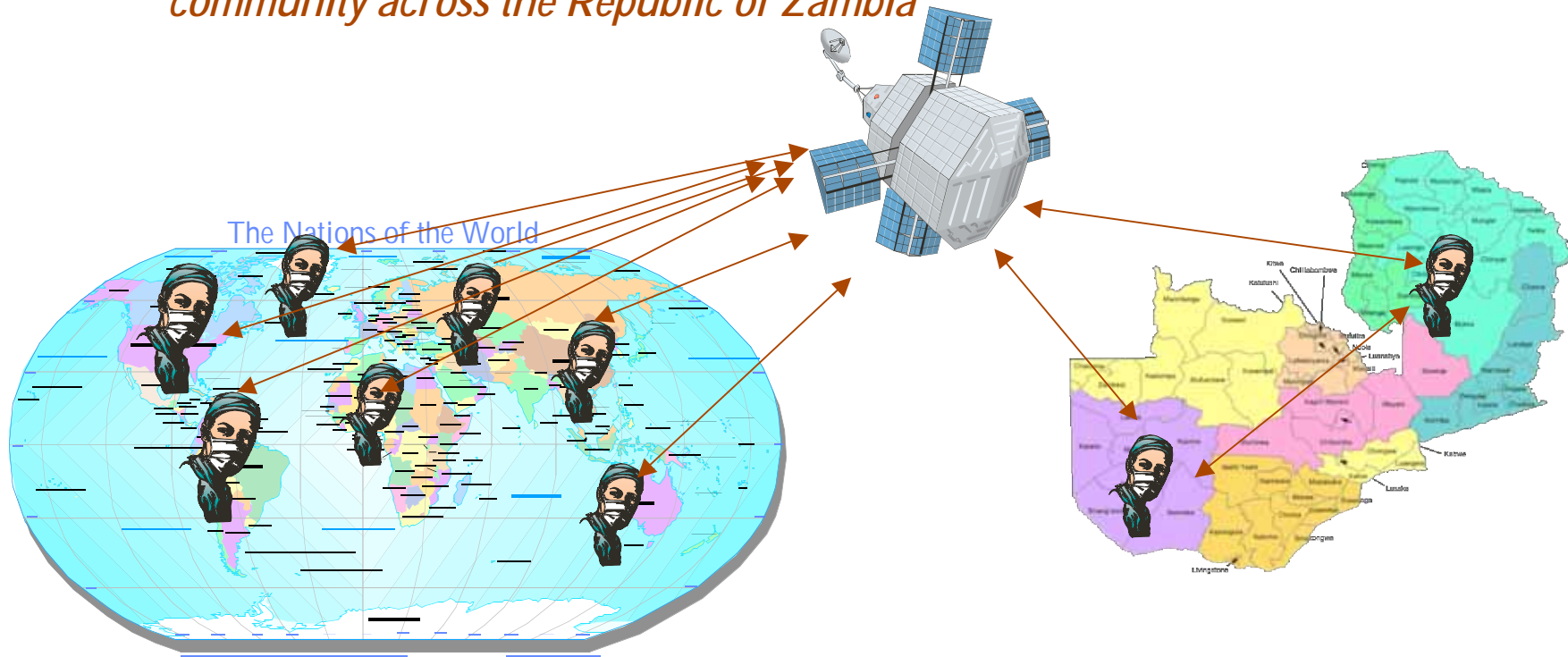
Country	WHO region	Number of physicians		Number of nurses and midwives		Number of health workers		Nurses and midwives to physicians	
		(per 10 000)	year	(per 10 000)	Year	(per 10 000)	year	(ratio)	year
Benin	AFR	0.6	1995	2.8	1995	3.4	1995	4.9	1995
Botswana	AFR	2.9	1999	24.1	1999	27.0	1999	8.4	1999
Burkina Faso	AFR	0.4	2001	3.0	2001	3.4	2001	7.5	2001
Burundi	AFR	0.5	2000	2.8	2000	3.4	2000	5.5	2000
Cameroon	AFR	0.7	1996	3.7	1996	4.5	1996	5.0	1996
Canada	AMR	18.9	2002	73.5	2002	92.4	2002	3.9	2002
Cape Verde	AFR	1.7	1996	5.6	1996	7.3	1996	3.3	1996
Malawi	AFR	0.1	2003	2.6	2003	2.7	2003	22.6	2003
Zambia	WPR	5.7	2002	7.7	2002	13.4	2002	1.4	2002
Central African Republic	AFR	0.4	1995	1.4	1995	1.7	1995	3.9	1995
United States of America	AMR	27.9	1999	97.2	1999	125.1	1999	3.5	1999
Chad	AFR	0.3	2001	1.7	2001	2.0	2001	6.7	2001



EMG Africa

A Medical Informatics and Telehealth Company
Sustainable Capacity Building for Africa

EMG Africa's Telehealth Model – will provide medical assistance via the Internet with Video Conferencing to the aid of the limited medical community across the Republic of Zambia





EMG Africa
A Medical Informatics and Telehealth Company
Sustainable Capacity Building for Africa

*The EduTeleCenters & EMG Africa are Committed to Supporting the:
Republic of Zambia National Strategic Public Health Priorities*

Within the framework of an integrated approach to health care, the following are the priority areas for the Strategic Plan 2001 – 2005:

Malaria – within the framework of Roll Back Malaria initiative.

HIV/AIDS, TB and STI – through the National HIV/AIDS Strategic Framework

Integrated Reproductive Health – which includes family planning, safe motherhood, adolescent health, abortion and post-abortion care, infertility and (sexual) violence against women.

Child health – which will aim at reducing morbidity and mortality due to childhood diseases.

Mental and oral health – creating the appropriate framework and mechanisms for strengthening of mental and oral health activities and programmes.



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Sustainable Capacity Building for Africa

Republic of Zambia National Strategic Public Health Priorities (Cont.)

Epidemics – improved public health surveillance and control of epidemics.

Hygiene, sanitation and safe water – Promotion of personal hygiene, proper refuse disposal and access to safe water and implementation of other critical aspects of environmental health as will be elaborated in the National Environmental Health Policy.



UNIVERSITY OF ZAMBIA SCHOOL OF MEDICINE



*As a “Strategic Alliance Partner”, **Ms. Prudencia Mweemba**, Lecturer, at The University of Zambia School of Medicine Department of Post Basic Nursing has issued a letter of agreement to assist us in identifying, training and deploying Nurses and/ or para-medical assistants to staff the EduTeleCenters.*

The Nurses will work with the volunteers to capture data from their in-the-field training sessions for monitoring, evaluation and review by appropriate officials to determine:

- the number of people trained in point of use safe drinking practices per district*
- reduction in waterborne disease occurrences per district*
- locations of and types of illnesses identified and treated*
- types of “free” medicines disbursed*
- number of Malaria treated sleeping nets distributed*
- trending results versus previous months, quarters, years*

In addition, each Edu-TeleCenter will be provided with 2 4-wheel drive vehicles for travel to remote villages/ towns and bicycles for travel where roads are not available as well as sleeping bags.

Introduction - Who is ResourceLinC

- *ResourceLinC is a minority company with:*
 - *40+ years combined experience in ICT*
 - *Experience in assembling industry specific teams of HIV/ AIDS professional personnel to successfully resolve challenges*
 - *History of successful project management & implementation solutions*
 - *History of successfully integrating ICT into solutions to realize the full benefit that an integrated ICT solution has to offer*
 - *History of creating leading edge, effective and successful HIV/ AIDS education programs and teaching solutions*

The ResourceLinC HIV/ AIDS Education Program

The ResourceLinC solution will be provided to the EduTeleCenter Nurses which takes the best of the available technologies which delivers:

visual impact to retain human interest

audio/ printed material to reach/ meet virtually everyone's learning style

This multimedia delivery vehicle will deliver HIV/ AIDS education, awareness and prevention material which:

- can be re-heard*
- re-read*
- re-seen*
- Will encourage voluntary adherence and behavioral change*

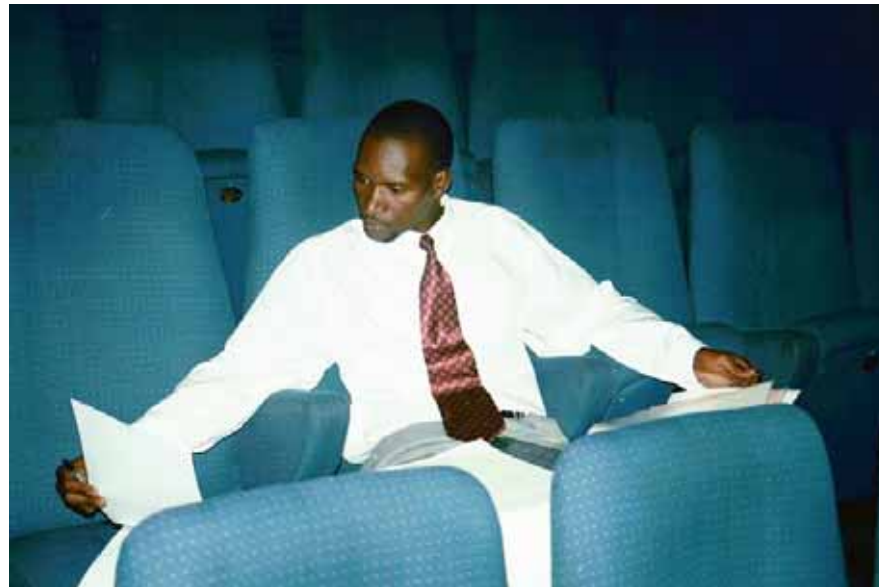
Continued learning and re-enforcement of the devastating effects of HIV and AIDS will entrench the impact of HIV/ AIDS on spouses, significant others, their children, and their country unless immediate behavioral change occurs.

The ResourceLinC HIV/ AIDS Program

The ResourceLinC HIV/ AIDS education program will be developed with intimate interaction and assistance from the Nurses and medical para-professionals to ensure that the content is culturally appropriate and relative to the life style of the people of Zambia.

This approach has been repeatedly supported by international organizations and ResourceLinC as they have successfully deployed similar programs in the Republics of Botswana and Malawi. Those who were train expressed their sincere appreciation and commitment to the outcome of the program.

The trainers felt a sense of ownership as a direct result f the program development.



The ResourceLinC HIV/ AIDS Education Program



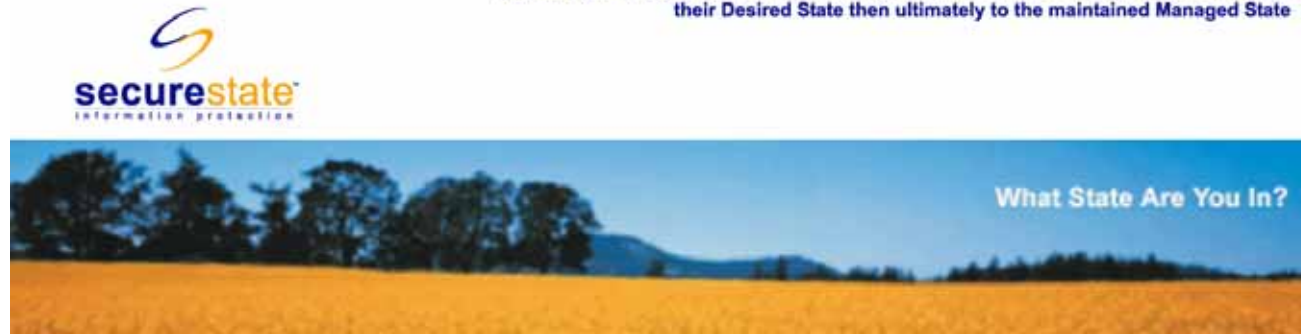
The solution will consist of:

- Providing up-to-date HIV/ AIDS education content*
- Content tested & approved by Civil Military Alliance*
- Laptop computers with GIS embedded applications*
- Portable projectors*
- Portable Printers*
- Deluxe Condom Training Penis Tool*
- Internet connectivity*
- Access to EMG-Africa Telehealth & Education Project resources for medical professional training*
- Access to WHO Health InterNetwork On-Line documents/ periodicals*
- Internet collaboration capability*
- Surveillance Tool to track level of knowledge*



SecureState – For patient record privacy confidentiality, integrity and availability

SecureState will assist clients in the transition from their Current State environment to their Desired State then ultimately to the maintained Managed State



Mission Statement

We use our broad base expertise in developing and applying innovative solutions that support government, education, healthcare, and business strategies.

Our services are worldwide in scope and are geared specifically to improving and/or implementing appropriate programs to meet and/or exceed the respective organizational performance goals.

SecureState will assist clients in the transition from their Current State environment to their Desired State then ultimately to the maintained Managed State



SecureState is committed in assisting in the development and deployment of world class and leading edge integrated solutions.

SecureState offers an extensive range of information security services for:

- Healthcare*
- Education*
- Government*
- Business, and*
- Technology based solutions*

SecureState will assist clients in the transition from their Current State environment to their Desired State then ultimately to the maintained Managed State



Nondisclosure of sensitive data has always been a priority for the SecureState team. All access to sensitive data will be controlled from an administrative, physical and technical perspective while data is at rest or in transit.

SecureState will provide the following services for the project:

- . Patient Record privacy*
- Data Integrity Services*
- Information security/ assurance services(internet/network/servers/laptops),*
- Secure coding practices*

SecureState will assist clients in the transition from their Current State environment to their Desired State then ultimately to the maintained Managed State



Project services provided by SecureState continued:

- *Security training and awareness*
- *Policies and procedures to safeguard and protect information*
- *Knowledge transfer*
- *Ongoing evaluation services*

Point of Use Water Treatment Products & Training:



The CDC Safe Water System (SWS) is a water quality intervention that employs simple, robust, and inexpensive technologies appropriate for the developing world. The objective is to make water safe through disinfection and safe storage at the point of use. The intervention consists of three steps:

Point-of-use treatment of contaminated water using sodium hypochlorite solution purchased locally and produced by a local manufacturer or in the community from water and salt using an electrolytic cell;

Safe water storage in plastic containers with a narrow mouth, lid, and a spigot to prevent recontamination; and,

Behavior change techniques, including social marketing, community mobilization, motivational interviewing, communication, and education. These activities increase awareness of the link between contaminated water and disease, the benefits of safe water, and hygiene behaviors, including the purchase and proper use of the water storage vessel and disinfectant.





Dr. Emmanuel Kafwembe, Executive Director of The Tropical Diseases and Research Centre (TDRC) as a part of their signed agreement with Safe Water Access & Training Consultants, will work closely with our Center for Disease Control trained Safe Water Specialists to modify and deploy the CDC Safe Water Program.

This program was originally co-developed with the TRDC and CDC, which as a result, makes the TDRC the most appropriate entity to provide in-country training for the EduTeleCenter nurses.

The training program will be provided to the 54 nurses assigned to the Edu-TeleCenters who will ultimately report their progress to their assigned Safe Water Access Project Manager.

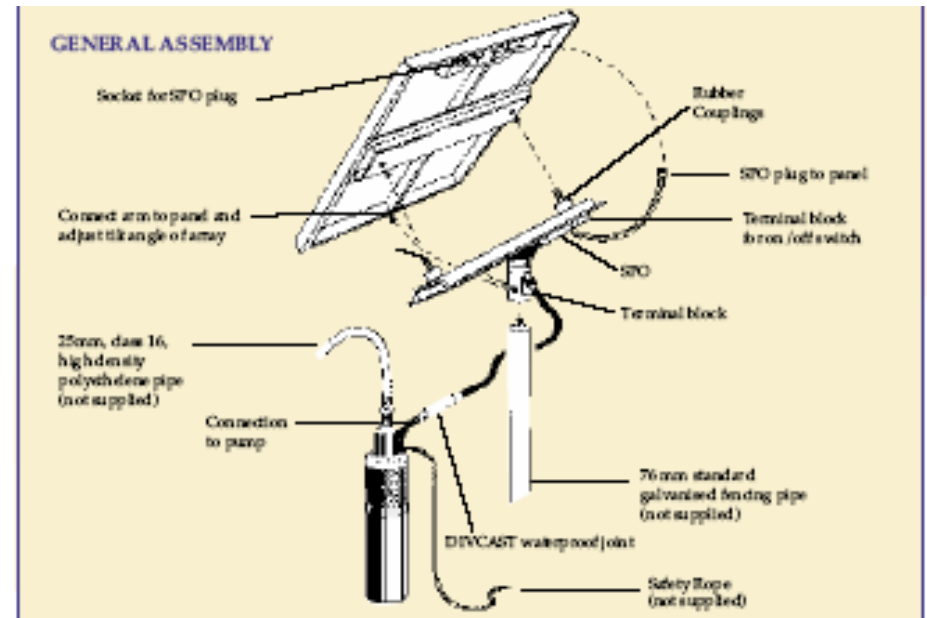
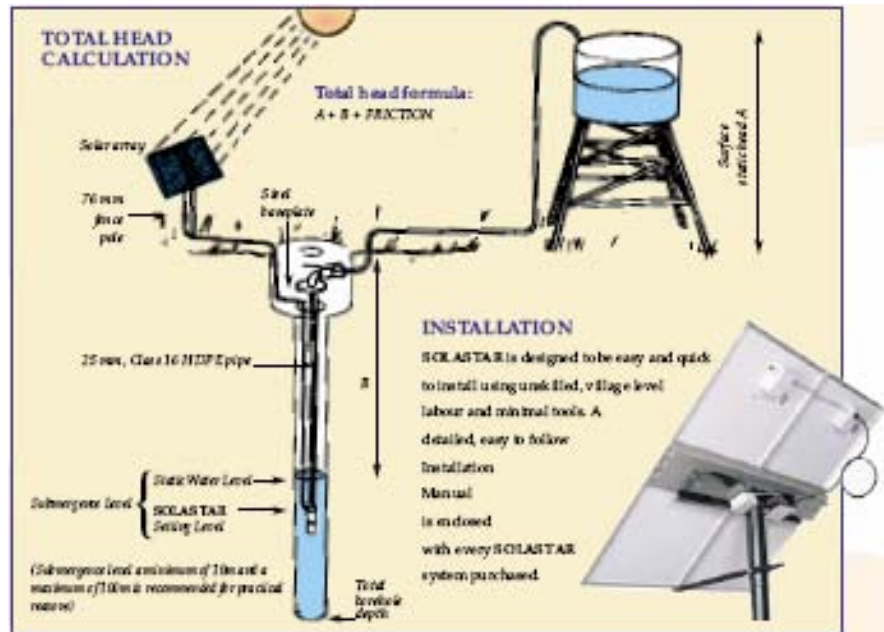
These nurses will learn the "Safe Water Systems" Strategic Plan on Community Based Safe Water Systems implementation and then train the Women Clubs Association of Zambia volunteers that are assigned to their respective Edu-TeleCenter.

Follow on Safe Water update and advanced training will be provided under an agreement with the CDC and TDRC to ensure continuing education and capacity building as each Edu-TeleCenter and the TDRC will have video/ audio conferencing capability.

Village Water Supply and Distribution System:

In addition to the safe water training that will be provided to the volunteers, Safe Water Access & Training Consultants will implement 144 Solar Water Pumping Systems in the most vulnerable districts/ areas across the Republic of Zambia.

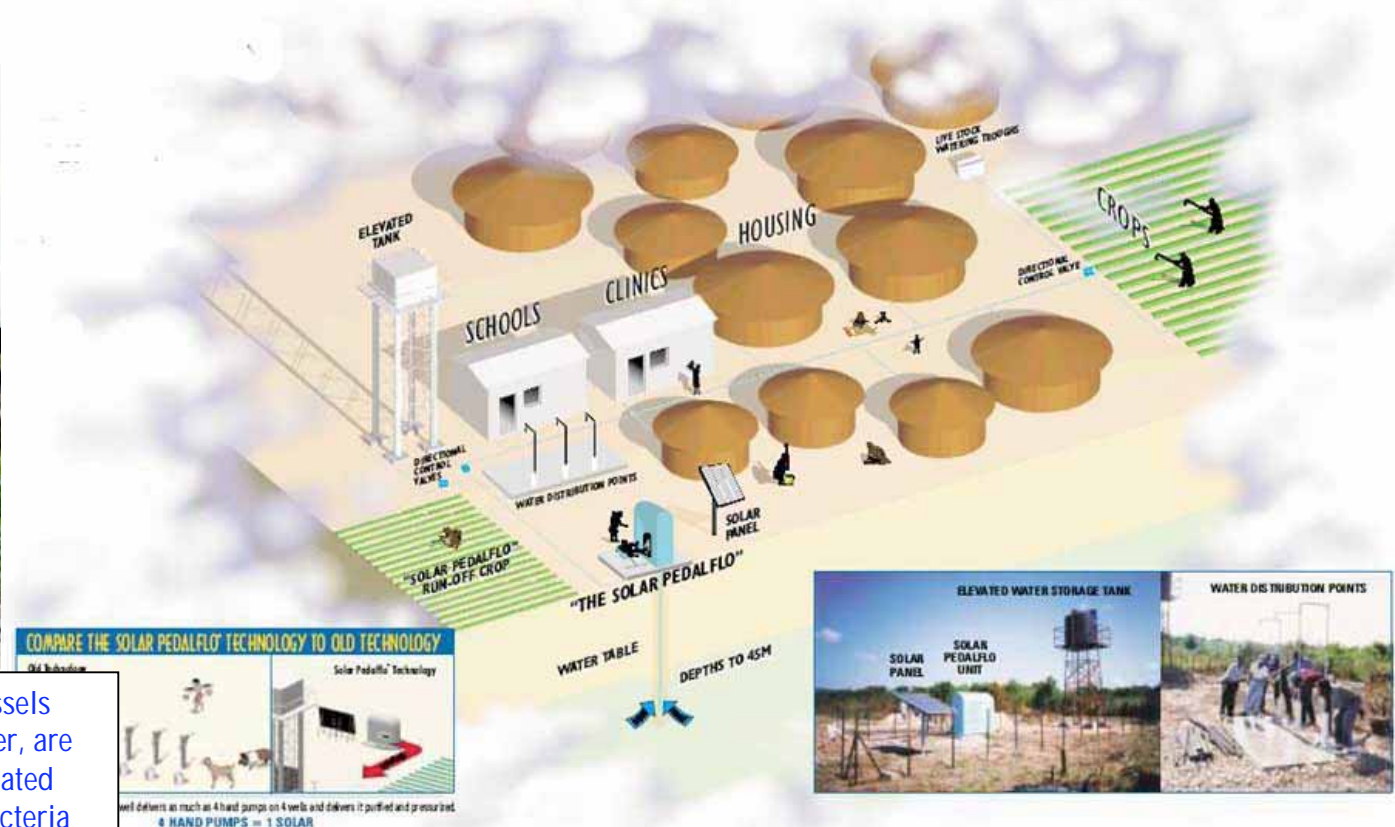
The Solar Water Pumping System is uniquely designed to withdraw water from a borehole using solar power, pumping the water through a filter to collect sediment and then moving the water into an overhead enclosed tank where the water is treated with Clorin to kill germs and protected from re-contamination. In the event of cloudy days, a series of batteries will be attached and housed in a secure structure to provide power for on-going operation.



Village Water Supply and Distribution System:

Using the Solar Pedalflo Solution or The Solar Water Pumping System will provides enough water for 600 people a day (at 20 liters per person). That's three to four times the amount of water from one borehole that a hand pump can produce.

In a recent installation in Mali, USAID expects diarrhea in the village to be reduced by 90%.



In many instances the water vessels that are used to capture the water, are contaminated. But as the Chlorinated water is received, the germs/ bacteria in the vessels are killed.



Central Statistical Office of Zambia

“serving your data needs”



The department of Census and Statistics, commonly known, as the Central Statistical Office (CSO), is a Government Department under the Ministry of Finance and National Planning (MFNP). The department is responsible for coordinating all statistical activities in the country and is a major source of official statistics.

*In a signed agreement from **Dr. Buleti G. Nsemukila, Director of Census and Statistics**, the Safe Water Access and Training Consultants team will work in a “Strategic Partnership” such that collected data will be provided to the Central Statistical Office to ensure updated and consistent demographic at a national level at all times.*



Central Statistical Office of Zambia

"serving your data needs"



The Central Statistical Office is extremely aware of the value that GIS brings to the effectiveness of government operations and citizen needs. GIS had been developed and deployed as a working tool that determines health and safe water access across the country.

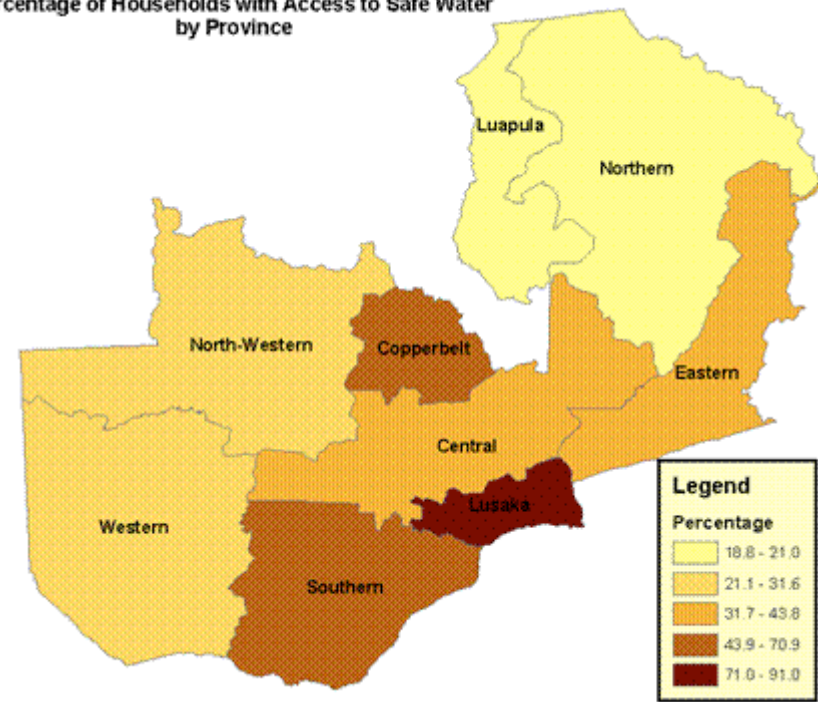
The objectivity of the data will be used as the determining factor for the placement of the 144 Village Water Delivery Systems and the concentration of the Safe Water Systems Training Programs.

Table 3.1: Households with Access to Safe Water by Sex of Household Head, Residence and Province Zambia 2000

Residence/Province	Households with access to safe water by sex of Household Head percent			Total Households by Sex of Household Head		
	Total	Male	Female	Total	Male	Female
Zambia	49.1	49.5	47.3	1,884,741	1,528,935	355,806
Rural	29.5	29.5	29.4	1,232,301	991,491	240,810
Urban	86.1	86.4	84.6	652,440	537,444	114,996
Provinces						
Central	43.8	43.8	43.9	178,820	148,582	30,238
Copperbelt	70.9	71.3	68.9	289,647	240,063	49,584
Eastern	43.6	42.9	46.3	254,603	203,781	50,822
Luapula	18.8	18.9	18.4	164,739	131,699	33,040
Lusaka	91.0	90.9	91.0	272,094	227,633	44,461
Northern	21.0	21.1	20.7	258,887	207,920	50,967
North-Western	31.6	31.6	31.6	111,133	89,887	21,246
Southern	58.6	58.1	61.2	204,398	169,017	35,381
Western	28.4	28.1	29.3	150,420	110,353	40,067

Source: 2000 Census of Population and Housing

Percentage of Households with Access to Safe Water by Province



Geographic information systems (GIS) provides the glue for these ideal platforms for the convergence of disease-specific information and their analyses in relation to population settlements, surrounding social and health services and the natural environment.

The GIS application is highly suitable for analyzing epidemiological data, revealing trends and interrelationships that would be more difficult to discover in tabular format.

Moreover GIS allows policy makers to easily visualize problems in relation to existing health and social services and the natural environment and so more effectively target resources.



Benefits of GIS and ICT in Safe Water Systems Deployment

- *Ability to identify and map safe vs. unsafe sources of drinking water*
- *Ability to determine if and where contaminants are effecting water sources*
- *Ability to determine suitable locations for training based on highest death rates*
- *Ability to track health trends geographically over intervals of time*
- *Ability to determine location of EduTeleCenters given population density*
- *Ability to determine allocation of Nurses given geographic and health concerns*

Benefits of GIS and ICT in Safe Water Systems Deployment

- *Ability to optimize limited resources and medicines to reduce child mortality*
- *Ability of Government & Healthcare Institutions to see and map future activities*
- *Ability to map across the Republic of Zambia – overall healthcare improvements*
- *Availability of electronic patient records for national & international medical assistance*

Protection of sensitive patient information with a leading edge application

Appendix



World Health Organization

Common Water and Sanitation-Related Diseases

Diarrhea

Diarrhea is caused by a variety of micro-organisms including viruses, bacteria and protozoans. Diarrhea causes a person to lose both water and electrolytes, which leads to dehydration and, in some cases, to death.

- * 1.8 million people die every year from diarrheal diseases (including cholera); 90% are children under 5, mostly in developing countries.
- * 88% of diarrheal disease is attributed to unsafe water supply, inadequate sanitation and hygiene.
- * Improved water supply reduces diarrhea morbidity by 21%.
- * Improved sanitation reduces diarrhea morbidity by 37.5%.
- * The simple act of washing hands at critical times can reduce the number of diarrheal cases by up to 35%.
- * Additional improvement of drinking-water quality, such as point of use disinfection, would * lead to a reduction of diarrhea episodes of 45%.

Diarrhea is the most important public health problem directly related to water and sanitation. The simple act of washing hands with soap and water can cut diarrheal disease by one-third. Next to providing adequate sanitation facilities, it is the key to preventing waterborne diseases.



World Health Organization

Common Water and Sanitation-Related Diseases

Arsenicosis

Long-term exposure to low concentrations of arsenic in drinking-water causes painful skin keratosis (hardened lesions) and can result in cancers of the skin, lungs, bladder and kidney. Millions of people are potentially in danger from arsenic poisoning since they rely on water supplies that are contaminated with arsenic (mainly from natural sources) and do not have a safe water alternative or are unaware of the risks.

Cholera

Cholera is an acute bacterial infection of the intestinal tract. It causes severe attacks of diarrhea that, without treatment, can quickly lead to acute dehydration and death. Cholera is a world-wide problem, especially in emergency situations. It can be prevented by access to safe drinking water, sanitation and good hygiene behaviour (including food hygiene). In 2002, over 120,000 cholera cases were reported worldwide.

Fluorosis

Fluorosis is a serious bone disease caused by high concentrations of fluoride occurring naturally in groundwater. Fluorosis is endemic in at least 25 countries across the globe. The total number of people affected is not known, but a conservative estimate would number in the tens of millions.



World Health Organization

Common Water and Sanitation-Related Diseases

Guinea worm disease

People contract the disease (also known as Dracunculiasis) when drinking water contaminated with *Dracunculus* larvae. The larvae mature into large (up to a metre long) adult Guinea worms and leave the body after about a year, causing debilitating ulcers. The incidence of cases of Guinea worm disease is steadily decreasing worldwide as a result of a concerted international initiative. However, in 2002 there were still 50,000 cases reported in a total of 13 countries in Africa.

HIV/AIDS

A hygienic environment, clean water and adequate sanitation are key factors in preventing opportunistic infections associated with HIV/AIDS, and in the quality of life of people living with the disease. AIDS-affected people are more susceptible to water-related diseases than healthy individuals, and they become sicker from these infections than people with healthy immune systems. Maintaining a healthy environment is essential to safeguarding the health, quality of life and productivity of people living with HIV/AIDS.



World Health Organization

Common Water and Sanitation-Related Diseases

Intestinal worms

People become infected with intestinal parasitic worms (also known as helminths) through contact with soil that has been contaminated with human faeces from an infected person, or by eating contaminated food.

Intestinal worms infect about 10 per cent of the population in the developing world and, depending upon the severity of the infection, lead to malnutrition, anemia or retarded growth. Children are particularly susceptible and typically have the largest number of worms. About 400 million school-age children are infected by roundworm, whipworm and/or hookworm. In fact, roundworm and whipworm alone are estimated to affect one-quarter of the world's population.



World Health Organization

Common Water and Sanitation-Related Diseases

Malaria

Malaria is a serious disease caused by a parasite carried by certain types of mosquitoes. Humans are infected when bitten by the mosquitoes.

- * **300-500 million cases per year throughout the world**
- * **1.2 million people die of malaria each year, 90% of whom are children under 5.**
- * **Most of the disease burden is in Africa south of the Sahara.**
- * **Intensified irrigation, dams and other water related projects contribute importantly to this disease burden.**
- * **Better management of water resources reduces transmission of malaria and other vector-borne diseases.**

Reducing the mosquito population in households and communities by eliminating standing water (caused by poor drainage and uncovered water tanks) can be an important factor in reducing malaria cases.



World Health Organization

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Schistosomiasis

Schistosomiasis (also known as bilharzia) is a disease caused by parasitic worms. At various stages of the life cycle, worms and their eggs live in certain types of freshwater snails, water (where they can survive for 48 hours) and human hosts. They penetrate the skin of people swimming, bathing or washing in contaminated water, They then cause infection and can eventually damage the liver, intestines, lungs and bladder.

- * An estimated 200 million people are infected with schistosomiasis.
- * 20 Million suffer severe consequences
- * The disease causes tens of thousands of deaths every year, mainly in sub-Saharan Africa.
- * It is strongly related to unsanitary excreta disposal and absence of nearby sources of safe water.
- * Basic sanitation reduces the disease by up to 77%.
- * Man-made reservoirs and poorly designed irrigation schemes are main drivers of schistosomiasis expansion and intensification.



World Health Organization

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Trachoma

Trachoma is an eye infection spread mainly through poor hygiene caused by lack of adequate water supplies and unsafe environmental sanitation conditions.

- * 500 million people are at risk from trachoma
- * 6 million people are blind today because of trachoma.
- * It affects women two to three times more than men.
- * The disease is strongly related to the lack of face washing, often due to absence of nearby sources of safe water
- * Children are also especially susceptible
- * Studies have found that improving access to safe water sources and better hygiene practices can reduce trachoma morbidity by 27%

Typhoid

Typhoid fever is a bacterial infection caused by ingesting contaminated food or water. Symptoms are characterized by headaches, nausea and loss of appetite. About 12 million people are affected by typhoid every year.



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