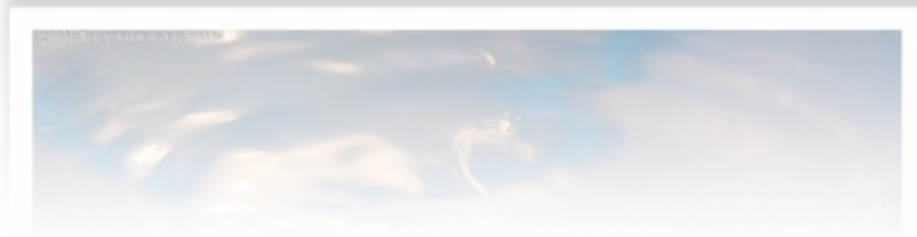


Faith in Water

Sarum College, Salisbury UK

July 5th – 7th 2009

Conference Papers



Alliance of Religions and Conservation (ARC)

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Table of Contents

Introduction	4
Faith Contributors	7
1. Interview with Dr Vinya Ariyaratne BUDDHISM. Sri Lanka	7
2. The Importance of Water: A Buddhist Viewpoint BUDDHISM. The Venerable PKS Lom, The Buddhapadipa Temple, London, UK	9
3. Organizing for Water: A History of the Communities of the Lower Lempa, El Salvador CHRISTIANITY. Hernan Gaitan, United Communities, El Salvador	12
4. The Australian Catholic Bishops' response to the call for Ecological Conversion and Ecological Vocations CHRISTIANITY. Jacqui Remond and Megan Seneque, Catholic Earthcare Australia	14
5. Faith and Water - a Christian Perspective CHRISTIANITY. Mary Grey, St Mary's University College, Twickenham, UK	19
6. Hai district water supply project: a model of community rural water supply initiated by a church in Tanzania CHRISTIANITY. Eng. Rogers C. Marandu, Tanzania	25
7. Water, Sanitation and Hygiene for Faith-Based Schools CHRISTIANITY. Magdaline Gitahi, Redeemed Gospel Church, Mathare, Kenya	31
8. Faith in Water CHRISTIANITY. Bishop Walter Scott Thomas Snr and Reverend Alfred Bailey II, New Psalmist Baptist Church, Baltimore, US	35
9. Links between Education, Religion and Inspiration HINDUISM. Rupa Ragunath Das, Director of Food for Life Vrindavan Society, India	38
10. The Dharma of Water: Hindu water principles HINDUISM. Ranchor Prime, UK	41
11. The Water Situation in Jordan ISLAM. Dr Murad Jabay Bino, Executive Director of the Inter-Islamic Network on Water Resources Development and Management, Amman, Jordan	45
12. Water Conservation, Sanitation and Hygiene in Islam ISLAM. Imam Dr. Muhammad Ridwaan Gallant, South Africa	51
13. Water and Spiritual Life in Batang Gadis National Park ISLAM. Jatna Supriatna, Fachruddin Mangunjaya, Jarot Arisona and Erwin Perbatakusuma, Sumatra, Indonesia	56
14. Cleanliness and Islam ISLAM. Dr Mawil Izzu Dien	59

15. “And she said to him, 'Give me a blessing: for thou hast given me a Negev land [desert]; give me also pools of water,' and Kalev gave her the upper pools and the lower pools.”	62
JUDAISM. Manlio Dell’Ariccia, American Jewish Joint Distribution Committee	
16. Water, Hygiene and Sanitation in Jewish Tradition	65
JUDAISM. Dr Mirele B. Goldsmith	
17. The Zoroastrian view of Conservation of Natural Elements: “Tanka” of Bharuch	69
ZOROASTRIANISM. Prof. Kavas Kapadia and Dr. Shernaz Cama, India	
18. Faith in Water: Ideas, Inspiration and Stories	74
ZOROASTRIANISM. Dr Rooyintan Peshotan Peer	
 Secular Contributors	 78
20. Clean Water Now!	78
CWN. Evert Groeneveld, the Netherlands	
24. The Importance of School Water Supply, Sanitation and Hygiene (WASH)	86
UK Department for International Development DFID. Stephen Young, UK	
19. Micro solutions have macro effects	95
EMF. Allerd Stikker, Ecological Management Foundation, the Netherlands	
23. Water supply, sanitation and hygiene facilities and related education in faith-based schools	97
IRC. Annemarieke Mooijman and Christine Sijbesma, International Water and Sanitation Centre, The Netherlands	
21. Micro Water Facility	109
MWF. Frederick Claasen, the Netherlands	
22. Smart Techs: new options to improve WASH in schools	111
SMART TECHS. Henk Holtslag and Walter Mgina, Tanzania	
27. Adaptive Water Governance	115
UNDP	
25. Religion and Water and the link with Hygiene Promotion: the case of Bangladesh	118
UNICEF. Hans Spruijt, Bangladesh	
28. Water, faith and education	120
WORLD BANK. Leonard Abrams, Senior Water Resource Specialist, Africa	

Introduction

In July 2009 ARC organized what turned out to be a very significant meeting at Salisbury's Sarum College in the UK.

The subject was Faith, Schools and Water, and we invited some 35 specialists – representing either faiths working on schools and water issues, or secular agencies doing the same, or – and this was one of the unusual things about our meeting – entrepreneurs who were developing new methods, tools and techniques which could help schools in the global south cope better with issues of fresh water and/or sanitation.

What it led to directly is a story in itself. ARC's new Water Schools Initiative, only 14 months old at the time of writing, but already linking to many faith schools, water NGOs and government education, water and health departments around the world, is really exciting.

On top of its outcomes, the conference itself was full of so many inspiring stories and statistics which we have found ourselves referring to again and again, that we have decided to issue this document in order to share them. We learned, for example, about:

1. The importance of a high-level campaigner. For example the King of Thailand has not only added the environment to the curriculum, but he has also added it as a Buddhist criterion, since throughout 45 years of his ministry the Buddha urged monks over and over again to be aware of using water and not to waste it. Today, if the King hears that the water in a lake near a village is dirty, instead of advising people to use chemical substances to clean it, he tells them that the best and costless way to sanitize the water in that lake is to put introduce water plants known as *Eichhornnia Speciosa* into that lake. The dirty water is mitigated by these water-plants.
2. In El Salvador's Lower Lempa region, there is plenty of water but ironically it cannot be drunk. During the 1970s, the land belonged to just a handful of wealthy families running cotton and sugarcane plantations and using vast quantities of chemicals, which contaminated the ground water. The rain spread the chemicals throughout the area. Today, following relocations after El Salvador's 1992 peace accords – there are many more families living there. The government refused to help, wanting the people to abandon the land, but members of the community led by the Church initiated a project to deliver clean water to each home, with volunteers laying the piping. "For some people it seemed like a lot of work for water – but they were the ones who didn't believe that the water was poisoning them. Today most communities in the Lower Lempa have direct access to water." Those people who drank the contaminated water for a long time are 45 percent more likely to suffer from kidney insufficiency.
3. A Hindu-run project building water pumps in villages managed to be sustainable by asking the villagers to pay for it collectively, and organize the upkeep of the pumps. In one village they declined to do so, and the project collected the pump and brought it to another village. Every other village has taken full responsibility for their tanks and bores.
4. Jordan is one of the 10 most water-scarce countries in the world, with only 150 m³ of water available per person The international limit to water poverty is 1000 m³, and

Jordanians have just 3 percent of the water share of Western Europeans. The reason is the lack of rivers (today you can cross the Jordan in a single stride) and insufficient funding for water desalination. And the result is that each household gets water only one day a week. Richer families have cisterns, but poorer people can't afford that. Most Jordanians are Sunni Muslims, and the Inter-Islamic Network on Water Resources Development and Management (INWRDAM) has been initiating innovative projects to help treat grey water and save fresh water throughout the country through understanding people's Islamic traditional understanding of natural resources.

5. Nearly half of all Ethiopian youngsters do not receive even primary education, and the likelihood of receiving a high school education is of course even smaller, with just 23% of teenage boys and 13% of teenage girls enrolled in secondary schools. We heard about how - before the American Jewish Joint Distribution Committee (JDC) installed the fresh water pump in a village in Gondar, Ethiopia - most people drank water from a nearby stream. Like hundreds of villages around rural Ethiopia, Gondar's Gabriel Kebele had no access to potable water for drinking, bathing, or cooking during the region's extended dry seasons and draughts. JDC has constructed over a hundred protected hand dug wells, protected springs, taps, micro-dams, and latrines across Gondar through its International Development Program.

6. The Zoroastrians traditionally built special tanks which harvested rainwater during the wet season, to enable it to be used during the dry. We learned about the tanks of Bharuch in Gujarat, with details about how they were constructed - and allowed ourselves to speculate a little on the impact on people, and on household gardens, if this practice were to be reintroduced.

In this introduction we have given just one example from each of the faiths represented. But there is much more to find. On the faith side there are theological explorations of the role of water in each religion, as well as stories from India and Tanzania, some moving tales from a local Church helping sanitation in the Nairobi slums, and the African-American church which is supporting it.

There is an extraordinary story from the Batang Gadis National Park where Islamic students and teachers were so distressed that they could not get clean water for ritual washing that they campaigned and helped create a national park. And another from South Africa where Muslims in the townships sometimes have to stand for two hours before morning prayer to warm the water for ghusl (compulsory bath) as well as for ablution.

On the secular side we: learn about a disinfecting unit called the Naiade which runs on solar power; hear from the UK's Department for International Development about their work with WASH (including a story from Pakistan); learn from our partner Ecological Management Foundation (EMF) about how micro-solutions to problems like the scarcity of clean water can sometimes have macro-effects, and saw some examples of that from the promoters of Micro-Water Facility and SMART TECHS; hear from the International Water and Sanitation Centre (IRC) about how disease is spread through water, from UNICEF with an important story from Bangladesh, and from UNDP about how this all fits in with the Millennium Development Goals, and from the World Bank about how water, faith and education are absolutely linked.

Side by side, religious and secular shared stories, visions, hopes, plans and expertise and from this a new partnership has arisen. This is the first fruit of that partnership.

The conference was organized by ARC, with financial and organizational assistance from the EMF, and support from IRC. Thanks to all those who participated, and in particular to all those who were inspired to continue the initiative, and make changes happen.

ALLIANCE OF RELIGIONS AND CONSERVATION

July 2010

Faith Contributors

1. Interview with Dr Vinya Ariyaratne

BUDDHISM. Sri Lanka

Sarvodaya has been working in Sri Lanka for the last 50 years. We have been inspired by Buddhist and Gandhian thinking but we work across all religions and ethnic groups. We face a very challenging time. We have seen the end of a very violent conflict lasting for 25 years, and the factors that led to the conflict have still not been addressed. As a national movement we work on the ground helping people affected by the war. We have about 300,000 internally displaced people and are also involved reconciliation.

The word Sarvodaya comes from the Sanskrit, meaning “awakening of all” and we believe this awakening has to take place from the individual upwards, to include the whole world. We work at the grassroots level but at the same time engage in dialogues like this. We believe development is not just about physical development but it’s about spiritual, moral and cultural as well as social, economic and political development.

We started in the early 1950s with a simple philosophy where people were mobilised to fulfil their own needs to the greatest extent possible, with their own participation. Our philosophy was picked up by various people and we supported it through various means. We reach about 15,000 out of a total of 40,000 villages in Sri Lanka. It’s an integrated approach to development and we derive a lot from Buddhist thinking.

FROM INDIVIDUAL LEVELS TO COMMUNITY LEVELS

At an individual level, we have principles that we try to practice based on Buddhist teachings of compassion and how you translate this into action. The joy you get out of it keeps you going despite the hurdles and challenges you face in a difficult journey. Finally, you develop a state of mind where you are able to withstand blame, praise, joy and sadness. We try to inculcate these principles at an individual level. At a collective community level we bring in principles based on sharing - sharing of your energy, wealth and intellect for social development. Our movement has been quite successful in mobilising a volunteer spirit towards community development.

We have developed a five-stage model towards community development:

1. You start with changing your own consciousness, building confidence about yourselves
2. And then organising the community, providing training to build certain skills within the village, leadership skills,
3. Then bringing the community’s own resources together,

4. Then forming a community organisation to take charge of your development work, which is given legal recognition by being incorporated under the existing law of the country.
5. Then we go into income and employment generation activities, at which point you become totally independent and don't have to rely even on the services of our own organisation.

WATER

We identify 10 basic human needs, with the two top priorities being setting up a clean and beautiful environment in your own community, and getting clean drinking water. We look at this fulfilment of the basic needs as part of a larger process of self-development; you can't just separate water and sanitation from other needs. But, at the same time you should look at the basic infrastructure needs of the community so it becomes part of a whole rather than standing alone as a development activity.

The Buddhist spiritual approach towards water

Water is seen as a life giver in Buddhism. And as in many other religions it's also a purifier. It's also a symbol of fertility; of transfer (of energy and merit) and of seasonality. Let me explain this: we believe that if your spiritual energy is very high, then there will be a lot of rain in the right season and if the rulers are also very just and right then there will be a lot of rain. So there is a very whole complex set of thinking and values that are connected to water in Sri Lanka.

When we try to address water needs in a community we have to look at the larger cultural context. Sri Lanka is very well known to have a hydraulic civilisation, that is we have a large number of tanks - human-made, ancient tanks - which supplied water to the entire community. Tanks are connected to the temple as well as to the village and this tank-village-temple concept was very much alive in Sri Lanka for more than 2,500 years.

Water supply and education

Many people still don't have access to clean drinking water and those needs have to be satisfied in a way that is culturally appropriate. Therefore, we use our model to fulfil these needs across all ethnic groups and in all districts. We use appropriate technology. We are not involved in fulfilling the water and sanitation needs in the formal education system but we are very active in the early child development sector or pre schools which is very important because these are the formative years and if you inculcate good practices at that stage then you are really going to make an impact.

We have made a big impact in the country over the 50 years in establishing water supply and sanitation systems, but what's more important is the process in which we try to:

- Develop the local capacity so that they become sustainable,
- Introduce appropriate technology
- Harness community participation.

We are active at the policy level as well, with partners including ICR, IRC and so many others. We have pioneered certain technologies in Sri Lanka and they have become national standards now. Recently, even introducing technologies like rainwater harvesting, solar, have been part of this process.

Rural infrastructure is seen as a unifying force in the community bringing various groups together and also creating inter-community harmony. We have to build that social capital and religion, religious teachings and spirituality are an integral part of the process to make the community really own those facilities and look after them. Also, we have to look at the financing options, which we are now looking at through our own microfinance schemes.

Lastly, we are facing a tremendous challenge; our organisation is now looking after more than 50,000 internally displaced people. There are tens of thousands of tents in one square kilometre area in the northern part of Sri Lanka, where the toilet ratio is 1:400 people. We are trying to bring it down, the international standard is 1:20, and we are at least trying to bring it down to 1:50, which is a challenging task. We are trying to bring water to these people through water filtration systems and transferring through water tankers.

The future is that we will continue to support achieving national targets in the water and sanitation sector. Then we have to be involved in post war reconstruction. Then lastly, we have to build on the new acceptance of the value of spiritual dimension in development thereby also contributing to ethnic and religious harmony and coexistence, not just at the community level but also at the international level.

2. The Importance of Water: A Buddhist Viewpoint

BUDDHISM. The Venerable PKS Lom, The Buddhapadipa Temple, London, UK

Throughout his lifetime the Buddha emphasized the importance of people respecting the natural resources on which of course all life depends. Water is vital to life: over 90 percent of the bodies of all creatures consist of water. In the modern world although these resources are an indispensable part of our existence there is a regrettable tendency to take them for granted. The huge increase in population of the world, a doubling in numbers since 1950, means inevitably that these resources are becoming increasingly scarce, and as a result now perhaps more than ever before people are realizing how vital it is for them to conserve these essential elements of life.

The Buddha's teaching in respect of these resources is not just simply an appeal to people to avoid waste but incorporates a complete reasoning of life. We are so utterly dependent on the world out there beyond the barrier of our skin that in a very real sense it is our other self; we are inconceivable without air, sunlight, animals, birds, insects, plant life and WATER and therefore we do need to honour and respect these other aspects of our other self. This need has always been an essential part of the Buddha's Dhamma (the Truth).

According to one part of the *Book of Buddhist Discipline* the Buddha states quite clearly that a human life is composed of four elements, one of which is the Water element, known as adhesion. The adhesion element (such as bile, phlegm, blood, etc) has a cohesive function that holds all particles of matter in a human body together and thus prevents them from scattering. He says not only food on which all living creatures depend but they also need water. Without water we cannot survive.

Throughout 45 years of his ministry he urged monks over and over again to be aware of using water and not to waste it. He orders the monks who live in a monk-compound (the dwelling houses and huts) should comply with the discipline of hygiene and sanitation. In one part of the ***Self-training disciplines*** he warns the monks against urinating, defecating and spitting saliva into water. If a monk is infected with cholera bacteria and passes his stools into a lake or a canal the water becomes contaminated with diseases. If people drink the water contaminated with cholera bacteria, it will soon cause a disastrous epidemic. We, Buddhist monks, often persuade our congregations to follow the Buddha's advice at all costs.

Although in his lifetime there were no such things as the carbon emission from factory and millions of petrol-fuelled cars as we have today the Buddha often advised the monks to look after trees, plants, shrubs and the like. He said that trees, bushes and other plants help to purify the air that human beings and animals breathe.

The King's Secret: *Eichhornia Speciosa*

I want to report on the projects of His Majesty the King of Thailand. As a devout Buddhist, the King always complies with the teaching of the Buddha. He keeps an eye upon the social welfare and environment of people from all walks of life. To this end, he has ***Four Thousand Royal Initiative Projects***. His main reason is to support all farmers. He says the agriculture is the great pillar of the kingdom. All of the plans he has made are to flourish 'water hygiene, sanitary conditions, irrigation and farm-soils' in the miserable slum areas, in the poverty stricken villages and in remote sites of the country.

He emphasizes that his projects are based on ***Simplicity***. And they must not be complicated so that the poor farmers should get on with his project facilities. The King often visits citizens in the countryside. There are no remote areas where he doesn't visit. As water is for both human and animal consumers he always advises people in remote regions to take great care of the water in a lake and a river and so on. He warns people against contaminating the water contaminated with sewage as it may cause a disastrous illness.

If the King sees the water in a lake of the village being dirty, instead of advising people to use chemical substance to clean it, he tells them that the best and lowest cost way to sanitize the water in that lake is to put *some water plants* known as *Eichhornia Speciosa* into that lake.

How does it work? These water plants always have lots of long roots. Naturally they grow up very well and float in the water. Soon afterwards all roots of these water plants absorb and suck up the dirt in the water. Strangely enough the water in that will look better in a short time. Although that water may not be ready for human consumers, it is not harmful and ready for animals to consume.

Now all of schoolteachers and university lecturers in Thailand who teach students religious education follow the King's projects and advice. They add the lessons on the usage of water, hygiene sanitary conditions into their teaching. Hopefully the future Thai generations should understand the usefulness of these methods.

During the past 20 years the Thai government who followed the King's stepping stone had three large dams constructed on three rivers: one dam in the North, another in the West and another in the Northeast of Thailand. The reason of having the dams is to prevent the

loss of the rains-water. All of the clean fresh water is stored in a reservoir so as to produce electricity and to support the rice farms with irrigation. By using the propellant machines with the strong flowing power under the dam is the right way. This electrical industry may have no carbon dioxide emission.

Buddhist Beliefs and Action

As the moon is a satellite of the earth, according to ancient myths many Buddhists believe that the moon has direct effect on a human life on earth. The moon is responsible for the ebb and flow of the tides. Hence it exerts its pull on all water elements and since this is the largest element of the human body it appears when the moon's movement directly influences a female period. Some women even get moon struck on the full moon night! In common with other religions some Thai Buddhists have ceremonial uses of water. Water is purified by specific Buddhist chanting of the monks – providing 'Holy Water' for use in variety of ceremonies including the blessing traditionally given on; birthday anniversary, marriage and other events.

We Buddhist monks **at the Thai Temple in Wimbledon** run an 'Introduction to Buddhism' for adults, and '*Sunday School*' for teenagers and children. Not only do we teach them Buddhism but we also advise them to grow up maturely and psychologically. To this end, our target is to educate the young that nothing should hinder, block or prevent them from properly growing inwardly. We often teach them to understand the usefulness of the vital resources like water we daily consume, fresh air we breathe, and good hygiene, sanitation and ecological environments.

When a school term begins we usually have groups of primary or secondary schoolchildren, coming to visit the Temple three times a week. The teachers want the children to experience a place of worship and to ask the monks about basic Buddhism for their exams. We take the opportunity to give them good advice on taking care of water resources, sanitation and hygiene at home and at school. We urge them that everyone needs to do more to reduce carbon emissions.

I wholeheartedly thank **ARC** for inviting me to take part in this unique workshop. I do hope that **Faith in Water** as the 'heart and soul' of the workshop should be landmark in widening and propagating what we all must do now to save environmental resources. This workshop should be the bread and butter for the whole human society so that the public, schoolteachers, health-care secretary, and education inspectors in less developed places should awaken and be aware of the risks and deal more with water, hygiene and sanitary conditions.

The government of powerful countries should unwaveringly support ARC's aim and objects and urge the public to save vital resources and rainforest before it is too late. Finally this workshop should shake off deforestation, and self-centredness and stubbornness that derive from **greed** and **delusion** to exploit natural resources and rainforest. Greed and delusion are the real diseases affecting the modern society. ***Let us hope that our workshop will be successful!***

3. Organizing for Water: A History of the Communities of the Lower Lempa, El Salvador

CHRISTIANITY. Hernan Gaitan, United Communities, El Salvador

Water is of vital importance for life and all of us who populate the earth. Our communities are characterized for their abundance of water, but ironically we cannot drink it. This is because during the 1970s, this land known as the Lower Lempa, belonged to just a handful of wealthy families. They ran cotton and sugarcane plantations for large profits, but to operate at such a scale they had to use large amounts of chemical pesticides and fertilizers, which after time accumulated and contaminated the ground water. This became a serious problem for the few families living in the area at the time, as the rain spread the chemicals throughout the zone. We are now many more families - relocated here after El Salvador's peace accords in 1992 – and our organization principally through Christian Base Communities has led us to mobilize around this issue.

Towards the end of the 70's El Salvador experienced economic, social, religious, political, and cultural crises. The unequal distribution of wealth and the exaggerated concentration of land among a few families had become so blatant that the government was forced to implement land reforms in a last attempt to restore social order. The redistribution of land brought more families to this highly fertile river basin in 1980. But since there were still no means to make social demands, the population was forced to drink the contaminated water. They sought moral support through the Catholic Church – where many formed Christian Based Communities as a means to organize and resolve the problems they faced in their communities.

The 80's saw the intensification of the armed conflict, and the landless and marginalized sought a political space through revolution. The inhabitants of the Lower Lempa were targeted as subversives by the government; initiating a genocide against El Salvador's rural poor. This is when many of us around the country were forced to abandon the little we had to join the ranks of the guerrillas.

After the peace accords in 1992 those of us forced into hiding were able to return to our homes, and others who had been exiled to other countries like Nicaragua and Honduras came to the Lower Lempa – now more socially conscious than ever. The Church was instrumental in organizing the communities and facilitating international contacts to begin addressing the many needs; we were starting from scratch. Many of the re-populated communities in the Lower Lempa began as mere campgrounds in a wilderness that had been abandoned during the 12 years of civil war.

The first projects sought housing, health care, education, but the water came from the same contaminated sources as before. Most families had artesian wells only 4 or 5 meters deeps. The first test for the communities came in 1998 with Hurricane Mitch flooded everything under 1 or 2 meters of water, demonstrating the vulnerability of the zone to an international audience. Mitch further polluted the local water supply, but we had no other option than to continue consuming it, causing outbreaks of disease, especially among children.

As the communities developed and the farmers exploited the land to survive, many trees were cut down. This also contributed to the weakening of the water supply, as well as their continued use of pesticides and herbicides. The introduction of cattle and pigs to the local economy also grew, the impact of which is evident during the rainy season when the

manure mixes with the ground water and increases pollution. The Church through the pastoral teams worked within the communities to raise awareness about the pollution and the dangers of drinking the water without at least boiling it. They and others also shared information and trained small groups in organic agriculture, searching for a way to prosper in harmony with the planet.

In January and February of 2001 two earthquakes again revealed the vulnerability of the communities. Cracks appeared in the ground, breaking the wells and latrines, further compromising the quality of the ground water. Many international organizations came to support us during this time, principally to supply food and potable water. The Church called attention to the issue and through their efforts we were able to rehabilitate the majority of the wells – but the water wasn't the same. In some areas it was salty, in others it gave off a bad smell. This is when many of the communal organizations, along with the Church and with other non-governmental organizations began to seriously lobby for a long-term solution for the communities.

The government refused to help and maintained the line that the communities should abandon the land and that the land didn't even meet minimum conditions for habitation. This of course made no sense; they were simply belying their real interests in recuperating the land for the wealthy families who had produced cotton and sugar cane before the war. But for those living here now, this land was paid for in the blood of thousands of *compañeros* – and what's more is that it is highly productive land, some of the best in the country.

So during this time each community began meeting and discussing the need to bring adequate water to the communities. The Ministry of Health came and did studies and found high levels of chemicals and other pollutants and declared it inadequate for human consumption. They recommended that the water be brought from higher land; land that hadn't been subjected to years of cotton cultivation.

By the end of 2001 the idea began coming together to initiate an autonomous water project, independent of the government and run by the communities themselves. In the beginning, many NGOs proposed building large cisterns where people could come to collect water. Upon reflection it was agreed to re-orientate the project and deliver the water to each home. That way, each family participating became a member of the project and would commit to a certain amount of time and labour to dig and lay the piping.

Some communities never believed a project of this magnitude would come to fruition and decided not to participate in the process, but later incorporated themselves when they saw the work underway. The Church also undertook an immense campaign to raise awareness among the communities, but some families remained unconvinced of the need for a water project. For them it seemed like a lot of work for water, but what they didn't realize was that the water they already had was slowly poisoning them.

By December of 2002 the dream of so many became a reality. The vital liquid began flowing into the homes of those who had worked so hard – but at the same time this was a hard blow for the families who hadn't believed in the project. For these cases the association's board established terms for new families to acquire access to the water.

Seven years later the majority of the communities in the Lower Lempa have direct access to water and the standards of living for these families have risen considerably. Levels of

sickness have reduced dramatically, especially among children. Unfortunately the mortality rate among elderly has increased, perhaps due to the years they were forced to consume contaminated water. This is most notable in the rates of kidney insufficiency. The Church did a study in the communities and they found a 45% rate of this illness.

Also, since the project began we have worked very hard through different sectors such as the Church and youth groups, to educate the communities about the appropriate use of the water. It is important for the water to be reserved for human consumption and not for irrigation or other secondary needs that can still use well water. We teach healthy hygienic practices for storing and using water, water rationing and responsibility, etc. so that this resource of life continues into future generations in our communities.

4. The Australian Catholic Bishops' response to the call for Ecological Conversion and Ecological Vocations

CHRISTIANITY. Jacqui Remond and Megan Seneque, Catholic Earthcare Australia

Introduction

Those of us who live in towns and cities are called to take real responsibility for our use of the precious gift of water. We propose a vision of our families and our Catholic schools as places where children grow up with an understanding of the beautiful and ancient place we inhabit, knowing the issues that confront us with regard to fresh water, and learning deep respect for God's gift of water. This vision would challenge our behaviour in the use of water for such things as lawns, gardens, showers, swimming pools, and car washing. It would suggest alternative practices, such as native gardens, rainwater tanks, water-conserving bathroom and toilet fixtures, and the prudent use of storm water, groundwater and wastewater. We need to model respect for the gift of water in our church and school buildings and gardens as well as in our individual homes.

Learning respect for the rivers and groundwater for the water we use will involve turning from old ways and taking up new ways. It will be part of the *ecological conversion* to which human beings of the twenty-first century are called.¹ Responding to this call is one of the great challenges facing the Christian community and the wider human community of the twenty-first century. We all have much to learn from those who have been committed to the wellbeing of creation. They have already long been learning what it is to live their *ecological vocation*.² We believe that all of us in the Christian community are called by God to discover and to live our own form of ecological vocation.

¹ This is an expression that the late Pope John Paul II used in his general Audience Address, 17 January 2001, and taken up by the Australian Catholic Bishops' 2002 Social Justice Statement *A New Earth: The Environmental Challenge* and this theme has been adopted by Catholic Earthcare Australia.

² This phrase was used by the late Pope John Paul II in his address given at the Angelus, Castel Gandolfo, Sunday 25 August 2002.

In this paper we outline the work of Catholic Earthcare Australia as the Australian Catholic Bishops' response to papal teachings that call humans to respect the integrity of other creatures, the integrity of ecological systems, and a 'human ecology'. We then outline these teachings and the scriptural understandings that underpin them.

Educational Materials

Catholic Earthcare Australia has responded to the call for ecological conversion and increasing young peoples' awareness of environmental/water issues in Catholic schools in Australia by providing a variety of resources. In 2002, a DVD entitled, *The Garden Planet*, was distributed to every Catholic school in Australia (1,697) and every Catholic Parish (1,358). In the film Bishop Chris Toohey, Chair of Catholic Earthcare Australia, says that our rivers are 'a limited resource. I believe that God has given us a stewardship role for this resource.... We can't be users and not give back, otherwise these rivers will die.'

In 2003, a CD-Rom called *Freshwater is Sacred Water* was produced. The CD-Rom contains a 40-minute interactive multi-media program that enables students to learn about the theology and science of water, including the availability of freshwater on Earth, the water cycle, the relationship between life and freshwater, how water is stored and used in Australia, water pollution and water conservation.

In 2004, Catholic Earthcare Australia launched a statement in the form of a booklet entitled *The Gift of Water*. This statement has been endorsed by the Bishops of the Murray-Darling Basin and focuses on the significance of this mighty Australian river system, which supplies water to Australia's largest food bowl. *The Gift of Water* was launched on a paddle steamer at Echuca, on the Murray-Darling River with students from St Mary's Primary school and St Joseph's College secondary school. Students participated in a creative water liturgy, which has been captured in part in a DVD entitled *Francis* by the Franciscan Friars in Australia.

The ASSISI initiative

Catholic Earthcare's most recent resource is a sustainability initiative, called **ASSISI**. The acronym (and how appropriate it is only became apparent after the concepts had been distilled) reflects commitment to a particular kind of social process, with particular kinds of outcomes. Any response to the call for ecological conversion and ecological sustainability would need to be **strategic** in the sense that all projects are linked to the strategic intent of individual organisations. It would need to be **systems-based** in the sense that it involves the whole organisation and the broader community (ecosystem) of which it forms a part. It also involves all aspects of organisational activity, in a participatory process (reflecting systems thinking). Integration is a feature, both in the sense that ecological content and values are integral to the initiative, and in the sense that ecological, theological, technical and educational perspectives are **integrated** through a focus on an ecological **sustainability initiative**.

ASSISI intentionally works with organisations to constitute a 'learning community', and engages with the broader community of which the organisation is a part, to build sustainable communities. *ASSISI* does not come with 'solutions' to ecological sustainability, but rather provides the learning infrastructure for schools, organisation, church agencies and congregations, and the broader community, to come to understand the critical issues facing them and how they might address them together. This means that while each

learning community will be the embodiment of a common pattern, each will also be unique. In this way, *ASSISI* seeks to integrate work and learning, and honour the two key principles of learning, namely that it is contextual and that it is social.

The commitment to these learning principles is exemplified by the passion-building program in schools, which is part of *ASSISI*. The passion-building program engages the entire school community – pupils, teachers and parents – in a competition around ecological sustainability. Pupils are encouraged to submit art, music, prose, film or photographs (amongst other media), reflecting ecological issues and concerns to enhance their ecological literacy. Issues are further explored in the context of the curriculum and other activities.

In the spirit of building learning communities, Catholic Earthcare provides the principles and infrastructure for the activity, which is then led by the pupils, supported by the principal and teachers (including the final celebratory event, to which parents are invited), thus giving the program a unique contextual flavour. In this way, passion is built not only amongst the students who submit entries to the competition, but the entire school community. In this way the wall between the school and broader community becomes more permeable and is crossed frequently.

Catholic Earthcare is piloting *ASSISI* in 18 Catholic schools in the Sydney diocese. What follows is a brief account of the passion-building program at St Francis Xavier's, a primary school in Sydney's inner west with 295 pupils and 36 staff. The photographs of entries and pictures of the celebratory event show how other modes of meaning making offer many opportunities for pupils to build their knowledge, and to represent and communicate it, in ways that engage audiences and send powerful messages out into the world. 200 parents and pupils attended the celebration, which was led by the student leadership team (Year 6 class), supported by the Principal and Teachers.

This bringing together of literacy and environment has been termed a 'place-based pedagogy' or a 'pedagogy of responsibility', which builds ecological relationships. When this awareness raising is accompanied by learning and inquiry in the context of the local environment, an 'eco-ethical' consciousness is developed. "For any action to be ethical, it must always begin from a consideration of the lifeworld rather than the self" (Comber et al 2007:15). Throughout their schooling at St Francis Xavier's pupils are given first-hand opportunities for understanding 'river health' and learning to 'read' their local waterway by regularly applying various kinds of scientific tests and measures and documenting the health of their waterway.

At St Catherine's Primary School Stirling in South Australia each student takes part in activities to look after the wetlands on their school site. The school property once belonged to the Dominican Order so it is no coincidence that this school is showing signs of leadership in cultivating and caring for Earth. Each classroom has a Bokashi compost bin and each class is responsible for looking after one ecological aspect at the school, such as Year 2 tending to the worm farms. The vision for the school includes having an outdoor classroom in the wetlands and incorporating ecology into every aspect of the students' education.

Assisi Catholic College is a primary and secondary school located in Queensland, in the Diocese of Brisbane. The local council is working closely with the school to realise its strategic plan for delivering recycled water to all properties in the region and providing water sensitive urban design for storm water management. The school curriculum has been developed to incorporate place-based pedagogy and ecological sustainability. For example,

Year 11 students study the lake water, which is located on their school site. This schools' ecological focus comes from being part of the St Francis of Assisi tradition.

Context

As the driest inhabited continent on earth, Australia experiences severe drought and water shortages and is vulnerable to the effects of climate change. Current research on the relationship between humans and water points to the challenge of our time: to recover a 'fuller, more sensitive and civilising relationship with water'³. We are reminded that many of the world's civilisations can attest that the very act of reducing water uncertainty by technical means (capture, storage and irrigation) has ultimately led to 'greater uncertainty and civilisation failure'. The sacred and living relationship of water with humans, one associated with health and purity, has been replaced by a relationship of control. This invitation to a change in worldview that comes from within science, one that calls humans to live with water as a complex entity rather than a commodity, is supported by current theology.

The Australian Catholic theologian Denis Edwards talks about a 'relational ontology' as foundational to a worldview which sees human persons and all other creatures as 'radically interrelational and interdependent'; a worldview which recognises that "entities emerge in our universe in patterns of interrelationship. Things are constituted by relationships.... And this world of interrelating entities can be thought of as emerging from within the dynamic relations of the Trinitarian God.

The interrelatedness that ecologists find in the biosphere on Earth and the interrelatedness that science discovers at all levels from quantum physics to cosmology are all sustained at every moment by a God who is Persons-in communion. Our interrelated universe, with all its diverse creatures, emerges from the embrace of the divine communion in love. This gives unthinkable depth to the importance of ecological interrelationships".⁴ It also provides the conceptual framework for the work of Catholic Earthcare Australia (Denis Edwards has been advisor to Earthcare since its inception in 2002).

Scriptural understandings

Jesus belonged to a people who knew about deserts and drought, and who loved moving, living water. They saw running water as a blessing from God and as a symbol of life. It was not taken for granted. They saw it as a precious gift. For them, a spring of living water was a beautiful image for the life that God gives us (Is 12:3; 55:1; Jer 2:13; Ps 46:4; Ez 47:1-20; Zech 14:8; Rev 22:1-2).

They thought of God's presence and revelation, which they often described as the Wisdom of God, as like a life-giving fountain of living water (Prov 13:14; Sir 15:3; 24:23-29). In John's Gospel, Jesus, hot and tired after his journey, sits by a well. He asks a Samaritan woman for a drink. Then he engages with her in a long conversation about the things of God. Later we hear that his disciples find this conversation astonishing (4:27). At the heart of this encounter, Jesus offers the woman living water:

³ Bruce Simmons, Robert Woog, Vladimir Dimitrov (2007) *World futures* 63, 275-285 "Living on the Edge: a complexity-informed exploration of the human-water relationship"

⁴ Denis Edwards (2006) *Ecology at the Heart of Faith*

Everyone who drinks of this water will be thirsty again, but those who drink of the water that I will give them will never be thirsty. The water that I will give will become in them a spring of water gushing up to eternal life. (4:13-14)

Later, at the feast of Tabernacles in Jerusalem, Jesus cries out:

***Let anyone who is thirsty come to me, and let the one who believes in me drink. As the scripture has said 'Out of the believer's heart shall flow rivers of living water.'* (7:38)**

The author of the gospel explains that this living water is the Spirit of God, the Spirit that will be poured out through Jesus' life-giving death and resurrection (7:39). For John's Gospel, and for all later Christians, living water is a sign of the Holy Spirit, a sign of our baptismal life in Christ, a sign of the life of God in us.⁵

St Francis of Assisi saw all of God's creatures as interconnected in a family of creation. For St Francis, other creatures are in kinship with human beings, brothers and sisters to us. In his Canticle, he speaks of water as "Sister Water," and celebrates it as beautiful, clear and pure and essential to our existence. Science also tells us that our lives and those of all other creatures on our planet are totally dependent upon clear and pure water.

We need a renewed spirituality of water that recognises its centrality for all life. We need to treasure it as the life-giving gift of God and as a beautiful sign of the life of God in us. "Every organism, every species, every ecosystem is the self-expression of the dynamic Trinitarian life, a sign of the divine presence. The biotic community of a rain forest, a wetland or a household garden is the work of art of divine Wisdom...Resisting ecological conversion is, theologically, resistance to the Incarnation"⁶

Catholic social teaching and papal teachings

While the Bible tells us that God entrusts the natural world to human beings (Gen 1:26), this is not to be interpreted in an unlimited or unprincipled way. According to the social teaching of the church, human beings have moral duties towards the natural world. They do not have absolute rights over nature. The late Pope John Paul II taught that human beings have God-given responsibilities towards other creatures. We cannot simply do what we like with the natural world.

We are called to respect the integrity of other creatures and the integrity of ecological systems. The late Pope John Paul II insisted that we are constrained not only by *biological* laws but also by *moral* laws.⁷ This would mean that we are morally responsible before God for our actions in relation to water. It would mean that the use of the gift of water, whether on farms or in towns and cities, is a matter of conscience, of right and wrong action before God.

⁵ Catholic Earthcare Australia, *The Gift of Water* (2004)

⁶ Denis Edwards in his foreword to *Care for Creation: a Franciscan spirituality of the earth* (2007)

⁷ *Sollicitudo Rei Socialis: On Social Concerns* (Homebush, NSW: St Paul Publications, 1988), par. 34, p.74.

One of the key principles the late Pope John Paul II offered for moral action is that “we cannot interfere in one area of the ecosystem without paying due attention both to the consequences of such interference in other areas and to the wellbeing of future generations.”⁸ We have to take into account the common good. Applying this to water catchments would mean that those involved in using water from one part of the system need to be mindful of the good of the whole system. This includes the good health of groundwater, rivers, lakes, their plants, fish, animals and birds, and all the human beings that depend upon the health of freshwater, now and into the future.

In the case of a river system it would mean that those making decisions about storing or extracting water upstream are morally required to take into account the needs of those downstream. In the case of water being drawn from groundwater sources it would mean that those making decisions about extracting water from an aquifer are morally required to take into account the rate of replacement through rainfall so that the needs of future generations will be met.

Ecology involves respectful relations with human beings as well as with other creatures. The late Pope John Paul II called this “human ecology.” He wrote, for example: “It is the *ecological question* – ranging from the preservation of the natural habitats of the different species of animals and of other forms of life to ‘human ecology’ properly speaking – which finds in the Bible clear and strong ethical direction, leading to a solution which respects the great good of life, of every life.”⁹ A vision of all water catchments founded upon this notion of human ecology would involve strong support for the dignity of human persons, for family and for communal life, within the context of respect for the land, the rivers, the fish, the animals, the birds, the trees and the shrubs of our water systems.

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5. Faith and Water - a Christian Perspective

CHRISTIANITY. Mary Grey, St Mary’s University College, Twickenham, UK

Relating to water- here and abroad

My relationship with water starts at home, with the clear, flowing water outside the door, the chalk streams of the River Test that journeys on into Southampton Water. It is a relationship nourished by the central place that Christian faith gives to the principle, “water gives life.” But that relationship takes on greater urgency when I am journeying through the drought-prone state of Rajasthan, India, as I have been for more than 20 years, with the

⁸ *Peace with God the Creator; Peace with All of Creation* (Homebush, NSW: St Paul Publications, 1990), p.5

⁹ *The Gospel of Life: Evangelium Vitae* (Homebush, NSW: St Pauls, 1995), par. 42, p. 80.

Charity *Wells for India*, that I helped to found.¹⁰ There I am continually struck by the relationship between water and life.

Rajasthan is one of the poorest states of India and the women of Rajasthan suffer from birth to death. The girl child is not welcomed here: boys are wanted to take over family farms. Women's lives are haunted by the search for water, as they are forced to walk ever-increasing distances in search of it, when wells dry up. There is no aspect of life that is not affected: health is seriously damaged by water-related diseases, women are 90% anaemic as diet is so poor, there is a high degree of both infant and maternal mortality, agriculture becomes almost impossible in a drought causing hunger in both people and animals. Men migrate in search of work and because income is so low, women are left to look after villages; the debt to the moneylender rises to an impossible level. So how can Christianity have any helpful message here?

The village people of rural Rajasthan in these remote areas are a mixture of tribal, Scheduled and Unscheduled castes, including Dalits, (or former Untouchables), their religions being a mixture of Hinduism, Islam, tribal and sometimes Jainism or Sikhism. Our partners are influenced by Gandhi and his focus on the poorest people. What brought Christian faith central for our group was, early one morning, at prayer in an Ashram in the Thar Desert, when our Gandhian leader, (who, sadly, has now, died) Lakshmi Tyagi, paused and said to us: "normally we now have the teachings of Gandhi to inspire us: because you are here, let us have the teachings of Jesus!"

Surprised by the teaching of Jesus

Surprised and challenged, with no time for preparation, I found myself telling of the prophecies that if we turned to God, water would spring up in the desert and trees would grow (Isaiah); of the sacredness of water in the time of Jesus and how he had used it to express messages of repentance and rebirth (through the sacrament of Baptism), healing, and renewal. The fact that Jesus worked with poor, often landless people, made an immediate link with these communities, struggling to make a living on the land. I told them that Gandhi himself was very influenced by the Sermon on the Mount (Matthew 5 and Luke 6), and how that was being dramatically lived out by the way their own Field Workers worked for dignity and water security with the poorest and most vulnerable people.

And dignity and water security inspire what we do in these areas. We see the truth of the Christian principle "water gives life" as things do change in the villages. We do not build new wells – except where this is the only solution – but practise "water harvesting" or conserving monsoon water by traditional methods, or "the ancient wisdom of the desert peoples",¹¹ something akin to the lives of the people of the Bible. With the building of water storage tanks – with a catchment to allow water to percolate into the tank – the fear of having no water is removed. Women are enabled to wash, with immediate effects on health and hygiene. The psychological burden of the weary daily search for water is removed for themselves and their daughters, so attention to health, education and income generation becomes possible.

¹⁰ See www.wellsforindia.org

¹¹ The phrase is that of the late Dr Anil Agarwal, founder of the Centre for Science and the Environment, Delhi.

Hygiene is tackled in other ways too. Most of these houses have no kind of toilet, so wherever possible bathroom/toilets are constructed. There has to be an education programme alongside this, as women are long accustomed to walking outside the village for defecation. They do not automatically want to lose this opportunity of socialising with each other. Nor do children have much socialising in using toilets.



Picture: A woman from the Thar Desert with her family on a *taanka* catchment: her husband is disabled. A *taanka* is water storage tank that can hold up to 20,000 litres.

Most important is that where we construct kindergartens or primary schools – we have eight in the Thar Desert - these will also have latrines. (These consume very little water). This is most important for girls, who find it difficult to attend school where there is no toilet provision, especially at times of menstruation. An issue that has arisen is that when the school is handed back to the responsibility of the Government (as is our hope) there is a maintenance issue for the latrines. If Dalits are to be liberated from cleaning toilets (their traditional task) who will then take this over? This is a disputed issue. Along with this provision is roof water harvesting – this is installed wherever there are suitable roofs- where the water is channelled down into a water storage tank. Children can see the importance of water, and valuing water along with caring for trees are values built into their school curriculum.

In other areas, like the Aravali Hills, the focus is more on plugging gullies of the streams that flow from the top of the mountains with small interventions like loose stone check dams and eventually anicuts, or small dams.. If the water can be halted from flowing away to flood elsewhere, ground water can be recharged and wells will be refilled from below.

How does Christian faith inspire this work?

Because of the gravity of the ecological crisis and the part Christianity has played in this damage through undervaluing creation and even using Scripture to justify exploitation, we are now mining the tradition for resources to sustain our quest for good practice. When I see a river regenerated in the Aravali Hills, south of Rajasthan, after years of practising water harvesting along a streambed, from the top of the mountain to the valley, I think again of the prophet Isaiah's words that waters would gush in the desert.

When I see the struggle for water and basic human rights I remember the earliest Bible creation stories (Genesis 1 and 2), in a context where poor farmers struggle for a livelihood on inhospitable land with frequent droughts and how the vision of sacredness of water is offered for all; that all created things - sun, moon, stars, plants, animals, seas, water and rivers, together with humans are in a interconnected, with human beings bearing responsibility for their wellbeing.

Even if this symbiosis was destroyed by human exploitation of the earth and Scripture stories tell of the Great Flood (we know this occurred throughout the Ancient Near East) that almost destroyed the whole earth and its people. Through the Rainbow Covenant God promised that this would never occur again. So the vision of prophets like Isaiah calls us back to a vision of Shalom (Peace) where both human beings and nature are restored to well being.



Picture: The river Gomati is regenerated.

Christianity- inspired by a new ethic

In the context of the ecological crisis and of climate change Christianity is now trying to make up for the neglect and exploitation of centuries. Some Christian communities - notably the Orthodox Church - have taken a lead. The Catholic Church recognises that there is such a thing as *ecological sin*. Although the Vatican documents do not address water specifically, many documents condemn economic policies exploiting poor people, (especially through global capitalism) and gradually there has been awakening to the need for repentance against exploitation of the environment. But recently Pope Benedict XVI made an important statement on water and its use: he calls for solidarity and responsibility in national and international policies on water, saying water is a right and profit should not be the only reason to protect it. There is a "right to water," based on the dignity of the human person, and it is not simply an "economic good," the Pope affirmed in a message to the international exposition on "Water and Sustainable Development," under way in Zaragoza, Spain, on July 15th 2008.

Because of the [...] pressure of multiple social and economic factors, we must be conscious of the fact that today "water must be considered a good that must be especially protected through clear national and international policies, and used according to sensible criteria of solidarity and responsibility," the Pope exhorted.

The use of water, he continued, which is regarded as a universal and inalienable right, is related to the growing and urgent needs of people who live in destitution, taking into account the fact that limited access to potable water has repercussions on the wellbeing of an enormous number of people and is often the cause of illnesses, sufferings, conflicts, poverty and even death.

He stressed that the right to water "a right that is based on the dignity of the human person." It is "from this perspective that positions of those who consider and treat water only as an economic good must be carefully examined," Benedict XVI continued: "Its use must be rational...the fruit of a balanced synergy between the public and private sector."

This is a very key statement. It means that both Christianity and Judaism offer a view of water as sacred and God-given but also relate it to human rights and the dignity of the human person.

From the Sacredness of Water to an Ethic of water-use

The life of the people of the Bible lands still testifies to this, even if the political situation is making water distribution a disputed issue of injustice. As I see in Rajasthan how, if the well dries up, this impacts on social life, Jesus experienced water at the heart of the social context, for example, of meeting at the well or by the pool, or by the lake or Sea of Galilee. He used the need for water for life itself to express the wisdom of his own ministry: **Christianity sees him as living water, quenching humanity's thirst for new life.** Water then and now is a place of revelation, a place of joy. *I have seen Siberian cranes enjoying the waters of a pond in Rajasthan, that has been de-silted, (again, a traditional method) and women singing and dancing in gratitude for water flowing.* Christian tradition in Britain draws on the thousands of wells regarded as sacred and often under the protection of a saint, like St David, St Winifred or, in Ireland, St Brigid.

Christianity also offers an ethic and discipline of valuing water, along with other created realities. The discipline of simplicity, of moderation and justice should act as a brake on over-use and exploitation. Monastic movements like the Benedictines and Franciscans are acting prophetically. Christian Groups like Christian Ecology Link and Eco-congregations in the UK, as well as some of the World Council of Churches' programmes, like Justice and the Integrity of Creation (JPIC) offer practical ways to put this ethic into practice.

But in addition, there is highly valued ethical framework, which can be drawn on, namely a **virtue ethics approach** based on the theology of the 12th century theologian St Thomas Aquinas. Within this, the idea of natural law is widened, to take into account the common ground between human and non-human.¹³ Secondly, this is integrated this within a virtue-centred approach - the virtues concerned being *prudence, justice, fortitude and temperance*. Prudence means the capacity to make decisions in emergency situations, to take advice from others, to have foresight in a way that accurately anticipates the future insofar as it is

¹² See www.zenit.org

¹³ Celia Deane Drummond, *The Ethics of Nature*, (Oxford: Blackwell 2004), pp.41-48

feasible to do so. It is part of wisdom, a practical prudential knowledge: specifically here it is knowing how to work in harmony with water's regenerative cycles.

Fortitude is the capacity to stand firm in adversity. Temperance – let us rename it simplicity or living within limits - is particularly important, as the ordering of our desires toward the whole and as invoking moderation within the knowledge of nature's limits. How important this is in countries like India where water sources cannot cope with the demand of tourism and western habits. Justice deserves a special focus. For Aquinas it is inspired by charity, the gift of the Holy Spirit, so it is rooted in God. In Aquinas's ability to link the ordinary person with the community and global justice there is a way for justice to include the self-preservation of all life forms and eco-systems.

But how can we persuade people of the west and north to act like in moderation, to simplify in order to live within the limits of our resources, to share resources with others? Here we can link with the ethics of liberation. The focus of ecological liberation ethics is on privileging the poor, seeking justice for the poorest communities, where people and earth are locked in cycles of oppression. *Nature- including depleted water sources - are now recognised as the new category of poverty.*¹⁴

Rising sea levels, melting ice caps, the polluted water systems along with the human communities affected - have now to be at the centre of liberation struggles. So strategies of resistance, for example resisting large and dams and large-scale interventions have to be combined with action for solidarity at local, national and international level. The same ethic must inspire personal life-style changes, such as asceticism and simplicity in water use, practice of water harvesting at a community level, working for legislation to curb water use in large corporations and in agriculture, insisting the need to respect the limits of the local ecosystems and so on. For this, Christian Churches must work with scientists, activists, NGOs and international groups – the crisis demands no less. The encouraging sign is that it is beginning to do so.

And finally, what Christianity offers is the vision of water at the centre of the vision of the New Heaven and the New Earth, a vision which inspires a new ethic and discipline in the use of water.

Then he showed me the river of the water of life, bright as crystal, flowing from the throne of the God and of the Lamb through the middle of the street of the city; also, on either side of the river, the Tree of Life with its twelve kinds of fruit, yielding its fruit each month; and the leaves of the tree were for the healing of the nations.

(Revelation, Ch.22, 1-2)

Mary Grey, St Mary's University College, Twickenham, UK, April 2009.

¹⁴ viii.Sallie McFague, *The Body of God*,(London: SCM Press 1993).

6. Hai district water supply project: a model of community rural water supply initiated by a church in Tanzania

CHRISTIANITY. Eng. Rogers C. Marandu, Tanzania

This is a shortened version of the full paper, which can be found on the ARC website:
<http://www.arcworld.org/downloads/Water-and-a-church-in-tanzania.pdf>

Background:

The Water crisis has contributed to Tanzania being one of the world's poorest countries, with many lives and working hours lost. Despite the government recognising the issue, the service of clean and safe water is still not good enough through the country. The 2002 National census indicates that 58% of people in rural areas had no access to clean drinking water. In urban areas this figure is 15%. This is mainly due to inadequate water laws, a lack of investment funds to invest in infrastructure and human skills, a socialist government policy of free water (which effectively has proved unsustainable) and a centralised system.

The Government is taking some action. The 2005 "National strategy for Growth and Reduction of poverty" considers water and sanitation as key factors in the fight against poverty. One stated target is to increase access to safe clean and affordable water to 65% of the population in rural areas (from 42%) and 90% to urban areas (from 85%) by 2010.

Before the start of the project in the Hai District there were 15 deteriorating water supply schemes from the 1960s and 1970s. Many people living in the coffee banana areas were fetching water from traditional irrigation furrows contaminated by animal/human waste, fertilizers and pesticides while those living in the savannahs were depending on polluted river water. Resultant diseases included cholera, typhoid, diarrhoea, dysentery, scabies, pinworm, typhus and ascaris.

However, on the positive side, according to the 2002 census, 94% of the 260,000 people living in Hai District have access to toilet facilities - mostly pit latrines, a situation that comes from people having higher incomes than the natural average, due to the fertile soil on the slopes of Mt. Kilimanjaro with productive coffee and banana plantations. Education standards are also higher than in other Districts in Tanzania, meaning that this is a good place to host a model project.



Women waiting for the inauguration of a new water scheme

2.0 The Project:

The Evangelical Church of Tanzania's Northern Diocese initiated the project in 1987 with the objective of supplying clean and safe water to Bomang'ombe Township, which is the capital of Hai District. The church first had to look for donors and fortunately the German Protestant church and the Government of Germany agreed to finance the project in a joint venture with the Tanzanian Government. It was therefore supported by four parties: two churches and two Governments. Physical implementation of stage 1 started in 1992 and was completed in 1996, at which point the Governments agreed to continue with rehabilitation of existing water supply schemes to a level of supplying up to 90% of the population with clean water by 2015. In 2009 the project is in phase IV- 2 of its implementation stage and has been able to supply 242,025 people with clean water.

2.1 The role of the religious organisations:

The greatest support from the religious institutions (both Christian and Muslim) in this project were:

To allow education and awareness campaigns to be conducted in the church during Sundays worshipping hours.

Muslim leaders assisted in gathering their worshipers together after Friday prayers to be educated and sensitized about their water project.

The Evangelical Lutheran church in Tanzania- Northern Diocese passed a resolution that no Lutheran child will be confirmed unless he/she shows ten trees she/he has planted.

Religious leaders attended or participated in all meetings and seminars invited for educating, sensitization and awareness campaigns for their water project. They educated their community in churches and mosques on:- the importance of voluntary contributions of labour, paying for water according to consumption, environmental sanitation personal hygiene.

2.2 General Implementation:

The project was implemented under a Steering Committee including the Kilimanjaro Regional Commissioner as chairman and the co-chairman is the Dr. Erasto N. Kweka, Retired Bishop of the Evangelical Lutheran church in Tanzania-Northern Diocese. Consultancy services are provided by CES – Consulting Engineers Salzgitter GmbH from Germany, responsible for preparation, planning, implementation (all in collaboration with local experts) as well as sensitization and awareness campaigns on Water Hygiene and environmental Sanitation, facilitation of legal implications, training and recruiting staff and carrying out independent annual performance appraisals for the water supply trusts.

2.3 Awareness campaigns:

The project was introduced to political, administrative and religious leaders through seminars and village meetings:

- * Explaining why they need clean and safe water and what types of water related diseases are affecting their communities.
- * Explaining why beneficiaries have to pay for their water according to consumption.

- * Explaining the coverage areas of the water project – villages, sub-villages, educational and health institutions.

- * Explaining the structures and installations to be built and installed in their areas, e.g. reservoirs, pressure reducing tanks, the various valves and water meters.
- * Explaining how to safeguard and protect their project construction materials from theft for example materials such as cement, sand, aggregates, reinforcement bars, concrete blocks, pipes and fittings etc.

- * Explaining why there is no compensation for land used and plants uprooted.

- * Explaining why people should help voluntarily e.g. in pipe trenching, back filling and ferrying of construction materials to sites where vehicles cannot reach.

Formulation of Village Water Committees:

According to Tanzania's 2002 National water policy village water committees should comprise five women and five men, educated to primary level or above, of good character. They must also be willing to assist in the operation and maintenance of the water supply, with the vision to see a reliable water supply system supplying clean and safe water. The chairperson must be elected by the village general meeting and will automatically be the board member for the water supply trust. Responsibilities and duties include: making sure that the budget is transparent, assisting the collection efficiency of water charges, helping to minimise the amount of water unaccounted for, assisting the trust in scrutinising private house water connections, knowing how to maintain public taps, knowing how to conserve water sources and forests, helping improve environment sanitation, knowing how to dispose of human waste, setting targets, assessing skills of employees, setting up affordable water tariffs which cover costs (including depreciation), to acquire land titles for areas where water structures are constructed.

2.3 Achievements:

- *The supply of clean and safe water is now reliable, with widespread consumer satisfaction, with loss of water just 15 percent and a sense of scheme ownership by villagers.

- *Beneficiaries showed they were willing to pay for their water according to consumption. In 2008 two districts had 100 percent payment, while the other three averaged 97%.

- *All public taps were constructed as per the Engineers specification and community's requests, and fenced by the beneficiaries before being opened for supply of water.

- *There was no vandalism and sabotages of the water supply system.

- *Water schemes were sustained by the funds raised without subsidies.

*Water users are aware of water sources and general environmental issues; they were also aware that their water is clean and safe and no need of boiling.

*All five independent Boards of trustees are able and capable of setting tariffs that are affordable to their water users.

3.0 Education on Water, Hygiene and Environmental Sanitation:

Seminars were conducted in primary schools, colleges, churches and mosques as well as through the radio stations, emphasising that water is a vital for life- without safe water for drinking we will not survive. Participants learned:

*How to treat contaminated water, how to keep drinking and bathing water away from latrines, how to keep drinking water in clean, covered containers and why they should never drink water direct from storage containers. They learned that farm fertilisers can pollute water, so were encouraged not to use chemicals near water sources, nor to let oil run into springs, rivers and furrows and to discourage people dumping waste into lakes, rivers and springs.

*To wash hands after using the latrines, before meals, before handling food, and how to live in a clean environment.

*To collect rubbish, dispose of it, sweep their houses, cut grass around their houses, fill open ditches, build pit latrines and care for them, and construct storm drainage for their school and homes.

*The importance of forests in protecting the ozone layer, acting as flood control, modifying the climate, preventing soil erosion, providing natural habitats for wild animals.

3.1 Primary schools:

In 2008 the church helped evaluate the impact of this education on 80 primary schools in Hai. All children (100%) knew about clean and safe water for drinking; 40 percent knew to collect rubbish and dispose; 50% knew about cleaning the classrooms (most remembered the floor and forgot the walls); 80% knew about drainage; 60% about bathing, and 50% about pit latrine cleaning (though this was attributed to lack of materials); 60 % had done tree planting in the school areas and 20% had created nurseries for trees. However none knew about the importance of tree planting for firewood or in the water catchment areas

4.0 Impacts of supplying clean water:

*Women's workload has decreased with no more need to fetch water; they can now do other income-generating activities.

*School attendance has increased, by releasing children from going to fetch water.

*Health standards have increased.

*Investment in education, health and construction of new houses has increased

*People are now much cleaner as are their clothes.

*People in the dry areas can get their two daily meals rather than one.

*Children now have white clean teeth because the drinking water contains fluoride.

4.1 Other observations

*Repair of leaking pipes are attended in time because of good management.

*Most water supply trusts employees are acting in an honest and transparent manner.

*Village water committee members have proved to be the central focal pillars in safeguarding the water supply system and assisting in water bills collection.

*The awareness educating in public meetings, schools, churches and mosques were of great importance for the sustainability of the water supply system.

*Educating campaigns through radio programs has made people more knowledgeable about water.

“Let us all praise our Lord Jesus Christ for the good project which is serving Hai District people with clean and safe water” AMEN.

Appendix 1:

WATER SUPPLY SCHEMES COMPLETED AND IN OPERATION:

SN	Phase	Name of water supply scheme	Physical implementation started	Scheme completed	Cost in “euro”	Cost in Tanzanian shillings	Targeted population by year 2015
1	I	Uroki Bomang’ombe	1992	1996	7.17 million	11.5 Billion	92,000
2	II	Losaa – K.I.A	1998	2000	4.40 million	7.04 Billion	65,000
3	III	Magadini Makiwaru	Jan 2001	May 2002	1.715	2.7 Billion	22,000
4	III	Lawate Fuka	April 2002	Oct. 2003	1.815	2.9 Billion	42,000
5	III	Masama Water Supply	July 2003	May 2004	1.375	2.24 Billion	“partly attached to Uroki-Bomang’ombe and Losaa-KIA”
6	III	Rundugai and Sanya Station	July 2003	May 2004	0.96	1.5 Billion	“Attached to Uroki-Bomang’ombe”

7	IV - 1	Lyamungo Umbwe	Jan. 2005	April 2008	8.01	12.8 Billion	75,000
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Appendix 2

YEAR 2008 PERFORMANCE STATUS FOR THE FIVE INDEPENDENT SCHEMES:

List of performance indicators	UBWS	LKWS	MMWS	LFWS	LUWS
Average annual monthly collection	Tsh 30,000,000/=	Tsh 18,000,000/=	Tsh 8,000,000/=	Tsh 10,000,000/=	Tsh 7,000,000/=
Number of people served up to year 2008	62,125	58,170	21,467	38,868	61,393
Number of employees	44	45	21	21	38
Number of Board meetings held regularly	2	4	2	6	4
Number of executive meetings held regularly	4	Nil	4	Nil	3
Annual unit cost per water produced (Tsh/m ³)	Tsh 219/=	Tsh 293/=	Tsh 274/=	Tsh 357	Tsh 318
Total expenditure on operation and maintenance for the year 2008	Tsh 151,698,482	Tsh 175,569,591/=	Tsh 6,864,000/=	Tsh 103,712,925/=	Tsh 1,229,700/=
Personal expenditure as % of overall budget	26.6%	53%	46%	46%	46%
Average annual technical water losses	15%	15.2%	11%	16%	12%
Average annual water consumption m ³ /day	2800m ³ /day	1883.5m ³ /day	605m ³ /day	790m ³ /day	990m ³ /day
Total length of pipelines in kms	Km 224.2	Km 260	Km 103.7	Km 127	Km 207
Total number of reservoirs	19	27	9	14	28
Total number of pressure reducing tanks	36	136	9	29	78
Total number of	240	310	142	208	273

public taps					
Total number of Intakes	6	5	1	2	4
Total number of valve and water meter chambers	241	268	239	186	540
Total number of connected customers	4429	2808	952	1609	2539
Average annual collection efficiency	95.4%	97.6%	100%	100%	99.6%

- UBWS – Uroki Bomang’ombe water supply
- LKWS – Losaa – K.I.A water supply
- MMWS – Magadini Makiwaru water supply
- LFWS – Lawate Fuka Water supply
- LUWS – Lyamungo Umbwe water supply

Currency conversion Rate:

1 USD = Tanzanian shilling (Tsh 1,300/=)

7. Water, Sanitation and Hygiene for Faith-Based Schools

CHRISTIANITY. Magdaline Gitahi, Redeemed Gospel Church, Mathare, Kenya



What is the Redeemed Gospel Church Development Programme?

The Redeemed Gospel Church Development Programme (RGCDP) is a faith-based organization started in 1998 with the aim of addressing the needs of the poor people in the slums. It is the social arm of the Redeemed Gospel Church, founded in 1974 in the slums of Mathare by Bishop Dr A Kitonga. He saw how many slum dwellers were obtaining money through “negative coping means” such as prostitution, alcohol brewing and theft, and realized that there was a need for them to find an alternative after giving their lives to Christ in order for them to continue earning a living and be able to support their families. This resulted to the Bishop introducing social programmes through the church in order to meet with the physical, social and economic needs of the poor as well as their spiritual nourishment.

Currently, the Redeemed Gospel Church has stretched her ministry to nearly every big town within the country and has over 2000 churches world wide, while RGCDP implements social programmes in three main places: the Mathare, Huruma and Korogocho slums of Nairobi. The work is grounded in its belief in a holistic approach to development, which takes into account the spiritual, social, physical and economic needs of people.

How many people live in the slums?

More than 800,000 people live together in the Mathare slums alone, in a mass of unplanned structures. Mathare is just a few minutes car drive from the Nairobi city centre in Kenya, East Africa, yet it offers such a contrast to the comparatively wealthy centre. It is characterized by poor housing, poor sewage systems, inadequate health and schooling facility, high crime rate, high HIV/AIDS infection rates, high child mortality, malnutrition, prostitution and unemployment. People have come from various parts of the country leading to a great variation in cultural beliefs, practices and values.

How do people access water in Mathare?

There are standpipes 300 meters apart. People have to queue with their 20 litre water containers for which they pay 2 Kenyan shillings. Water sellers in the slums have to pay a monthly fee to the local government in order to have a continued supply from the mains. This is paid according to a meter reading.

Outside Nairobi, people might have to travel more than 10 km for water sometimes, especially in Central Kenya and especially in the dry season. In many cases the fetching of water is done by women and children except where men are living alone. Water is carried on the back supported by a strap held on the head. Where distance are vast, donkeys are used where available and will carry four 20 litre containers; two each side.

What is RGCDP'S vision?

The vision is to have a society without poverty, injustice and where people co-exist peacefully and children are facilitated to develop their full potential.

What is RGCDP's mission statement?

RGCDP exists to address the physical, social, spiritual and economic needs of vulnerable people in the slums of Mathare, Huruma and Korogocho, especially children, women and youths, through active participation and empowerment.

How does RGCDP achieve this?

RGCDP has six specific projects:

- 1. Child sponsorship:** Poor children are given money for school fees, uniforms and books.
- 2. Health and Nutrition:** malnourished children are fed with a balanced diet and their parents/guardians are taught how to prepare the food through demonstration. The project involves a nutrition demonstration kitchen, a health clinic, a full HIV/AIDS programme (with voluntary counselling and testing services, prevention of mother-child transmission, home-based care and support for vulnerable children), and the training of Community Health Workers on teaching the community on general hygiene, family planning, and other health issues
- 3. Primary/Secondary schools**
- 4. Community empowerment**
- 5. Vocational Training: largely in** computers and hairdressing
- 6. Relief**

Why is the Church filling this Government role?

The Kenyan government is not effectively addressing the needs of its people by putting policies in place to care for the poor. Therefore churches and NGOs need to fulfil that role. In addition, the poor in the slum do not know their rights and the church has to take up the responsibility of explaining these to them. The church is within the community and this means that we are on the ground: we cannot turn a blind eye to the needs of those that we are serving.

How does the church fund its outreach ministry?

The Redeemed Gospel Church is funded by donors and well-wishers for its Outreach work. Most funding comes through Kenya-based NGOs, including Compassion International, MAP International and PATHFINDER International. Funding also comes from the Netherlands. The money is used to support the pastors and also for spiritual outreaches like crusades. A small amount comes from the weekly collection by the congregation, however this is comparatively small, since most church members come from within the slums and have very low incomes or no incomes at all.

What is the meaning of water in the context of the Christian faith and tradition?

The Redeemed Gospel Church believes in the saying that "Water is Life". In the book of Revelation 21; 6 we read: "And he said to them, it is done. I am Alpha and Omega, the beginning and the end. I will give unto him that is thirsty of the fountain of the water of life freely." In chapter 22;1 we read that: "He showed me a pure river of water of life, clear as crystal proceeding out of the throne of God and of the lamb"; and in verse 17 that: "The spirit and the bride says come and let him that is thirsty come and whosoever will, let him take the water of life freely. In these scriptures, water symbolizes Christ.

John 4:10, Jesus talked of living water when asked for water by the Samaritan woman. In this instance, He was referring to Himself as having water of life and that whoever drinks Him will not thirst again. When the Lord Jesus commissioned the disciples to preach the good news, He also commanded that whoever believes and is saved, should be baptized by being immersed in water as a symbol of dying and resurrecting with Him.

What is the hygiene and sanitation situation?

RGC use a holistic approach involving people's spiritual, physical, economic and social needs. It is not possible to have good physical health in the absence of clean water. Cleanliness is vital in the prevention of many kinds of infections. Personal cleanliness (hygiene) and public cleanliness (sanitation) are both important.

In the slums, toilets are few and this means that one has to walk for quite a distance to access one. Some cost 5 Kenyan shillings per visit, to cover the cost of someone keeping them clean, but many find this too expensive. Due to security and cost reasons, many are forced to use plastic bags as an alternative, and then they throw them into dumping sites, trenches or into the rivers. Many people relieve themselves in a corner of the narrow streets while children can be seen relieving themselves at the garbage sites, even during the daytime. Some toilets are built by the river with the affluent flowing straight in, which adds to pollution and increased risk of disease. There are no built-up drainage systems in the slums – resulting in wastewater finding its own way, through trenches filled with dirty stagnant effluent. This also becomes a source of diseases especially for the little children who play in and around the dirty water.

Scarcity of water leads to inadequate hygiene. Many children attend school while dirty - leading to low self-esteem. At times, the children studies are affected due to the time they take to fetch for water which in most cases has big queues. Children also learn in dirty classrooms, which are washed once or twice a week due to scarcity of water.

Some people in the slum will bath and wash their clothes only once a week in order to save on the cost. You also find that utensils are not rinsed in clean water.

Currently, there is a big problem of water in the country and the government has resulted to rationing it where it is available. Most estates in the city of Nairobi are now getting water either once or twice a week. In other places the water dried over one year ago and they have to fetch for it though they have taps in their homes.

How are girls affected?

Girls are greatly affected, especially when they are undergoing menstrual periods. There are no disposal facilities for sanitary towels and as a result they sometimes keep used towels in their school bags or throw them down the toilets causing them to block. In most cases, they do not even afford the towels and they result in using whatever piece of cloth is around them clean or not clean. Most parents cannot afford to buy sanitary towels on a monthly basis.

What is the church sharing with young people?

As a church organization, we have been conveying the message of importance of clean water, hygiene and adequate sanitation to the young people:

- Boiling water before drinking or using chlorine tabs and ensuring that containers/cups used for drawing or keeping water are clean.
- General house cleaning. Since family members are in close contact it is very easy to spread germs and illness. It is even more important to keep the house clean when there is a sick person because sickness reduces the body's immune system and ability to protect itself from even ordinary illness. The objective here is to maintain good hygiene so as to prevent the spread of infection and make the house a pleasant place to live in.
- Throw away leftover food in a proper way.
- Always keeping food covered.
- Not to spit on the floor and when coughing or sneezing to cover your mouth with your hand or piece of cloth and later wash your hands.
- Importance of washing hands before and after eating.
- Importance of washing hands after visiting toilets.
- We conduct environmental cleanliness with them at least thrice a year- during school holidays

How does the church train Community Health Workers?

The church has also been involved in training some community members as Community Health Workers;

- Teaching the community on general and body hygiene
- General environmental cleanliness. This includes keeping the surrounding clean by sweeping and collecting garbage and burning them in a pit.
- Referring the sick to hospital before it is late.
- Advising the community on the importance of eating well to prevent sickness

How can I learn more?

<http://www.redeemedgospel.org/>

8. Faith in Water

CHRISTIANITY. Bishop Walter Scott Thomas Snr and Reverend Alfred Bailey II, New Psalmist Baptist Church, Baltimore, US

In the Christian faith, water is both a symbol of life and source of strength. It is also a reminder to us that some things are indeed vital for our survival. The stories of our faith show mankind struggling to live and kept alive by water. When Elijah entered the city of Zarephath, he saw a woman picking up sticks and asked of her a drink of water. The drought was great and the only way he would survive was to have a drink of water. She was a widow and he was a prophet, but the need for water was the common denominator. We sometimes forget the life giving force that is in water and that the greatest and the least among us need it.

At the New Psalmist Baptist Church, a predominately African American, Baptist congregation established in Baltimore, Maryland, USA, the existential need for water, common to all living things, has become central to our exercise of our faith. As with other congregations in our denomination, and Christians more generally, water plays an important role in our ritual observances, and has a powerful symbolic presence in our sacred texts. Candidly, it would be easy enough to refer to: the great flood of the Old Testament (*Gen. 6-9*); rain (*Jer. 2-3*); Jesus' baptism (*Matt 3; John 3:5*); or the woman at the well (*John 4*) to offer some understanding of water's significance among many Christians. This would offer little, however, to illuminate how or why water occupies its current place of importance in our exercise of our faith. Accordingly, this paper will not attempt to trace the origins of water as a symbolic presence in Christian traditions. Rather, we hope to impart some understanding of how water has become so meaningful in our particular expression of our faith, and it is our hope that our journey to this point can be somewhat instructive.

The central mission of any Christian church is to spread the gospel – the good news of Jesus Christ. It falls to particular congregations, and ultimately, to each individual himself or herself, to divine how to undertake this mission – each in accordance with God's unique revelation. The ministry of New Psalmist Baptist Church has distilled its central mission to *empowering disciples*. Our faith is not exercised merely in our utterance of platitudes, but in our striving to reflect the characteristics of Christ in our living and in our works.

In practice, this compels us to preach, teach and live the gospel in such a way as to grow each hearer according to each of his needs, and each of her capacities. Our divine assignment is to lift those around us, and to help them to get to the next place to which God calls them. Jesus taught and preached (*Matt. 5:1-16*), but he also fed those he sought to enlighten (*Matt. 14:13-21*). Jesus healed those whom he sought to save (*John 9:1-25*). By Jesus' example, then, it is not enough that we expound on the gospel. Rather, we, our collective works and witness, are, God's instruments for delivering Jesus' promise of life and life more abundantly (*John 10:10*).

For all of water's symbolic import to those of us Christians who have never struggled to secure it, or suffered from its loss, we have rarely considered its practical relationship to our undertaking of our central mission. Water lies at the heart of human struggles for health and sustenance. Its scarcity has led to starvation, disease, conflict and war. Indeed the stories of our faith have recognized that water brings out the selfishness that often lives in the human heart. We want to insure our survival even at the expense of others. Isaac re-dug the wells of his father, Abraham, yet it was not without contention. Conflict arose and his enemies forced him to move on.

Now as then, struggles for water security in our age demonstrate that we are not yet one human family and that we have hurdles to cross until we see every one's needs as our own. Struggles, notwithstanding, however, in a very tangible sense "life abundant" is not possible without water. So, if we are to deliver on God's promise, as we believe that we are charged to do, and if we are to lift the hope of those who live in dry, hostile and barren places, if our works, and not only our words, are reflect the character of Christ (*John 4:14*), then we must confront and address water's attendant conflicts and ameliorate the problems in these places. The revelation of how we have internalized this connection is perhaps best illustrated by the story of how we came to initiate our work in Kenya.

Our journey to this new understanding began shortly after the December 26, 2004 Sumatra-Andaman earthquake in the Indian Ocean, which triggered the devastating tsunamis in the

Indian Ocean ravaging Indonesia, Sri Lanka, India, Thailand, and East Africa. Like many churches, and people of faith and compassion around the world, New Psalmist Baptist Church and New Psalmist Primary Christian School sent aid to World Vision and Feed the Children with the hope providing of some relief to the people devastated by this disaster. In that moment, we believed ourselves to be operating squarely in accordance with our most fundamental tenets; we had empowered members of our congregation to join with others to provide aid and comfort "...unto the least of these..." (*Matt. 25:40*). However, as we confronted the devastation beyond our borders, of understanding of who we were and who we were called to be was expanding.

Almost simultaneously with the tsunami-related events, World Vision had approached New Psalmist and began a dialogue on how African American faith-based organizations (FBOs) could become more engaged outside the borders of the United States. As a part of this consideration, we began to examine how we actualized our mission, and moreover, how our mission might expand beyond our local outreach efforts. Our notion of *empowerment* had to move from the theoretical or the superficial. Our notion of *disciples* had to expand to comprise not only members of our congregation or communities, but those worlds away whose lives we might touch. It followed then, that where life could not be sustained, then empowerment would not be practical or possible, and where there was no water, life could not be sustained. Water, then, emerged as a touchstone of our effort to live true to our more robustly defined calling.

The Potter's House, a sister church in the USA, had begun working on water security issues in Kenya, and subsequently invited New Psalmist Baptist Church to join a meeting in Nairobi, Kenya with representatives of congregations from around the world to discuss issues of water, sanitation, health, education and community empowerment. Among the outcomes of the meeting was the establishment of a collaborative effort to purchase equipment to dig wells in Kenya.

By October 2005, we had participated in efforts led by Potter's House and FBOs to complete 6 wells to provide water for living in some of the most arid areas of Kenya. Members of our congregation supported several ongoing collaborative empowerment efforts, including a medical outreach program that reached into schools and the surrounding communities. (We participated in bringing doctors and medication from the United States to partner with Kenyan doctors to treat some 1200 patients a day for three days Nairobi.)

Our school outreach efforts provided students and teachers with needed schools supplies, shoes, hygiene products and clean water. Additionally, we constructed a computer lab and hosted a writing contest at the school. In addition to providing water for families, the initiative sent outreach teams to participate in food, hygiene products, and shoe distribution, in the local village. It took very little time for us to observe that providing clean water had been the essential resource to sustaining community empowerment efforts.

As our exposure to and participation in efforts to address people's most fundamental needs have grown, and as our partnerships have continued to develop, we have found the context in which to live out the rest of our charge – to express the good news of God's promise, to help individuals find His path to each of their next great places of revelation. In so doing, we have attempted to provide various resources to strengthen the families and schools. We have forged relationships with local churches in Kenya, including The Redeemed Gospel Church, a mega church in Nairobi, Kenya with a heart for outreach. We continue to pursue our central mission of helping people everywhere to experience, understand and grow in the

transforming power of the Gospel of Jesus Christ, but we have seen that such expression can ring hollow and ineffectual when we are not prepared to take action.

To the more casual observer, water's biblical history may be somewhat checkered. One might conclude that water has been a force for destruction (*Gen.6-9*) as often as it has been a force for good. Closer inspection would suggest that water, even in those instances where its devastating power was unleashed on the earth, ultimately cleansed and restored life. Indeed, water as a giver and sustainer of life pervades the scriptures (*John 4*). Even with water's powerful symbolism in our tradition, however, our charge to stewardship of its supplies, and our call to promote conservation, water security and improve hygiene, do not spring so obviously from our faith traditions.

Rather, our understanding of our mission to empower the lives of every person that our ministry reaches constrains us ensure that the most fundamental needs are met. Water is a most fundamental need. Our experience in Kenya has taught us that comprehensive, collaborative activity to address basic human need, based upon a shared value of common humanity, even across lines of faith and nationality, creates the necessary context for people of faith to speak to the divine potential that we believe is at work in us all.

Ultimately, the placid streams and flowing waters remind us of the peaceful world God intends for us. Though there are times when we see its fury and face its force, we are reminded that God has given us this great gift to show us our commonality and to guide us to a common good. That is why St. John the Divine's eschatological vision presents a portrait of a world at peace:

Then the angel showed me the river of the water of life, as clear as crystal, flowing from the throne of God and of the Lamb down the middle of the great street of the city. On each side of the river stood the tree of life, bearing twelve crops of fruit, yielding its fruit every month. And the leaves of the tree are for the healing of the nations.

(Rev 22:1-5NIV)

Just as in the writings of Ezekiel the water flowed from the temple, so in the end God will grant uninterrupted life. It is a picture of what the future will be and a command to each of us to work to bring it to pass.

9. Links between Education, Religion and Inspiration

HINDUISM. Rupa Rangunath Das, Director of Food for Life Vrindavan Society, India

In the early 90's I started working in an ISKCON temple in Vrindavan distributing food to the poor and it wasn't long before my inspiration to make a difference to the people and environment of Vrindavan led me to start my own charitable organization called Food for Life Vrindavan.

Now, despite the name of the organization, distributing food is only a small part of what we do. Food for Life Vrindavan provides free education for over 1000 poorest of poor children as well as adult literacy, health education and environmental services such as tree planting and paper recycling.

One of the first projects outside food distribution that Food for Life Vrindavan embarked upon was installing a water facility in Javat village in 1999. Two large water tanks and a submersible pump were installed on the edge of the village. A deep boring was done to reach the fresh ground water and a committee was formed among villagers to handle the maintenance and upkeep of the pump and water tanks.

Ten years later, this water project is still functioning and hundreds of families gather water there every day. The project is completely self sufficient as the village committee collects a small monthly maintenance fee from all the families who use it.

Let me take you deeper into our work in Vrindavan and why we are here. Vrindavan is made of two words, Vrinda and van. Vrinda is a Hindu goddess who is in charge of Vrindavan. Van means forest, so she is in charge of the forests of Vrindavan. Vrindavan is one of 12 forests in a radius of 168 Km, which is called Braja and was the playground of Lord Krishna 5,000 years ago.

Even though by name those 12 forests still live, all of them have been drastically reduced to few trees here and there.

Vrindavan is encircled on tree sides by the sacred river Yamuna that has been the basis of life for generations. Unfortunately since the last few years the river Yamuna has been turned into a sewage flow from Delhi and other industrial district.

So trees have long gone, the river is basically not there anymore and the ground water bed are, for the most, salty and can hardly be used for washing clothes.

We, (FFLV www.fflvrindavan.org) have been working for the last 20 years in addressing this issues, please see our website for details in trees, water, sanitation etc.

Lack of interest from local authorities, religious groups and general public has made it very difficult to have any effect at large. It was only when we started our Sandipani Muni School that we saw that incredible potential. Thousand children who do not litter, 1000 children who close the taps and are careful not to waste water, 1000 children who will not snap a tree sapling just out of play.

Sandipani Muni School was made for the poorest of the poor, catering to children from families who are considered absolutely poor, or having an income of less than £ 20 per month. Our school was built with a water harvesting facility and the rainwater via the roof is collected in a 100,000-litre underground tank. The water is then used for irrigation and cleaning, eventually when the need will arise this rainwater could easily be filtered and used for drinking. In our school we also have a reverse osmosis water filtration plant. The tap water in this area has a TDS or total dissolved solid of 2,200. International standard for TDS is 50. Wastewater from the plant is used for flushing toilets.

Our children take part in a number of educational activities, from tree planting to environmental drawing competitions, to cleaning drives and education on the importance of

water for our lives and the planet's survival. In 2006 we published and printed a booklet in Hindi called "a change of heart" 100,000 free copies were distributed to all Vrindavan's schools, colleges, ashrams, temples and our children went in the street distributing them to everyone they met. In our school we stress recycling from paper, which is then used in our paper plant for making notebooks shopping bags etc. Please see links:

http://www.fflvrindavan.org/gallery/main.php?g2_itemId=7987

http://www.fflvrindavan.org/gallery/main.php?g2_itemId=9168

http://www.fflvrindavan.org/gallery/main.php?g2_itemId=6948

http://www.fflvrindavan.org/gallery/main.php?g2_itemId=6604

During the summer our children make paper bags out of old newspapers and we go out and sell them to shop keeper encouraging them not to use plastic bags. Every last Saturday of the month (except summer time as it is too hot) our children do a cleaning drive in and around our schools, with banners and boards to awake awareness in the local community.

If anybody needed a reminder of how crippling bureaucracy can be, consider the campaign to clean up the sacred Yamuna River in Delhi. The river oozes through town like a putrid ribbon of black sludge. Its level of faecal bacteria is 10,000 times higher than what's deemed safe for bathing. After a half-billion-dollar, 15-year program to build 17 sewage treatment plants, raw sewage still spills into the river at the rate of 3.6 billion litres a day.

Providing clean water is a solution to the immediate crisis of people needing clean water, but Food for Life Vrindavan also works towards solutions for the long term. Our major focus is on primary and secondary school education because it is only through education that people gain the skills they need to change the future.

In India, there are still millions of children from poor families who grow up without getting an education. At Food for Life Vrindavan's schools, we work to break the cycle of poverty, not only by giving children an academic education but also by inspiring them and teaching them that they can be agents of change. For example, at our schools, we work to create a culture of everyone pitching in to help out and willingness to helping others is fostered and rewarded.

We are assisted in our efforts to create an atmosphere of service to each other by the Hindu practice of Bhakti, which is translated into English as "loving service".

Bhakti is a spiritual activity and when Hindus offer flowers, water or incense to a statue or picture of God, it takes them beyond the material realm into the spiritual world. As God is not a material being, service to him is not an activity of the material world - so an act as simple as offering a flower to God takes one out of the material realm and into the spiritual realm.

When Hindus serve the particular form that they consider to be the most worshipable form of the lord, it is with a loving heart and a desire to increase love for God by serving Him. A Hindu offers a flower to God just as we would give someone we love a nice flower, for their enjoyment and to show our love.

The principle of Bhakti or loving service is practiced in Food for Life Vrindavan schools from the beginning of the day when the children take flowers and present them to their

classmates and teachers at the morning assembly. After one person has smelt the flower, the child takes the flower and presents it to the next person for them to smell also.

The feeling of having a supportive and loving community, of being able to co-operate with others and get their co-operation is what empowers religious communities to work together to make positive changes in the world. And the practice of contenting ourselves with simple, homely and God given pleasures can enable us to reign in our destruction of the planet.

The twenty years I have spent running Food for Life Vrindavan have been the most satisfying and happiest time of my life. I have a sense that I am doing what God intended me to do, and this feeling is reinforced when, over and over again, I feel that God is making some arrangement so that our work goes smoothly.

When I came to India, alone in the 1980's, I had no plan of opening schools or doing conservation work, but Krishna made arrangements so that I could start this organization in Vrindavan India, which is said to be the place of His childhood pastimes. I feel that I am truly blessed by God to have been given the opportunity to run schools for children who are so happy to be able to come to school to learn and to be given good food, clean water and medical care. These children are our hope for the future.

10. The Dharma of Water: Hindu water principles

HINDUISM. Ranchor Prime, UK

1. Vishnu is the taste of water

Water symbolises God's presence, which is why Krishna says, 'I am the taste in water.' (Bhagavad Gita 7:8)

Because of these words when Hindus drink a glass of water, before putting it to our lips, we repeat mantra, 'Sri Visnu Sri Visnu Sri Visnu,' to remind ourselves that we are about to experience the taste of God's universal presence.

Not only water, but everything we experience in this world, comes from God:

I am the source of all. Everything emanates from me. The wise who know this serve me with all their hearts. (Bhagavad Gita 10:8)

The elements of matter are all part of God's existence: earth, water, fire, air, ether, mind, intelligence, and ego (Bhagavad Gita 7:4). Reality is made up of God's energies. If we wish to see evidence of God we have only to look around us and appreciate the wonders of this world.

It is easy to take these wonders for granted: we can easily overlook the taste of water, for its taste is present in everything. So it is with the presence of God. He permeates everything

and becomes invisible. All life is in him, yet it cannot contain him, because God is independent of all.

2. Only take your share

Water is sacred and cannot be anyone's property. In one sense it belongs to all living beings, to be shared fairly by us all. But in a deeper sense it belongs to God. This is how the classic Vedic text, Isa Upanishad, teaches us:

Everything in the universe belongs to God. Therefore take only what you need, that is set aside for you. Do not take anything else, for you know to whom it belongs. (Isa Upanishad, Mantra 1)

Water is an example of how God shares his wealth with us. Its value is beyond calculation – no amount of money gold or silver could equal a glass of water to a person dying of thirst. Yet water is free – or at least it should be! That is God's generosity.

Traditionally all over the world people dug wells and carried water to their homes, sometimes over long distances. Because water was so valuable, to give people access to water, by digging wells or village water tanks, was considered one of the great acts of charity. Many Hindu temples are endowed with public water tanks so visitors can wash and refresh themselves after their journeys.



photo: Kusum Sarovar, a temple water tank dug for the people of Govardhana, U.P., India. (© www.sanskritweb.net)

In most civilizations water provision, which had been a great act of charity, became institutionalised as part of the functioning of a just society, to ensure water was available for all. And in the modern age in many countries it has now been privatised, though the water companies are still regulated by government agencies.

But the Isa Upanishad warns us that if you do claim such a valuable thing as yours, be sure that you only take your fair share. Take only what you need, that is set aside for you. Do not take more, for you know to whom it belongs – everything in the universe belongs to the God.

The water companies and their shareholders must be sure to care for their responsibilities to the people and not unfairly exploit their position, and the people who consume water should not take more than their fair share.

3. Moderation is a virtue

Moderation, to be reasonable in taking your share of what you need and not to be excessive, is an important virtue. And so is cleanliness, in personal hygiene and in cooking, especially for Hindus – and this requires water. Therefore we need to be moderate in how we practice cleanliness.

Moderation in all things is called the middle path, described in the Gita as ‘eating neither too much nor too little, sleeping neither too much nor too little.’ The same applies to our use of water. One person might say that to keep clean I require three baths a day – and that is not uncommon in India – and another might insist on washing every item of clothing after only an hour’s use, or having constant running water in the kitchen sink. Such moderation is part of yoga, for as Krishna says:

One who is moderate in eating, sleeping, working, and recreation banishes all sorrow through yoga. (Bhagavad Gita 6:17)

Enjoying the benefits of clean water in a regular and moderate way is a necessary part of life. We live in a time and place where this necessity is very lavishly provided for, but we should control our demands for water as part of a moderate lifestyle that will contribute to our peace and happiness.

4. Duty towards Mother Earth

The Bhagavad Gita teaches us about duty. We all have duties, personal obligations to our families and ourselves and more general obligations to society. In Hindu teaching an individual’s first duty is to oneself – for unless I can save myself from birth and death how can I save another? But equally it is my duty to serve society. And all my duties are ultimately part of my obligation towards my maker – whether I call that original source by the name Krishna, Rama, Shiva, Brahman, or any of the many other names by which God is known.

Surprisingly, in the Bhagavad Gita even Krishna says He has a duty – he works to maintain the world, and if He were to stop working the world would cease to be.

He urges us all to join him in working selflessly for the benefit of the world. This means that we all can help maintain the balance of life, and we can all profit as a result.

Caring for the Earth is not just someone else’s responsibility – it is a noble work in which we all share. Krishna bids us all work for the welfare of others and He calls this work the wheel of sacrifice. He says that nature’s gifts, such as water and food, depend on this great cycle, in which each gives to another and in return receives gifts from another. It is a never-ending cycle that brings happiness and prosperity for all. At the heart of this cycle is Vishnu.

Life is sustained by food grains. Food grains are nourished by rains. Rains depend on sacrifice, and sacrifice is born of work. ... So turns the wheel of sacrifice. One who lives selfishly, who delights only in the senses and does not care for the turning of the wheel of sacrifice, lives in vain. (Bhagavad Gita 3:14 & 16)

Krishna calls it the wheel of sacrifice. All work, even the everyday struggle for survival, forms part of this cycle. Life is a constant process of offering and accepting service in which we all

depend upon each other for happiness and security. If we ignore that cycle, if we do not care for it, we must face the consequences.

But if collectively we live on this planet with this spirit of service, seeing our lives as a cycle of giving and receiving, then we need not fear climate change and we can look forward to a regular rainfall, with the abundance of well-being it brings.



photo: Swollen by the monsoon rains, the rich alluvial waters of the Yamuna swirl around the ancient steps which line the riverfront of Vrindavan © Ranchor Prime

5. Rivers the veins of the God

In praise of God's Cosmic Form the Vedic hymns sing that the oceans are Vishnu's waist, the hills and mountains are his bones, the clouds are the hairs on his head and the air is his breathing. Rivers are his veins, the trees are the hairs on his body, the sun and moon are his two eyes and the passage of day and night is the moving of his eyelids:

Air is His breath

Trees are the hairs of His body,

Oceans His waist,

Hills and mountains are His bones.

Rivers are the veins of the Cosmic Person,

His movements are the passing of ages.

(Srimad Bhagavatam 2.1.32-33)

This truth of the underlying and all-pervasive presence of the Supreme Being is with us all the time everywhere. Wherever a river flows we can look upon it as one of the veins of God. The greatest of all rivers is Mother Ganga, who flows from the feet of Vishnu, and all Hindus honour her.



The Goddess Ganga by B G Sharma (© www.mandala.org)

In every land great rivers flow, draining catchment areas and providing nourishment and life. The Thames is such a river, named after Tamesis (from the Sanskrit word *tamas*) which means 'Dark One', because the waters of the Thames are dark. In Hindu tradition rivers are female and Tamesa would be a Goddess.

British tradition however has named the river as both male and female, Father Tamesis and the goddess Isis, for the upper and lower parts of the course. But these are differences of point of view only, which do not hide the shared realisation that the river is alive and a representative of God: a cosmic vein.

6. Rain and drought

Rain is a gift of God. Yet God also withholds rain, and drought may be the result.

O Arjuna, I give heat and rain, and I withhold the rains. (Bhagavad Gita 9:19)

Why should God withhold the most basic necessity of life when people lack rain and fresh water in many parts of the world? Rains depend on the wheel of sacrifice. If society lives in accord with nature's laws, we will have abundance, but if we take from nature without giving back, we must accept nature's consequences.

Therefore it is the duty of all people of faith to honour clean as a sacred gift, and use this precious gift with care and moderation.

11. The Water Situation in Jordan

ISLAM. Dr Murad Jabay Bino, Executive Director of the Inter-Islamic Network on Water Resources Development and Management, Amman, Jordan

WATER SCARCITY

Jordan is one of the ten most water-scarce countries in the world. The amount of fresh water available per capita in 2006 was only 150 m³, far below the 1000 m³ per capita per year considered as the limit to water poverty. Far from increasing, this figure is decreasing

due to the near constant water resources and increasing population. This means the water share of a Jordanian is only 3% of that enjoyed by citizens of Western Europe.

It is difficult to estimate the amount of water needed to maintain acceptable or living standards. Moreover, different sources use different figures for total water consumption and for water use by sectors of the economy. A range of 20 to 40 litres of freshwater per person per day is generally considered to be a necessary minimum to meet needs for drinking and sanitation alone. If water for bathing and cooking is included as well, this figure varies between 27 and 200 litres per capita per day. Several different amounts have been proposed as minimum standards. But the World Health Organization of the United Nations proposes an overall basic water requirement of 50 litres per person per day as a minimum standard to meet four basic needs—for drinking, sanitation, bathing, and cooking.

The reason for the severity of the water shortage is simple: Jordan lacks the rivers of nearby Syria, Turkey, Iraq and Egypt and it doesn't have the money the oil- rich Gulf Cooperation Countries have available to pay for desalination of sea water. But Jordan is the only country rationing year round because of shortages - meaning each household gets water supply only for one day once every week. All newly built houses have to build a water cistern in a basement section to store water, but poor families cannot afford to built large cisterns or even install large enough roof top tanks. When it is their turn to get water then it is when households could wash clothes, bath children and water the garden. Water scarcity is most evident during the long dry summer when it is common to see neighbours arguing over accusations of water thefts from rooftop tanks of neighbouring buildings.

AGRICULTURAL WATER – AND A SOLUTION

Agriculture consumes only about 60% of water resources in Jordan compared to 80% or 90% in neighbouring countries. Farmers use trickle or drip irrigation to save water. The following example may clarify how farmers in Jordan use irrigation water efficiently. I was visiting in 2006 a farm in Mona district of Lahore, Pakistan to observe a demonstration to local farmers how to conserve irrigation water. The farm was five hectares grown with palm frees. A diesel engine was pumping water from a standpipe dug into the earth. My immediate question was how much water was pumped daily and the answer was 700 cubic meters a day the year round. I made a quick calculation to find out that the quantity of water my five hectare olives and grapes farm in Jordan is getting along for one year is consumed in the Pakistani farm in just two days.

Jordanian agriculture is challenged by low productivity, limited and/or unreliable water supplies, and increased demand for water from rural populations and urban water users. The Ministry of Water and Irrigation recently initiated the “Education and Information Program to Improve Irrigation Water Use Efficiency” or Kafa'a in Arabic, a five-year program designed to create a more profitable but less water intensive agricultural sector.

Over the five-year period, the program will encourage new attitudes and behavioural patterns among the Jordan Valley and Amman-Zarqa Basin farmers, engage community-based groups in action programs, establish a sustainable producer-level extension and agriculture service, and prepare information campaigns for decision-makers and the general public. Key objectives of Kafa'a include: increased value per cubic meter of water, through improved crop selection and water technologies at the farm level; improved capacity of farmers and associations to effectively market regionally and internationally; and development of effective extension capabilities.

The Ministry of Water and Irrigation of Jordan with support for United States Agency for International Development initiated in 2005 a "Water Efficiency and Public Information for Action" (WEPIA) program that supported a nationwide social marketing program focused on practical ways to protect and conserve Jordan's scarce municipal water supply. It raises knowledge about water scarcity in Jordan, improved popular attitudes towards conservation and worked towards a water demand management program.

WATER EDUCATION PROGRAMMES

The main components of WEPIA were development of water education programs for teachers, students in public and private schools, religious leaders and NGOs; media campaigns to reach the general public and businesses; increasing local NGO capacity; expanding the pool of professionals in the water and environment; increasing the number of public and private buildings with water saving devices and roof top rainwater harvesting facilities; and sustainable community understanding and participation in water activities. A significant amount of water and financial resources have been saved, knowledge and acceptance of water conservation measures have increased, policy has been strengthened, advocacy and constituency for policy have developed, and capacity of government has increased.

Domestic water supply coverage in Jordan is 98% but sewage and sanitary services lag behind at about 60% nation wide. Most of domestic wastewater is collected, treated and reuse for irrigation. Augmentation of the usable water resources provides some relief to the water strain. Jordan practiced wastewater treatment and reuse since the 1960s.

Without down playing the weight of the water challenges, the readily recognizable challenge in the Middle East and particularly in Jordan is the ever- growing imbalance of the population-water resources equation. The population growth over the past half-century has been due to the high rate of natural population increase and also due to hostilities and wars. In 1948 the population of Jordan was just under 500,000 and suddenly it rose to over 750,000 due to the first Arab Israeli War. In 1991 Jordan's population swelled by 10% over a month due to many Palestinians who were forced to leave Kuwait after the first Gulf War. The population of Jordan now is 5.5 million.

RED-DEAD CANAL PROJECT

Jordan is planning water projects that aim to increase water availability. One such a project is the Red-Dead Canal project that aim to connect the Red Sea from the port of Aqaba in Jordan with the Dead Sea in Jordan Valley so as to generate hydroelectric power for use in desalination because of elevation difference of 400 meters between the two points. After years of study and evaluation, the current plan, as envisioned by the Jordan, Israel, the Palestinian Authority, is to construct a 112-mile, partially covered pipeline across the Wadi Araba, a desert region between Israel and Jordan that stretches from the Gulf of Aqaba in the south to the Dead Sea.

Theoretically, enough Red Sea water flowing into the Dead Sea could restore most of its water level over time. The realization of the Red-Dead Canal project is dependant on political and financial agreements between Jordan, Israel and the Palestinian Authority. A second major water supply project for Jordan is to pump annually 100 million cubic meters of good quality water from groundwater wells located in the south of the country to Amman

and other populated areas along a 300 kilometre long conveyance line. This project is not economically feasible based on full cost recovery, but the government is planning to subsidize the cost of water for the poor.

SOCIAL RESPONSE TO INNOVATIVE WATER-SAVING INTERVENTIONS

During the past 20 years many initiatives were launched by the government to inform and educate the public how to conserve and save water. This was necessary because a transformation was taking place where water supply to different users had to be rationed. Water was diverted from irrigation uses into domestic uses and potable water was brought to urban users from long distant sources at considerable cost to consumers.

The great majority of the 5.5 million Jordanians are Sunni Muslims. Christians, about one-third of whom belong to the Greek Orthodox Church, make up about 5 percent of the population. Religion is taught in public and private schools and it is true to say that more and more youth in Jordan and in the Middle East in general are becoming more faithful Muslims. Generally, peri urban dwellers are more religious than average urban dwellers. The role of religion in every day life of a Muslim is very powerful. It can be so strong instrument for social change.

The Inter-Islamic Network on Water Resources Development and Management (INWRDAM), where I work as an Executive Director since 1994, is composed of 17 Muslim countries. INWRDAM implements many water related research, development and cooperation programs targeted mainly to public sector that require cooperation with ministries and public water utilities. Beginning of year 2000 INWRDAM initiated an action research activity¹⁵ that targeted households and rural poor in Jordan to help them save fresh water, generate income and help the environment.



The idea was to develop a low cost method (kit) to treat greywater from domestic sources and make fit for use in irrigation of home gardens. Greywater comprises 50-80 percent of residential wastewater consumption - which is all wastewater from the home, except black water, or sewage. This is to say that a house fitted with a greywater treatment kit would have a small spring of water flowing every day through out the year that recovers more than 250 litres of wastewater discharged otherwise into sewage cesspit. Emptying a cesspit is expensive but with most greywater diverted into a treatment then some money is saved too

¹⁵ The initial work of INWRDAM on greywater for rural poor was funded by the International Development Research Centre, Ottawa, Canada.

and there would be less pollution to groundwater sources. Cost of a 4-barrel type greywater kit which is shown in the figure was about US\$500 and the owner could recover what he or she spent on it in a couple of years by saving freshwater and in value of additional crops. Next stage of this research was to implement the greywater kits in rural areas of Jordan, Lebanon, Palestine and Yemen.

In order to achieve acceptance by the rural communities of greywater reuse it was necessary to understand their Islamic tradition and social perception of the environment and natural resources including water. The importance of liquid water to life is well known, summarized by the Qura'anic verse: "And from water we made every living thing" and that its cultural value in Islam is inherent in Wadou¹⁶ and in the Hadith¹⁷ of the Prophet (Peace be upon him): "Cleanliness is part of religious belief" and water is essential to keep a hygienic household. Water is further needed to enhance the environment and to protect public health. Among the most important roles water is its indispensability as an input to produce food that, in turn, fuels humans, animals and birds with energy to perform work. Therefore, INWRDAM approach to convince rural families to accept greywater recovery and handling was in some way linking their Islamic religious beliefs.

Most rural households in Jordan and near by countries (Palestine, Lebanon, Yemen) are extended families where father and married sons live close together sharing parts of houses on a land plot. A rural household would keep a small garden around the house planted with some trees and vegetables and would raise chicken and some goats or sheep. Because domestic water supply in Jordan is rationed and available only one day a week throughout the year, summer months increase demand for additional water supplies for the garden and animals. Cost of tankered water in summer in Jordan becomes very expensive (more than US\$5/m³) and some households give priority to watering trees in their garden that would otherwise die, to taking baths or washing floors or other hygienic needs of the family.

Field surveys showed that many rural families routinely separated greywater originating from the kitchen sink and directed it to the trees so that it is not mixed with sewage from toilets that contains human waste. This was because of the Islamic teachings prohibiting, whenever possible of deliberately mixing food and food remains with human waste. Muslims consider food as a source for life sustenance and as such must be respected. This practice or habit greatly facilitated the marketing or selling the idea of greywater kits to rural communities because it complemented their practices of separation of greywater from black water.

The benefits of greywater reuse were obvious but the poor had many priorities so investing in a greywater kit was not an easy decision to make when promised rewards were a couple of years ahead. In order to promote greywater use in peri urban areas good marketing of the idea was necessary so that the idea becomes popular. Different methods were used to convince the public adopt greywater reuse. It was found that installing demonstration greywater kits in mosques could be effective. This was because mosques in rural areas are usually surrounded with a small area suitable for planting with trees. Water discharged from ablution sinks in mosques, a type of greywater, which is much less polluted than household greywater, is abundant and easy to recover and use for irrigation.

¹⁶ Wadu or Ablution is the ritual cleaning of the body before beginning an act of worship

¹⁷ Hadeeth is a narration describing what the Prophet (pbuh) said, did, or tacitly approved

Therefore mosques were fitted with greywater units and a small garden of olive trees was established in mosque courtyard. The mosque keepers were taught how to maintain the greywater units. The Imams of these mosques were also informed to preach worshippers on some Friday prayers about the benefits of greywater use and savings that could be accrued. Most Imams were aware of the Islamic teachings about good stewardship and conservation of water. The evidence of greywater use benefits were also clearly demonstrated. Trees planted in the mosques' courtyard grow vigorously because of the abundant and regular supply of water laden with nutrients.

A number of secondary level schools were also targeted for installation of demonstration greywater kits that captured water from sinks and drinking point sources. School activities usually include practical exercises and in rural areas gardening is a main activity. Teachers were informed about the practices of some community members that installed greywater kits and visits were made to these users. The teachers were interested in the simplicity of the greywater kit operation and maintenance.

The teachers were also informed of Islamic teachings that encourage in principle separation of greywater from black water so that they could address these principles in teaching the theology classes. Also important was to overcome some social taboos that discourage men from doing cleaning chores at home that included cleaning of the greywater units once a month or so. Therefore, success of greywater use in rural areas was possible to attribute to public acceptance in mosques and households.

During the first four years of the greywater promotion period more than 1200 households in Jordan alone were regular users of greywater kits. Challenges in promoting greywater use were simple and mainly related to the reluctance of the individual households to pay the cost of the greywater unit. The need for additional water was obvious, but as said earlier the priorities of the poor are to purchase food, cloths and other life necessities and not to pay significant sum of money to install a greywater kit.

This financial barrier/ handicap was possible to overcome in different ways. First it was necessary to provide some success stories that prove that the simple technology or practice of greywater treatment is working and not difficult to understand. Within two years of installing a greywater kit it was possible to prove that a household that owned a greywater kit saved on the cost of domestic water bills and generated additional income from the garden produce.

Community involvement in any greywater project is a basic requirement for long-term sustainability of the intervention. This why INWRDAM held community awareness campaigns and participatory meetings explaining the possibility of families practicing in comprehensive greywater recovery and not just that part of greywater that originates from the kitchen sink. Demonstration units were installed in the main mosque and secondary schools of targeted villages. Local technicians were trained on how to separate greywater with least cost and damage to floor tiles and how to install a greywater kit.

Comprehensive community training and awareness program was conducted during the implementation stages of the greywater promotion. Also important was to understand how the community utilized its local knowledge in dealing with gardening practices, how they would take care of the components of the greywater unit such as protecting freezing a water pump by insulating it in winter months with a piece of old rug or sacks and so on. Selecting the type of plants that best suited the local soil and the greywater quality resulted in

increased confidence of the community in the benefits of the practices they learned. New plants were introduced such as cactus, Sudan grass, herbal plants that grew well on greywater.

As in Christianity and Judaism, in Islam humankind has the first right to the resources that God has provided for his creation. Islam is a practical religion where all aspects of life are considered and addresses in the Qura'an and the Hadith so the faithful who observe Islamic principles could live a peaceful and productive life and enjoy rewards of blessed and lasting after life. Humans are the most favoured of God's creation, we also are responsible for ensuring that God's gifts (including clean water) are available to all living things. In Islam, human interactions are guided by the notion of humans as *khalifa*, vicegerents or stewards of the earth. Thus, humans are equal partners of with everything else in the natural world.

Muslims believe that ensuring social justice, or equity, in society is the cornerstone of Islam, and that the Prophet Mohammad (peace be upon him) set the example for them in this regard. Water has special significance in Islam and it is mentioned in the Qura'an hundred of times either directly or indirectly. Many books are written on the subject of water in Islam. A relevant source to the subject of water and sanitation in Islam is a booklet published by Regional Office for the Eastern Mediterranean of the World Health Organization entitled Water and sanitation in Islam¹⁸.

Virtually all the Hadith relate to the preservation of equity, and those related to water are no exception. For example the Hadith says, "Non of you will have faith till he wishes for his (Muslim) brother what he likes for himself. Obviously, that applies to the desire for an adequate amount of clean, fresh water, as well as anything else. A Muslim cannot hoard excess water- rather he is obliged to allow others to benefit by it. In fact, the recognition of water as a vital resource, of which everyone has the right to a fair share, is emphasized in the following Hadith, which effectively makes water a community resource to which all, rich and poor, have a right: "Muslims have common share in three things: grass (pasture), water and fire (fuel)."

12. Water Conservation, Sanitation and Hygiene in Islam

ISLAM. Imam Dr. Muhammad Ridwaan Gallant, South Africa

Hygiene, the usage of water and sanitation facilities all work together in Islam and are interdependent. Cleanliness starts with the individual. The Prophet (SAW) has linked cleanliness with our beliefs, and as we know to believe is one of the basic principles in Islam. As it is reported from Ibn Malik Al-'Ashari that the Prophet (SAW) said: **Cleanliness is half of faith** (Muslim: Vol.1 :163:no. 223).

¹⁸ *Water and sanitation in Islam*, Series of the Right Path to Health, Health Education through Religion, Regional Office for the Eastern Mediterranean of the World Health Organization. Alexandria, Egypt 1996.

Water Conservation

Allah (TA) has shown us by providing us with sustenance in the form of water that without it, we cannot grow crops, perform our daily ablutions or provide our animals with water.

Allah speaks about the importance of water in the Qur'an. Allah (TA) says:

And we send down from the sky water in (due) measure, and we gave it lodging in the earth, and verily, we are able to take it away.

(Surah al-Mu'minun 23:18)

Allah mentions His innumerable blessings to His servants, whereby He sends down rain in due measure, meaning, according to what is needed, not so much that it damages the lands and buildings, and not so little to be insufficient for crops and fruits, but whatever is needed for irrigation, drinking and other purposes.

South African religious leaders are very conscious of water conservation, firstly due to faith perspectives. This is taken from the Islamic teachings on how the Prophet (SAW) used his water. It is narrated by Anas: **The Prophet (SAW) used to take a bath with one Sa'a (approximately 2.4 litres) of water. He used to take ablutions with one mudd, or a quarter of a Sa'a (about 0.6 litres) of water.** (Bukhari: 1986: Vol.1:135 no.201).

Islam is also against the extravagant usage of water. This applies to private use as well as public, and whether the water is scarce or abundant. The Prophet (SAW) emphasized the proper use of water without wasting it.

When the Prophet (SAW) saw Sa'd performing wudu he said: **"What is this? You are wasting water."** Sa'd replied: Can there be wastefulness while performing ablution? The Prophet (SAW) replied: **"Yes even if you perform it in a flowing river."** (Ibn Maja : 1990: Vol. 1: 147:no.425).

In South Africa water is an expensive commodity. The Masjid Committee has to pay the local authorities for the usage of the water. The higher your water bill is the more you pay. It is for the reasons mentioned above that Masjid Committees put the following notice boards in the ablution rooms:

PLEASE USE WATER SPARINGLY
WATER IS A MERCY FROM ALLAH
PLEASE DO NOT ABUSE OUR WATER
WATER IS A GIFT FROM ALLAH

The Department of Water Affairs (DWA), which is linked to the Department of Environmental Affairs, has many programmes concerning water usage for the public. Every year, one week in the month of March is set aside in which the South African public is made aware of the importance of water usage. We call it "water week".

DWA takes many of its programmes to educational institutions. They also use local TV, radio stations and posters are printed in local newspapers. The religious leaders especially those who belong to SAFCEI (South African Faith Communities' Environment Institute to which the major religious groups in SA belong and who handle many environmental issues) preach the importance of water usage in their local religious institutions.

I am in charge of the environmental desk of the Muslim Judicial Council (MJC-local Muslim authority). I normally write the Khutbah (sermon) for that week. The MJC distribute the

Khutbah to the various Masajid (plural for Masjid). In SA we held a workshop for the Ulama (Islamic scholars) on environmental issues recently. I was assisted by many people who work for DWAF. The idea was to give the Ulama an idea of the scientific names and terms which we use when we write the Khutbah, as many Ulama are not scientifically trained.

Since South Africa became a democracy in 1994, water points was introduced to many impoverished areas especially in the country areas we call the platteland. This was done by the Department of Water Affairs. This never happened during the apartheid era. Many of the black and coloured communities celebrated when these water points were installed.

Since 1994 many people have migrated from the former homelands to the various cities for various reasons. The result has meant an enormous amount of water stress in the cities and other urban areas. If we take Cape Town and surrounding areas then we have a summer drought and winter rainfall. In 2005 there was very heavy rainfall during winter. The result was there was insufficient water for the summer. Water restrictions were put in place by local authorities with heavy fines for over usage. Water consciousness has been taken up as a very serious since then. The Muslims performed congregational prayer for rain at that time. This is a special prayer followed by a sermon at the end of which those praying turn their garments left side to the right and the right side to the left. This is to show their humbleness and humility to Allah(TA). They then turn towards Makkah and invoke Allah(TA) for rain with hands outstretched.

Thousands of black people are presently staying in squatter camps around the cities, this is an informal type of housing also called shacks. Water points are installed by authorities at certain points in the camps. The housewives queue for the water and carry it to their dwellings on a daily bases. It is a good sight to see the co-operation that exists between those who stand in the line. This water is normally freely given to them by the local authorities. On the other side people who have water points in their houses are restricted and have to pay for every litre of water used.

As far as the Masajid are concerned one finds that the majority have adequate ablution facilities. These even prevail in the township areas as well as the black vicinities. Many of the masjid facilities are sponsored by the well to do people in the community. There are masjid in the black areas which only have one water point but this is very rare and is mostly in newly built areas. I saw one masjid like this a few years ago at a newly built site. I was amazed to see how the young children would carry water to the elderly at times of prayer and place it in buckets.

Interviewing people from the townships and black areas where there are no hot water cylinders, I have discovered that they stand for up to two hours before the morning prayer to warm the water on fire for ghusl (compulsory bath) as well as for ablution.

In our Madaris (Muslim schools which takes place in the afternoon across South Africa), water conservation is being taught under the chapter of Taharah (cleanliness). The religious bodies e.g. Ulama Council of South Africa are responsible for the curriculum of the Madaris. Many private organizations are also involved here e.g. Association of Muslim Schools (Southern Africa).

We encourage people to place a brick in the cistern to use less water. We also recommended that this should be done at all masjid.

Recently we have had big religious gatherings where approximately 10 000-15 000 people met for a weekend. This is called ijtima (gathering of people). The structure build for the ijtima is designed in such a way that the toilet and ablution facilities are next to each other. The sewerage pipes are structured to ensure the used ablution water runs through the toilets. In this way there is no need for a cistern and at the same time everything runs together to one outlet.

Sanitation:

Islam is against polluting the environment. Human beings are not allowed to consume and pollute nature carelessly as they wish, (Ozdemer: 2003:29). In a hadith the Prophet (SAW) prohibits humans from defecating at places frequented by others and also teaches them that human waste has its specific place. If it is dropped at unguarded areas it can cause a health hazard and can lead to many illnesses.

The Prophet (SAW) warned people when he said: **“Be on your guard against three things which provoke cursing: easing in the watering places, and on the thoroughfares, and in the shade (of the tree)”**.(Abu-Dawud -Abi Tayeb: 1990: Vol. 1: book no 1: 31: no. 26).

Most South Africans use the cistern in their toilet facilities and this is very well organized in South Africa. The cistern is even used in many rural areas. A majority of South African Muslims use the 'western' (high pan) type of toilet although Islamically speaking the 'eastern' (low pan on the ground) toilet is more recommendable. As theologians we are forced to teach our people toilet usage according to western facilities where Islamic text recommends usage of 'eastern' type of toilets. This has now become acceptable by our local ulama (learned scholars). We strongly stress that men and women always adopt a sitting position when using the toilet.

We pay great attention to clean toilet facilities at homes and masjid at all times.

At many masjid people are hired to keep ablution and toilet facilities clean. These people are paid with funds collected from the community. One of basic teachings to children is that you always clean yourself after stools or after you have urinated with the left hand only and you eat with the right hand only. Water usage and toilet paper is important in cleaning yourself.

Washing your hands with soap and water after toilet usage is greatly emphasized before you commence with any activity. In the squatter camps near the cities one finds that the people use communal toilets. Local authorities put up these toilets. The community in the squatter areas see to the cleaning of these facilities themselves. There is good co-operation and understanding among the locals.

Hygiene:

The Prophet (SAW) promoted hygiene to prevent illnesses, plague and diseases. This is important because illnesses cause loss of life. In a hadith narrated by Abu Darda The Prophet of Allah, Muhammad (Peace Be Upon Him) said: **Allah has sent down both the disease and the cure, and He has appointed a cure for every disease, so treat yourself medically but use nothing unlawful**. (Abu-Dawud -Abi Tayeb: 1990: Vol. 5: book no 10: 251: no.3865). The Prophet (SAW) urged his followers to seek a solution by seeking medical attention.

Thus he taught his followers not to seek solution by prayer alone.

On personal hygiene the Prophet (SAW) taught us the importance of washing ourselves regularly. In a hadith narrated by Abu Hureirah (R.A.) who said that the Prophet of Allah (S.A.W.) said: **It is the duty of every Muslim to wash both his head and body every seven days.** (Bukhari:1986:Vol2 :10 no. 896). This command was given by the Prophet of Allah (S.A.W.) in spite of them having lived in a desert where water is scarce. The Holy Qur'an also teaches us to prevent sexual transmitted diseases. Therefore sexual relations between married partners are not allowed when the wife has her menstrual period. Allah (T.A.) also says in the Holy Qur'an: **They ask thee concerning woman's courses. Say they are a hurt and a pollution. So keep away from women in their courses, and do not approach them until they are clean.** (Qur'an 2:222)

Personal hygiene is the first step towards a healthy body hence the Prophet (SAW) taught his companions how to keep their bodies physically clean. In a hadith narrated by Abu Hureirah (R.A.) who said that I heard the Prophet of Allah (S.A.W.) saying: **Five practices are characteristics of Fitra: Circumcision, shaving the pubic hair, cutting the moustache short, clipping the nails and removing the hair under the armpits** (Bukhari:1986:Vol7:516 no. 5889). Fitra means the natural instincts of man or the habitual practices of the prophets (Askalani:1989:Vol 10:415).It is important to clean the hair from the private parts as well as under the armpits, because it can cause an obstacle for correct cleansing, it breeds germs and can cause an unpleasant smell. The nails must always be kept short because germs accumulate under long nails and may contaminate food when eating with the hands.

South African madaris (Muslim schools) emphasize great awareness on personal hygiene. Teaching is done at all levels (school and tertiary) in the subject of taharah (cleanliness). Our local school curriculum stretches over a period of twelve years and at every level cleanliness is studied. At tertiary level (theological schools) much research is done on cleanliness.

Cleanliness is so emphasized because it is a pre-condition of prayer. The body as well as the place of prayer must be clean. Certain acts which also involve cleaning, like ablution, is a compulsory act for the five daily prayers and involves the washing of the following: **O you who believe when you intend to offer the prayer, wash your faces and your hands up to (and including) the elbows, wipe (your wet hand) over your head and wash your feet up to (and including) the ankles** (Qur'an 5:6). Allah (T.A.) also says further in the Holy Qur'an: **If you are in a state of ceremonial impurity, bath your whole body.** (Qur'an 5:6). Here Allah (TA) instructs believers to take a full bath after sexual discharge, sexual relations, females after monthly period and after childbirth-bleeding. It is this physically prescribed cleansing which brings about a healthy body.

We always encourage our people to wear socks in the Masjid to prevent fungal problems. We also encourage people to dry their feet properly. These days there are roller towels at the masjid unlike the older days when the usage of towels caused the carry over of fungus.

With the influx of many people from the rural areas to the city and with the result of so many people living in a small space in the squatter areas there is always the fear that these conditions are prone to diseases. The health authorities find it difficult to cope with the amount of cases daily. It has now become a common occurrence of overcrowded hospitals. The problem at hospitals increase because many people from north of the border of South Africa come into the country and expect medical treatment.

13. Water and Spiritual Life in Batang Gadis National Park

ISLAM. Jatna Supriatna, Fachruddin Mangunjaya, Jarot Arisona and Erwin Perbatakusuma, Sumatra, Indonesia

“There is not a crisis. There is a war.

...And we are losing.”

[Stakeholders response to the question, "Is there a possible solution to the forest crisis in North Sumatra?"]

Indonesia is a majority Muslim nation with world recognized biodiversity and conservation priorities. It is inevitable that in some cases a conflict, or a resolution, will occur between the Islam religion and the diverse natural environment. We would like to share an experience we had spreading awareness in an Islamic community about water and sanitation issues. This initiative emerged during a project we developed to conserve ecosystems in North Sumatra. The project placed special emphasis on forest and freshwater biodiversity in Mandailing Natal Regency, which was rapidly declining due to the growing logging and gold mining industries in the surrounding forested areas.

The story begins in 2003, when Conservation International Indonesia initiated an effort to conserve a large tract of forest in the Batang Gadis watershed area. The area, considered to be rich in wildlife and home to the Sumatran tiger and several other species of wild cats, covers around 386,455 hectares, or 58.8% of the Mandailing Natal Regency. Batang Gadis is also a key watershed for the region, as it is the main water source for roughly 1,175 rivers and creeks.

The Batang Gadis River flows like a major artery through the forests of six different watershed areas, spreading out into smaller streams and creeks for a total of over 137.5 km. This watershed system supplies almost all of the domestic water needs of 400,000 people in the regency, including water for irrigating 42,100 hectares of paddy fields and 108,320 hectares of commercial crops such as coffee, cinnamon, cacao, palm oil, cloves, ginger, and others. CI's economists estimated an additional amount up to \$24.8 million a year in indirect values from the extensive water system (Midora and Anggraeny 2006).

For the people of Mandailing Natal, a local Islamic community, the river provides water for drinking and bathing, sanitation needs, irrigation, and additional socio-cultural, religious, and economic functions. These people traditionally protected places called "*naborgo-naborgo*" (water springs) through customary laws. In the 1970s, the local committees formalised these laws into river protection (*lubuk larangan*) schemes (Lubis, 2001). An Islamic practice known as a *harim* (meaning zone) (Mangunjaya & Abbas 2009) prohibits the harvesting of fish from rivers close to human settlements for 6 to 12 months each year. The community leaders have to power to decide when the best harvesting time is and a small fee is charged to residents or sojourners who desire to fish. The income generated is used to pay for the development of local social facilities such as schools, roads, and mosques, and some of it goes to provide educational scholarships and administrative salaries and grants to orphans, poor families and invalids (Lubis, 2001).

The river also has several cultural values to the people here. Students attending Islamic boarding schools across Sumatra, totalling around 15,000, use the river to bathe and to perform the ritual “*wudhlu*,” which involves washing their bodies before prayer, which they do five times a day. One of the largest boarding schools in the region, Al Mustafawitah, has more than 7,000 students coming in to be educated from surrounding villages, regencies and other provinces, and even from abroad. The school itself has been established for many years, and is the best known school in Sumatra for studying Islamic teachings.

The exploitation of Batang Gadis for logging recently displaced almost all traditional customs and regulations by shifting central laws, including the ownership of the state forest for traditional or cultural values. For centuries in the state forest, local communities have wisely managed and depended on the natural forest and rivers, but now access to these resources is becoming more and more restricted. This situation triggered several social problems and conflicts between the central government and local or traditional communities. The corrupt central government was profiting from the legal gold mining and logging concessions in this same watershed area, making it hard to convince them to implement conservation strategies.

For many years communities have been suppressed and not allowed to appeal to any government system regarding land use issues. Only after the old regime was replaced, and Indonesia’s decentralization authority over the forests was given to the regency in early 2000, were those conflicts brought up and began to be addressed. As a result, a new local government (*Pemda*) was established that enabled the traditional institution of *Namora-Natoras* (nobles and elders) to be revived and to play a critical role in the management of local affairs including the protection of forests and rivers. This helped the Mandailings recover their tradition of consultative governance, and encouraged them to challenge the newly-headed regency to promote a participatory planning and decision-making process (Lubis, 2001.)

CI realized that if we were going to conserve the Batang Gadis tropical forest catchments area, then we would need local allies. We began by approaching the most influential person in the community, the Islamic school’s top spiritual leader, or *imam*. To him, we described the potential pollution problem facing the river running through his school’s property. The river will become polluted with tailings if the proposed gold mining upstream in the Batang Gadis forest goes ahead as planned. The river would also get clogged with silt and could possibly dry up, if logging around the nearby Batang Gadis River was permitted. Then we pointed out to the *imam* that the Batang Gadis water that he and thousands of his students depended upon to wash themselves for *whudlu* five times before prayer, would become very dirty and contaminated with poisonous chemicals.

The *imam* was sceptical of our predictions, so we brought him to the upper part of the Batang Gadis River to see with his own eyes how the mining and logging activities were negatively impacting the river water quality. The *imam* was surprised, and he agreed that the logging and mining activities were indeed contaminating the river. He knew that polluted water would not be good to use for the *whudlu* cleansing ritual. The *imam* began to talk and discuss these issues with his students, and his students talked to their parents, and the information about potential environmental hazards in their water spread to the entire community. We also approached the village’s parliament to remind them of their old traditional practices of “*naborgo-naborgo*” and “*lubuk larangan*.”

As the awareness of the potential Batang Gadis River pollution problems spread, the concern for environmental movement grew from the bottom up. The communities took the issue straight to the *bupati* (the regency head) and asked for the forest to be protected. The *bupati* agreed to consider this request, but he was worried about how he could compensate the people who profited from the logging and mining industries. We explained to him that the Batang Gadis River was the source of irrigation for 42,000 hectares of local rice fields, all of which would be imperilled if the river were polluted by new industries established upstream.

The *bupati* understood the situation, but he was not yet sure what he could do. At that same time, Indonesia was changing its governmental structure from a central government based in Jakarta, to have more elected officials in the outlying regions and islands. With the elections coming up, we told the *bupati* that if he addressed the concerns of his people and supported their movement, then he could become a hero to them. It might even help him to win his first election. So after some thought, the *bupati* sent a letter to the Ministry of Forestry asking them to declare Batang Gadis a National Park. He was later chosen by his people in the first election in the area.

The process to get Batang Gadis its National Park status was long and involved a lot of lobbying and negotiating. But by the end of 2003, more than 13,000 Muslim students (*santri*) and *ulama* (Muslim leaders), together with other society members, gathered for the declaration of Batang Gadis National Park, which covered an area of 108,000 hectares or more than 25% of the total forest in the regency. Because of this established park, the Batang Gadis River will be protected from logging and mining industries, and will remain in its natural condition.

The National Park declaration was announced as follows:

“We realize that the forest is our source for wood, fish and wildlife, water for our paddy fields and agriculture. These important forest resources need to be protected by all of us. We realize that current conditions are very critical and threatening the sustainability of our life resources for future generations. We realize that these conditions are caused by mining activities, illegal logging, and unsustainable use of forest products, encroachment, deforestation, and limited alternatives for sustainable living.”

There are three key things we learned during our experience of influencing the establishment of Batang Gadis National Park in Sumatra:

First, we saw how spiritual interest can be one of the most important influences on the local community to protect their forest and resources.

Second, positive responses and support from spiritual (Muslim) leaders facilitate public movement to protect the environment, because they can explain how a conservation concept is in agreement with the mission of religion.

Third, the demand of clean water and sanitation, and a protected forest is initiated from the lesson of *lubuk larangan*, a local tradition. This cultural behaviour reflects a strong social togetherness that supports the implementation of conservation principals. *Wallahu ‘a lam.*

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14. Cleanliness and Islam

ISLAM. Dr Mawil Izzu Dien

Islam attaches great importance to cleanliness. This is reflected in the Islamic view on life, which makes ablution and bathing a duty. Islam also requires Muslims to wash their hands before and after meals and to wash their clothes to purify them. All these obligations are related to individual and collective acts of worship, emphasizing the Islamic concept, which considers man's body and soul, two parts of a single entity, as mutually complementary. Following from this sanitation and hygiene are considered of prime importance to human life; this is reflected in ideology and practical application.

The concept of 'Tahara', meaning purity, plays an important role in Muslim attitudes towards life. In all hygiene practice there is "tahara", which is about both physical and mental purification. A Muslim cannot pray unless all the parts of the body are clean. There is a regime to follow in washing oneself, starting with the face, moving on to the hands, the hair and finally, the feet.

The Koran says: ***“O, you who believe when you prepare for a prayer wash your face and your hands to the elbows then; rub your head with water and wash your feet to the ankles. If you are in a state of ceremonial impurity bath your whole body but if you cometh from offices of nature or you have been in contact with a woman and you find no water then***

take for yourselves clean sand or earth and rub therewith your faces and hands: God does not want to place you in difficulty but make you clean and to complete his favour to you that you may be grateful" The Koran acts as a book of general guidance for Muslims giving instruction on the most intricate of details.

Water in ritual and everyday practice

Water is used in ritualistic practice such as prayer called *salat* in Arabic. For Muslims *salat* cannot be performed without *wudu*, a ritualistic ablution required before prayer. It represents an opening to prayers, and includes the washing of the face, hands and feet. Even at death, cleanliness must be observed and a corpse must be washed with water before being laid to rest at the last abode.

In preparation for Friday prayers the whole body must be washed and the clothes in which you pray must also be clean. Cleanliness of the body is necessary for preparation of cleanliness of the soul. This is a reflection of the physical and mental purity which complement each other. The mind should be cleaned from the difficulties and conflicting demands of life by focussing on God and trying to do the right thing by doing what He orders.

Within Islam the expectation is that rigorous standards of hygiene should always be maintained, from the washing of the body, to the teeth and clothing. The expectation is that Muslims should be clean in preparation for praying 5 times a day, from sunrise to sunset. While water is the preferred method for cleaning the body Islam is pragmatic and allows the use of alternatives such as tissue and towels when water is scarce. The Prophet Muhammad stated that prayer is an easily accessed practice like a river streaming by your door.

Islam and Sanitation

Cleanliness is a central aspect of Islamic culture. Elements of nature in Islam are considered to be pure *tahir*. This can be deduced from the way Islam permits the utilisation of all elements of the environment as cleansing agents, for it considers them pure in themselves. When Muslims want to clean their bodies they can use water, dust or, should these be unavailable, the leaves of a tree and even stone or gravel. 'Taymum' is the term which refers to using anything from the earth to clean oneself.

The awareness of environmental pollution in early Islam can be concluded from the diverse terminology devised by the legal legacy to describe various forms of contamination or pollution. *Najis* is the Arabic word for dirty, the opposite of which is clean, *tahir*.

In the mosque pure water is provided as are toilets in order for believers to clean themselves before prayer. Fountains are common to old mosques to allow people to wash. Mosques are planned with water sources nearby because of the centrality of water to the faith. As early as the medieval period Islam developed the structure of the toilet and this was used in urban parts of the Muslim world. The relationship between cleanliness and faith is so intertwined and co-dependent that in some Muslim countries, such as Iraq, the toilet is referred to as the 'Tahara' meaning the place of physical cleansing.

From the earliest times in many parts of the Muslim world the toilet was designed in such a way as to avoid sitting in order to reduce any contamination. Toilets were constructed to allow squatting while fulfilling the call of nature. In some parts of the Muslim world today

toilets are made from marble incorporating a cistern but designed in such a way as to avoid any bodily contact with the toilet seat. Toilets are also built so as to prevent any splashing on oneself. In more recent times toilets in various parts of the Islamic world would have washing bowls to allow for cleaning and bodily purity.

Poverty means sanitation is not always at its best in the Islamic world, yet, the hygienic aspect of the faith such as cleaning before prayer is seldom compromised.

The importance of water in Islamic architecture

Islamic architecture reflects the continuation of the mind and body. The physical needs of believers are achieved by buildings, which both express the belief and cater for bodily needs. This is clearly seen in the old mosques in Turkey which focus on beautiful domes that stretch their tops to God and end with a sustainable sanitation system which provides for mundane earthly needs. Water used to wash hands would accumulate in the reservoir which, once full, would sweep into something like a trap door from where it would run into the toilet area and then clear into the cistern. Sanitation is a prime objective of architecture – and the idea of how to construct the ablution area is paramount within Islam.

Houses in the Islamic world are often designed in such a way that they are built around open space, the intention being to bring hygiene into the home with the sun and air cleansing the building. In Mecca for instance, buildings are structured to take advantage of the water coming from the mountains, which is used in preparation for prayers.

Significant waters in Islam

In Islam, water is seen as an objective gift of God with no mystic value attached to it, yet, it is an endeared part of the environment since it is a God given source of life. The well of Zamzam is located right in the heart of Mecca. The water that comes from this well is not seen by Muslims as “holy” water but is given great value simply because the prophet of Islam described it as sweet to drink and a “curer”. Substantial numbers of pilgrims visit the well each year while performing hajj to experience what the prophet thought of it.

In modern times scarcity of water has necessitated the entire world to start attaching more value to water and avoid wasting it but reducing water use could compromise hygiene, particularly in hot countries where water is even more necessary for cleanliness and the cost of water production can be expensive. In some oil rich Arab countries the production of one gallon of water could cost more than one gallon of petrol. The Islamic instruction regarding economising with water use without compromising hygiene can be a very helpful environmental guide for the rest of the world.

Personal reflections on water and sanitation

From childhood my mother encouraged us not to waste water because it is a gift of God. I used to swim in the river Tigris and after swimming it was always advised to wash again but without wasting water; my mum insisted I never use more than one jar.

One of my earliest memories from Iraq, which remains with me until today, is having to remove your shoes when entering the house, even when there are carpets. Being in direct contact with the earth while walking on it gives a great feeling of awareness of mother earth, which is described by the Qur'an as a womb for the living and a safe for the dead.

Earth is also seen as a form of sanitation, and like water is believed to cleanse people from dirt.

Finally, we could say that water and sanitation in Islam are important since they are the physical reflection of the purity of faith and the ethics of the human heart.

15. “And she said to him, 'Give me a blessing: for thou hast given me a Negev land [desert]; give me also pools of water,' and Kalev gave her the upper pools and the lower pools.”¹⁹

JUDAISM. Manlio Dell’Ariccia, American Jewish Joint Distribution Committee

Azanaw Musaw Tegegne, an eighth grader, says that before the American Jewish Joint Distribution Committee (JDC) installed the fresh water pump in his village in Gondar, Ethiopia, most people drank water from a nearby stream. Like hundreds of villages around rural Ethiopia, Gondar’s Gabriel kebele had no access to potable water for drinking, bathing, or cooking during the region’s extended dry seasons and draughts.

Ethiopia is one of the poorest countries in the world. In rural parts of country, only 11% of the population has access to clean water while just 7% has access to adequate sanitation facilities. The health hazards are enormous: 90% of all preventable diseases such as malaria, cholera, yellow fever, hepatitis, typhoid and diarrhoea can be attributed to underdeveloped and ill-protected water supplies. Waterborne diseases claim the lives of hundreds of thousands of Ethiopians each year.

Limited access to safe drinking water also causes serious development problems. Collecting water is backbreaking work that drains precious energy and restricts involvement in productive activities and community affairs for many women and children in every village. On average, rural villagers spend four to six hours per day collecting water from sources that can be as far as 10 kilometres from their homes.

Since 1984, JDC has constructed over 100 hand dug wells, protected springs, taps, micro-dams, and latrines across Gondar through its International Development Program. Whenever possible, JDC also constructs communal latrines to facilitate a safe, sanitary human waste disposal system (as open air toilets are widely known to contaminate the town’s clean drinking water).

“...the more study, the more wisdom; the more counsel, the more understanding ...”²⁰

“If circumstances force one to choose between closing a synagogue and closing a school, there should be no hesitation in choosing to leave the school open”.²¹

¹⁹ Judges 1:15

²⁰ Pirkei Avot 2.8

With safe, fresh, local water sources for drinking, cooking and sanitation available in his village for the first time, Azanaw Musaw Tegegne no longer needs to travel great distances to collect water. Freed of this chore, he will now be able to finish eighth grade at the newly built JDC School in his hometown of Gabriel, Gondar—one of 10 schools JDC has built in the region in the past 18 months.

Ethiopia has an adult literacy rate of barely 36%. Azanaw will be one of the just 23% of teenage boys and 13% of teenage girls enrolled in secondary schools. (Only 55% of all boys and 47% of all girls are enrolled in primary schools; 38% will not reach the fifth grade.)

Schools in villages in the Gondar regions are often held outside, under the shade of a couple of trees. The tree trunks holds up blackboards, rocks serve as seats and wandering cows are inadvertent classmates.

Committed to making a difference in the development of Ethiopia’s educational system and securing a future for some of the most vulnerable people on the globe, JDC has been repairing and building schools for some of the poorest Ethiopian children for many years. The one- or two-classroom mud- and concrete-brick schools are provided with all school furnishings. JDC also attaches a latrine and often a well with hand-pump to meet the clean water needs of the children, their families and the rest of the village.

“Education is the key to development.”²²

Nearly half of all Ethiopian youngsters do not receive even primary education, and the likelihood of receiving a high school education is even smaller, with just 23% of teenage boys and 13% of teenage girls enrolled in secondary schools.

Women are especially penalized in terms of education, but JDC is convinced that, those young women who manage to complete their secondary schooling must be given a chance for higher education. Once they have completed their university levels courses, they will have a monumental impact on their own lives, those of their families and villages, and on the country itself.

JDC has provided scholarships for well over a hundred university students over recent years, most of whom are young women from poor rural areas. They study for degrees in areas such as marketing and public management, economics, and law. They are provided with full tuition, as well as financial assistance for lodging, food, a monthly living allowance, and school materials. In order to meet the challenges of a college education, the four-year degree courses are preceded by a preparatory year.

In addition, JDC runs scholarship programs for nurses training in Gondar, combining a response to the need for education and one response to the staggering health problems in Ethiopia. Almost half of the population has no access to health care, primarily because of the lack of qualified, trained health personnel. The young women in the programs will become fully certified public health nurses (over three years), giving them a chance at quality long-term employment in their home communities and villages and letting them

²¹ Rabbi Elio Toaff, Chief Rabbi Emeritus of the Jewish Community of Rome.

²² Rita Levi Montalcini, Jewish Nobel Prize winner for medicine in 1986.

contribute to their society. They too receive full tuition, as well as financial assistance for lodging, food, a monthly living allowance, and school materials.

“...Whoever saves a life, it is considered as if he saved an entire world.”²³

The health challenges in Ethiopia are staggering. One in eight people face severe hunger. One in six children will not see their fifth birthday. Life expectancy at birth is only 48 years. The most common illnesses and deaths can be easily prevented or treated, yet four out of every 10 people have no access to health care.

JDC has a formal partnership with the Mother Theresa Care Centre in Addis Ababa to help orphans and the destitute in Addis Ababa and surrounding areas. Under our agreement with Mother Theresa, JDC with its partners provides quality surgical and medical care, in and outside Ethiopia. One major project involves partnering with leading physicians in the US and Ghana to provide complex and high quality, life-saving spinal surgeries for needy children. Since the project started in 2006, over 35 children have been sent to Ghana for surgery accompanied by JDC staff.

JDC also implements a project for treatment of patients with lymphoma or leukaemia (Hodgkin’s Disease) who greatly benefit from treatment. This project – which consists of importing the needed medication from countries where it is less expensive than in Ethiopia - is being extended to the treatment of other curable cancers.

JDC also has an agreement of the Gondar College of Medicine and Health Sciences to promote training, clinical and teaching services, research and community service between Gondar Medical College and foreign physicians. Foreign medical teams visit Gondar, providing voluntary teaching and medical care, and Gondar physicians have spent time studying abroad.

Tikkun Olam

All of JDC’s projects are inspired by the Jewish principle of *Tikkun Olam* (Repairing Our World), whereby Jews are required to help the cosmos evolve by providing service to society and helping those in need. This principle leads JDC to work in over 60 countries all over the world. Other examples of JDC’s efforts at *Tikkun Olam* can be seen in its **Post-tsunami Relief and Development**, the lightning-fast **Relief and Rehabilitation Response** during and after the Kosovo War in 1999, and the new **Agahozo-Shalom Youth Village (ASYV)** in Rwanda. ASYV is a multifaceted youth village, providing children orphaned in the genocide with a holistic and protective environment where unconditional support allows them to thrive, a high school enables them to shape their future, and a medical clinic ensures their health and well being as well as those of the surrounding communities.

JDC is a Jewish organization because the greater part of its funding comes from the US Jewish community and from Jewish individuals and foundations and because it runs specific programs to help Jewish communities in distress that would otherwise not receive assistance. But in all our other programs we are absolutely, utterly non-sectarian, uninterested in religion, race, or ethnic origin, in the people we seek to help, and in the partners with whom we work.

²³ *Talmud Yerushalmi, Sanhedrin (37a)*

We are guided by the principle of *Tikkun Olam* and by the value of social justice for all humanity. This is one of the basic principles of Judaism and should be an inspiration for all religions, and for all of secular society. It should be a guiding light all individuals, of whatever religious belief as well as those without any.

16. Water, Hygiene and Sanitation in Jewish Tradition

JUDAISM. Dr Mirele B. Goldsmith

There is no single straightforward answer to the question “What does Judaism say about water, hygiene and sanitation?” All four topics are vast. Judaism is not one thing, and water, like hygiene and sanitation, is found in many forms and varying contexts. And, to begin to answer the question we must move back and forth between symbolic and practical perspectives, both of which are present within Jewish tradition. The integration of these perspectives is one of the strengths of religious responses. Faith-based perspectives can give expression to our hopes by arousing the sense of the sacred, as well as to our fears and anxieties. Today’s water and sanitation policy issues have in many cases moved beyond what can be addressed by traditional practices. The deeper insights accessible through religious teachings can help us to develop appropriate responses to practical challenges. (Blanchard)

Appreciation for Water

A point of departure for this exploration is the Jewish story of the creation of the earth. The Bible begins with two different stories describing the creation. In both stories water exists before everything else on earth. In the first story, all of creation emerges from water just as the human being emerges from a watery womb. In the second story, flowing water irrigates the earth so that life can emerge:

“Such is the story of heaven and earth when they were created. When the Lord God made earth and heaven – when no shrub of the field was yet on earth and no grasses of the field had yet sprouted, because the Lord God had not send rain upon the earth and there was no man to till the soil, but a flow would well up from the ground and water the whole surface of the earth.” (Genesis 2:4-6)

As Ellen Bernstein writes in her meditation on the first chapter of Genesis, “From the perspective of water, all the earth, the plants, and the animals are channels through which water flows en route to the atmosphere or to the seas.” (Bernstein, p28)

As befits such a critical and ubiquitous element of creation, upon which human beings are dependent for their survival, water has many associations and symbolic meanings in Jewish tradition. We can follow one stream of this symbolism through the association of water with birth. Just as the earth was born from water, the foetus develops in a watery womb. Thus many Jewish texts and traditions connect women and water. The birth of the new nation of Israel is linked with water as the people passed through the sea in the exodus from

Egypt. Water is associated with salvation and as such it is connected, especially by the Prophets, with the end of days when ethical actions will elicit divine favour.

Among water sources, rain has a special significance in Judaism. Judaism first emerged and developed in the Land of Israel where rain is the primary source of water. Thus this form of water receives special attention in our tradition. In fact there are 6 different words for rain in Hebrew, an indication of how closely our ancestors watched and studied the rains. The rabbis of the rabbinic period were keenly aware of their dependence on quantity and quality of the rains, and expressed it directly. In a famous passage, the rabbis discuss the supreme importance of rain: "Rav Yehudah said: 'The day when rain falls is as great as the day when the Torah was given...' Raba said: 'It is even greater than the day when the Torah was given.'" (BT, Ta'anit 7a) As Jeremy Benstein writes, "both symbolically and literally, rain expresses the physical connection between heaven and earth, and thus becomes the most direct expression of the divine abundance we experience in the natural world." (Benstein, p85)

Procuring and Using Water

Of course water is not only a symbol, but it is an absolute necessity of life. In the vast body of Jewish law, many issues regarding water sources and use of water are addressed. Many of Judaism's traditions related to water, hygiene and cleanliness stem originally from the system of purification which is mentioned in the Bible and was elaborated in the rabbinic period. In this context the Mishna provides explicit guidance about water sources and their potential to transmit ritual impurity. Water from springs was considered least susceptible to impurity and water in small ponds was considered most susceptible. Contemporary analysis suggests that microbiological considerations would dictate a similar ranking of water sources. (Hutterman, p31, see Mishna Mikvaot 1:1-8)

The rabbis of the rabbinic period instituted specific rules for safeguarding water supplies and human health, which were further developed over time in halacha (Jewish law) and remain relevant today. For example, on the protection of water sources, drinking water must be kept covered (Avodah Zarah 27b), and wells may not be dug near dumps or cemeteries (Tosefta Baba Batra 1). Regarding the responsibility of the community for water supplies and equity in their distribution, rules were instituted about the maintenance of waterworks and the allocation of scarce water supplies. Of relevance to today's debates on privatization, the rabbis stated that, "The rivers and the springs that are drawn upon belong to everyone (kol adam)" (Tosefta Baba Kama 6:15 and Maimonides Mishneh Torah, Laws of Theft and Loss 6:13, quoted in Benstein, p133).

Purity and Cleanliness

In a much-quoted story, Hillel the Elder, the famous scholar who lived at the end of the 1st century BCE and beginning of the 1st century CE, taught his disciples about cleanliness through his personal example: "When he [Hillel] took leave of his students, he used to go off for a walk. His students asked him: 'Where are you walking to?' He answered: 'To perform a meritorious deed.' – They said to him: 'And what is this deed?' – And he said to them: 'To take a bath in the bathhouse.' – They said to him: 'And is this a meritorious deed?' – He answered: 'It is; if the statues erected to kings in the theatres and circuses are washed and scrubbed by those in charge of them... how much more should we, who have been created in His image and likeness, take care of our bodies, as it is written: For in the image of God made He man' (Gen. 9:6)." (Lev. R. 34:3).

Bathhouses are a frequent topic of discussion in the sources of the rabbinic period. The Talmud states that it is forbidden for a scholar to live in a city without a bathhouse (TJ Kiddushin 4:12 check this or TB Sanhedrin 17b). It even offers a special prayer to be said upon entering a bathhouse: “May it be thy will, O Lord, my God, to deliver me from the flames of the fire and the heat of the water, and to protect me from a cave-in (TJ Berachot 9:6, 14b; cf. Ber. 60a) Apparently the rabbis had similar concerns to ours about the maintenance of infrastructure.

As noted above, many of Judaism’s traditions related to hygiene and cleanliness developed through interplay between the system of purification and other more secular influences. The concern with bathhouses is an interesting example. The Bible describes several causes of impurity which require immersion (tvilah) in water. Over time, this requirement led to the development of the ritual bath (mikveh). The symbolism of the ritual bath is very rich. The water in the ritual bath must arrive in it untouched by human hands. The word “mikveh” contains the same root as the word used in the Book of Genesis to describe how God gathered together the primordial waters to form the land and the sea. It is related to the word for hope, and God is sometimes referred to as “mikveh Israel” (the hope of Israel). As a practical matter, the necessity for a ritual bath dictated that every Jewish community had to have a bathhouse. Because one must be clean to enter the ritual bath, facilities for washing for cleanliness also had to be provided.

Hand washing is a particular focus in Jewish law. The Book of Exodus includes the instruction that a laver must be placed outside the Tabernacle, and the priests must take the water from it to wash their hands and feet before entering, and that this “shall be a law for all time for them, for him and his offspring, through the ages.” (Exodus 30:17ff) The laver, which we use until today for ritual handwashing, became the symbol associated with the levites, who poured the water onto the hands of the priests. Halacha (Jewish law) requires that we wash our hands immediately upon awakening and before every meal.

Explanations for this practice highlight a continuing controversy over the interplay between hygiene and purity. Some believe that ritual purity and cleanliness should be understood as intimately related. While others believe that purity is a spiritual concept that has no relationship to cleanliness. They explain that this washing is a way in which the holiness of the priesthood has been transferred to every Jew. In fact, the blessing we recite when washing our hands includes a peculiar term. We bless God who has commanded us concerning “ntilat yadayim.” This term may be translated as “taking” or “raising up.” The rabbis relate this to the verse: “Lift your hands toward the holy (sanctuary) and bless the Lord.” (Psalms 134:2)

In Jewish tradition, study is a holy act which has the same significance as worship in the Temple. Jewish law explicitly states that places of prayer and study must be kept clean. Schoolchildren must be clean to study the sacred texts. As soon as a child can to talk, his father should begin to teach him, “however, one must be exceedingly careful to make certain that the child is clean while being taught.” (Kitzur Shulchan Aruch, Chapter 165, 10)

Sanitation

Toilet practices are regulated explicitly in one Biblical law: “Further there shall be an area outside the camp, where you may relieve yourself. With your gear you shall have a spike, and when you have squatted you shall dig a hole with it and cover up your excrement. Since

the Lord your God moves about in your camp to protect you and to deliver your enemies to you, let your camp be holy; let Him not find anything unseemly among you and turn away from you.” (Deuteronomy 23:13-15). Some of the Hebrew terms in this verse are unclear to us today, but the tool referred to may have in fact been an implement for digging, and the place a latrine.

It is intriguing that faeces are not a source of impurity according to the Bible. Some scholars believe that the sources of impurity are related to death and what is abnormal in life. This view finds confirmation in the prayer recited upon elimination, known as the Asher Yatzar (who has created): “Blessed art thou, Lord our God, who has formed the human being in wisdom, and created in him a system of ducts and tubes. It is well known before thy glorious throne that if but one of these be opened, or if one of those be closed, it would be impossible to exist in thy presence. Blessed art thou, God, who heals all creatures and does wonders.” (TB, Brachot 60b) Certainly cultivating an attitude of appreciation for the natural functioning of the human body and the process of elimination may be useful in overcoming the revulsion that may keep us from properly managing human wastes.

The disposal of human wastes is not a separate category in Jewish law but is addressed as one of many types of waste that must be regulated to protect the public. Thus general rules about negligence and infringement on the property of others are applied to human waste. For example: “One who pours water into the public domain, and another was injured by it, is liable for his injury. One who conceals a thorn, and glass, and makes his fence out of thorns, or his fence fell into the public domain, and others were injured by them, is liable for their injury. (Mishna, Baba Kama 3:2)

Conclusion

Jewish tradition provides us with an array of ideas, practices, and laws that relate to water, hygiene and sanitation. Among these we can find those that inspire appreciation as well as those that direct our attention to our responsibilities. Perhaps we can learn from the dynamic interplay between concepts of spiritual purity and physical cleanliness that the two are inseparable. If rain is an expression of divine abundance, then the way we manage it on earth is a responsibility we owe to God. If cleanliness is an expression of purity, then enabling ourselves, our neighbours and our children to maintain hygiene, is a spiritual challenge. Providing water, hygiene and sanitation are ethical responsibilities. We must be inspired by water as a symbol of creativity, abundance and purity, and manage it in a way that furthers justice. As the prophet Amos proclaims: “But let justice well up like water, righteousness like an unfailing stream.” (Amos 5:24)

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17. The Zoroastrian view of Conservation of Natural Elements: “Tanka” of Bharuch

ZOROASTRIANISM. Prof. Kavas Kapadia and Dr. Shernaz Cama, India

Overview

Cities are living organisms. In order for the cities to remain sustainable it is necessary for them to remain within their capacity to regenerate their natural sub systems. The rapid physical expansion of cities, especially in the developing world, has encroached upon the vast resource of air, water, flora and fauna of the hinterland, which is an essential requirement for maintaining the environment in a holistic and organic manner.

The failing traditional water harvesting system in India is leading to an alarming status of water supply scenario in the Indian cities. The vanishing systems of traditional water collection, storage and supply assume significance and it is important to consider the potentials/limitations of rejuvenating some of the traditional systems. In the Indian system one of the most potent ways of propagating this idea is thru religious practices. The paper looks at a couple of examples of Zoroastrian houses in Bharuch who have kept alive the tradition of water harvesting. India has a wide range of ecological regions ranging from hot dry to temperate regions.

Except the cool greens of the mountains, a large part of the country gets hot and dusty during a long hard summer, which is broken by a brief monsoon. Each one of these regions have, over the years evolved a suitable means to collect, store and use the restricted quantity of water available. The more hostile the terrain, the more care was taken to conserve scarce resources. Social controls ensured the collection, storage and distribution, as also checking of wasteful use/misuse of water to all residents at all time. In many small towns of India, as indeed also in Afghanistan and Iran, the persons associated with the indigenous water works (digging canals *Qunats* of Iran, constructing tanks and dams including the '*Gabarbands*' –the system of check dams -of Afghanistan) were regarded as the true heroes of the community. In India there is a strong belief that dredging of a temple tank is one of the most noble acts a man could perform in his life. Quite similarly the basic tenets of Zoroastrianism hold all elements as sacred and water especially so.

Harvesting water for survival

Both in India and in Iran traditional settlements respected ecological sustainability by optimally using food, firewood water and other natural resources. Design of the human settlement was an ecological statement, between man and the elements of nature in the most harmonious way. Many states in India had different terms for water storage systems, different devices such as wells, ponds, reservoirs, dams and streams. **1**

Rainfall in India is seasonal, spread over roughly three months all over the country. The runoff is swift and heavy. For this reason rainwater harvesting was as common a practice as the harvesting of the fields for food. The principle of rainwater harvesting is to collect/store water where it falls. Many towns in the arid region of Rajasthan and parts of Gujarat optimised this system of water catchment of a large watershed for the community needs.

The 'temple towns' of South India (Tiruchanpur, Madurai, Kanchipuram) had huge tanks in the heart of the town. Managed by a temple trust the water was kept unpolluted and used judiciously. Large cities of today (Nainital, Udaipur, Mandu, Nagaur) had their beginning as habitations clustered around lakes. Towns located on the rivers such as Delhi, Mathura and Brindavan on the Yamuna, Allahabad, Varanasi, Patna, Calcutta on the Ganges and Ujjain on the Kshipra had well defined and developed '*ghats*' (terraced riverfront) for social and religious activities. Forts wherever constructed as in Rajasthan (Chittorgarh, Jodhpur, Bikaner, Pushkar, Ajmer...) and Gujarat (Ahmedabad, Rajkot, Junagarh, Jamnagar, Bhuj, Mehsana...) contained a combination of tanks, step wells and lakes as the major features of the towns. In many of these towns and cities today these systems have been rendered redundant due to mindless development thereby causing flooding and health problems.

Water bodies dictated the location of temples. Indeed, in the arid region of Rajasthan they dictated the location of whole towns. Rivers and lakes were named after gods and goddesses, who are depicted to be residing in or close to water bodies. The water, or the deity residing in water must be venerated with rituals and offerings. A typical step well is a series of steps (the long flight broken by landings) leading to a deep well lavishly decorated by arches and lintels. Light work is made of heavy stone retaining walls by elaborate decorations and projections. Step wells like the helical '*vav*' in Pavagarh, or the *Rani ki bawli* reflect a very creative approach, where the stair itself gets sculpturally transformed in to a well as one reaches the bottom.

Hindu as well as Muslim rulers have constructed step wells in India. Though essentially the same in nature, they vary in the level of decoration and ornamentation, the Muslim structures being simpler and less ornate.

The significance of cultural/spiritual elements in Zoroastrianism

The Zoroastrians, a micro minority better known as the Parsees, who migrated to India in the 8th Century AD to escape religious prosecution in Iran, have a lot in common with these Hindu practices. The Zoroastrian tenets of 'Asha' proclaim and celebrate the sacred nature of elements i.e. fire, water, earth and air. The now vanishing predawn practice of 'yashna' is a daily prayer ritual that honours all creation by drawing a sample of water from the well and returning it back to the source after the religious act of consecrating the same. The Zoroastrians treat water not only as a life giving entity but also a living element. It is considered improper to 'disturb' water at night. Water bodies are to be respected by not crossing them but to find land route around the same for fear of polluting the same. Offerings of flowers and food is made to water especially on its 'birthday', the '*Ava parab*' celebrates the sanctity and importance of water.

We see from the prophet's own words, uttered over 3000 years ago, ideas that have great relevance even today. In the *Gathas* (Ys. 29) Gaush Urva, the Soul of Creation, calls out in anguish for a saviour. Zarathushtra, comes to earth to ensure total justice and righteousness

for all creation. He preaches the divine law of Asha or Cosmic Truth, which is not just for human beings but for every aspect of creation. Every aspect of being must be treated with justice, such justice ensures harmony. Harmony can only be possible when there is no exploitation or degradation of creation. In the 21st century, we are still struggling to achieve human rights. In the Bronze Age, prophet Zarathushtra, spoke in the Gathas, of the rights of plant and animal, mineral and waters, of reverence and nurture of all Spenta (Bounteous) Creation.

Many festivals and social rituals coincide with the arrival of the monsoons. Water related rituals dominate religious celebrations, death rituals and special social occasions.

The Zoroastrians follow the ritual prayers to *Ava Yazata* -the guardian of waters. In Iran the water harvesting and wind towers of the Zoroastrian settlements continue ancient traditions. With and legends of the Oral tradition come together on the occasion of *Tirgan*, in praise of *Tir Yazata* who brings rain, at the time of the heat of summer. *Adar Roj*, honouring fire, *Bahman Mahino*, paying respect to the animal world are just a few examples of the interconnectedness of all being. The festivals, rituals and texts of Zoroastrianism thus exemplify Zoroaster's holistic vision and environmental consciousness. **2**

The Zoroastrian Calendar its rites and rituals, then stress environmental awareness and teach a holistic approach to daily life through the interweaving of all aspects of Ahura Mazda's Good Creation. Reverence, care and compassion for the earth are inculcated primarily through the theology of the Amesha Spenta and Yazatas, divinities after whom each day of the month and each month of the year is dedicated.

Spenta Armaiti, "Bounteous Devotion", *Haurvatat*, "Health" and *Ameretat* "Immortality" are the last three Amesha Spenta. Armaiti is feminine, she is the constant companion of the Zoroastrian for only through devotion can man travel to God. She is identified with the Earth Mother and at death man is left in her care.

The twin spirits of Health and Immortality are always spoken of together in Zoroaster's *Gathas*. *Haurvatat*, spiritual wholesomeness or Health is the perfection of life and *Ameretat* or Immortality is the freedom from death, which inevitably accompanies perfection. Water, upon which all life depends, is assigned to *Haurvatat* and the plant Kingdom comes under the care of *Ameretat*. Because Health is the perfection of man's life on earth and Immortality the eternal reward for the soul in the next world, these twin divinities grant happiness now and forever.

Zoroaster assigned man to the care of Ahura Mazda Himself - through His Holy Spirit *Spenta Mainyu*. Thus, through the doctrine of the Amesha Spenta, Zoroaster weaves together the abstract and the concrete, material and spiritual, once against stressing the harmony that is the ultimate goal of life.

One can see a level of devotion and care in the construction of water related elements as was bestowed on temples, palaces and *havelis* (rich man's mansions). Be it an embankment of a '*ghat*' ,a step well or a tank in India as was the case of the covered water tanks in Iran. The architecture is extremely rich and meaningful." This, for someone not from the desert, might seem extravagant and excessive but once the value of water is realized one can appreciate the manifestations in construction to hold and access it".

The decline of indigenous systems

As uncontrolled development took place blocking or altering the natural path of flow of water channels, these traditional systems of water harvesting lost importance. Also the British system of planning saw water as a centralized service, with no understanding of the socio cultural significance of the traditional water systems

All this has led to the issue of water supply in the towns of India as one of the most crucial problems of today.

In the arid state of Gujarat, water has always played a very dominant role in the social-cultural life of people. Perpetual shortage of water has inspired people to appreciate the value of conserving and storing this resource in all conceivable ways. The city of Bharuch, a small town (populated 1,50,000 as/2001 census of India) though situated on the river Narmada, shows dependence on ground water for its survival. Like many other rivers in India the flow in the Narmada in summers is minimal and pollution levels high. Bharuch today exemplifies the small Indian town in many ways. The municipal water supply, at best is just enough to cover basic needs of the people. Long queues at the public distribution stand posts indicate shortage. Over dependence on the well water has rendered many a well brackish the water table to fall deeper.

The system of collecting rain water falling on your roof top, locally known as the "tanka" is still practiced by a handful of persons, mainly the Parsees, the Zoroastrians who brought the consciousness of water related rituals and the concept of harvesting water from ancient Iran.

All the tankas are very old structures - often more than 100 years old.

The "tanka" of Bharuch

The 'Tanka' is an underground tank, accommodated inside the house, preferably under the kitchen or dining room, made of chiselled blocks of stone, in lime mortar, unlined but made waterproof by an indigenous herbal mix. The ingredients of this mix is not recorded but the quality of this mix was not only to render the inside surface waterproof and seal minor cracks but mainly to prevent the bacteriological growth inside the tanka. The size of the tanka is large enough to store sufficient drinking water for a family for six to eight months. An average storing capacity of the tanka is around 25,000 litres. Some tankas are virtually like independent cellars with 8 to 10 feet of filling over them. With sizes reaching nearly 20 feet by 60 feet and height of 12 feet, arches and vaults were needed to support the earthwork and the superstructure on top of the tanka.

Since the bottom of the tanka was well below the lowest level of the house, there was no outlet of water provided. When it has to be cleaned it must be emptied manually. Almost all tankas are large enough for people to enter and walk/work inside. The tanka floor slopes into a sump right under the point from where the water is drawn out.

The tanka feeds on the rainwater collected through roof runoff. A simple system of collection, via a 3" to 4" pipe, depends on successive sumps whose water is collected and overflows on its way to the tanka, and settled impurities are flushed out thru an overflow pipe. In fact the total water runoff of the first couple of days of rainy seasons, is just made to run down the overflow pipe, ensuring a maximum cleaning of all surfaces in contact with water. When the owner is certain of the cleanliness (this is done by constant visual testing

and actual tasting of water) the overflow is plugged. That starts to direct the flow of the water into the tanka. The tanka has a hatch cover, which is kept closed except for the time when water is needed to be pulled out as out of a well, by a bucket on a pulley. The water retention capacity of these tanks which is seen in the form of a particular 'danger level' indicated inside the tank by the depiction of a sculptured 'fish' form along the inlet neck of the tanka. Filling the tank above this mark was considered dangerous as the hydraulic pressure inside may well exceed the retaining capacity of the tank wall.

The tanka is filled gradually till the 'fish' mark and then is stored away to be used after the rains have stopped. The clean conditions of collection, storage and once in a while ventilation by opening the hatch (which is incidentally, so placed that direct sunlight never enters the tanka), trap door and using the water judiciously makes the tanka water a most precious resource specially in the hot summer months. Most owners clean the tanka only once in 5 to 10 years. The water quality has been tested and found to be potable quality.

The system survives today due to the sheer belief and tenacity of the few people who use this system. It is disheartening to know that there are others in the town who consider the presence of the tanka in the house as a nuisance and would rather have it filled up or permanently closed off. In fact some old residences when sold to new owners completely demolish the same, including the tanka, and rebuild in the 'modern-Bombay style' flats.

The need of the hour

This attitude has taken a heavy toll on the social, cultural and heritage front. Historical buildings of heritage value lie unprotected and vandalized. Traditional water systems depended heavily on the coordinated operation of the society. The society at large must recognize and care for the traditional systems. The easy availability of water and a lack of community feeling among the residents have combined to destroy the water harvesting systems. Public awareness and education in this regard is of extreme importance. It will need an effort much beyond mere rules and legislation to set things right. Perhaps a divine intervention.

As is the Zoroastrian belief, to restore the world to its perfect stage, *Ahura Mazda* needs the help of all beneficent being and finally this will culminate in the *Frashokereti* or Renewal of existence when all wounds heal and evil is destroyed. The rituals of the religion, some of which have survived from pre-history, are therefore concerned with the nurture and protection of all creation and the need to preserve it from destructive evil.

If ever an intervention was required to bring man and nature together again in our city –it is now. The message is now very clear that issues of common concerns –issues such as water supply- will need to be tackled jointly by the government and the people themselves.

If the neighbourhood social organisations with a little help from Non Govt. Organisations (NGO's) get into the act even now they could find a few systems of water storage that can be rejuvenated. The efforts of PARZOR, the project initiated by UNESCO to document and conserve the traditional practices and customs of Parsee Zoroastrians in India, are laudable in this regard. "Only when that whole or unit of continuity, which has been destroyed by the presence of conflicting factors has been restored in *another* whole.....can we claim validity for our procedure." 4

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18. Faith in Water: Ideas, Inspiration and Stories

ZOROASTRIANISM. Dr Rooyintan Peshotan Peer

Introduction

Zoroastrianism is one of the most ancient religions of the world, and the most important factor about it is that it is the religion of Nature. It reveres all the basic natural elements and creations in their original forms.

Zoroastrianism as a religion flourished through the ancient Iranian civilization. It belongs to the Aryan group of religions and people of the Indo- European stock. The geographical areas covered in the scriptures are right from the North Arctic regions downwards towards Central Asia and then towards what is present day Iran and the entire neighbouring areas of Pamir Mountains region and Azerbaijan and other regions on the other side of the Caspian Sea. The religion is named so after its prophet Zarathushtra (called Zoroaster "by the Greeks"). The language and the scriptures are both known by the term 'AVESTA'.

In the Zoroastrian religion therefore, Ahura Mazda is considered the Supreme Creator of the Universe. As such all natural creations, and all types of natural phenomena through the function of heavenly bodies and material creations are considered to be the actions of Ahura Mazda. In the Zoroastrian Religion these are understood through the concept of Amesha Spentas and different Yazatas. All these are therefore different attributes of Ahura Mazda himself, and through them, each of these different Universal aspects is understood clearly and separately, e.g. Fire through Asha Vashista, Vegetation through Ameretat and so on. The difference between the Amesha Spentas and the Yazatas is very important, in that the former are the immortal type of creations whereas the latter represent specific aspects. For instance, Haurvatat is the Amesha Spenta presiding over Water itself, whereas the Yazata Tishtriya presides over rain-making.

Divinities of Water

In the Zoroastrian Theology, three divinities are assigned to the Creation of Water.

- first is Haurvatat an Amesha Spenta presiding over Water;
- second is Tishtriya Yazata presiding over the formation of rain upon this earth,
- third is the female divinity Avan (Ardivisura Anahita) representing the force arising out of all types of liquids, fluids, and saps in Nature and being seen as being feminine in nature.

A fascinating feature of Tishtrya and the entire procedure of rain-making on the earth is not only its physical aspect but a deep astronomical pattern underlying it. That Iranians in those ancient times were very well advanced in the field of astronomy is amply testified through the contents of specific Yashts - Hymns. The very fact that the most brilliant star in the sky is connected with the work of rainmaking, imply astronomical connotations. As is well known, the Iranian society of those times was primarily an agrarian one, and the people have obviously to depend on the cycle of the monsoon. The Iranian people, and of course the whole of nature, watched the heliacal rising of Tishtrya for the result of the succeeding year.

As stated in paragraph 36: *We worship the radiant and glorious star Tishtrya – For whose rising humanity which lives by the fruits of the year (i.e. who go by the season), and the chiefs of deep understanding, the wild beasts wandering on the mountains, the hedgehogs, and the animals that wander wild at large, desire eagerly. Because, the way it rises, (it) becomes the year of fertility (or) the year of famine for the country. It is so significant that among the several epithets of Tishtrya, one is 'afsh-chithra; i.e. 'having the seeds of water' or 'of watery nature'. His mythology concerns itself primarily with various aspects of hydrology.

The great longing to see Tishtrya and the repeated question in the Yasht – Hymn - "when shall the bright and glorious Tishtrya rise for us" points to a period of entire disappearance i.e. the period between the heliacal setting and rising. The rains then come after the heliacal rising of Tishtrya.

Then there is this classic narration of the war between Tishtrya and the opponent demon Apaosha. ('He who burns the watery or rainy clouds'). Where there is a hero, there is a corresponding villain too, and in this case it is Apaosha, the demon causing drought. In the first series of battle, Tishtrya is projected as having been overcome by Apaosha, and whereby he complains to Ahura Mazda about the people on earth not remembering him and not worshipping him through the celebrated Yasna. Then Ahura Mazda relates this to humanity, and upon proper worship by the people, Tishtrya gets again renewed vigour and support, and drives away Apasosha.

This aspect is very significant and echoes the concept of ecology and environment in the matter. It tries to show that ultimately the cycle of rainfall depends in the hands of the people, and how they co-ordinate with the forces of Nature (and this is what we are experiencing precisely at present), After the battle is over, and Tishtrya being victorious, it is described in paragraph 31 as 'ho zrayo ayaozayeiti, ho zraiyo vivaozayeiti, ho zrayo agzharayeiti, ho zrayo vigzharayeiti' – 'He (Tishtrya) causes the sea (Vourukasha) to be agitated, to surge exceedingly, he causes the waters of the sea to overflow exceedingly.'

Now to a geologist, the description may lead to conclude that the original inland sea basin had suffered a coastal subsidence thus broadening or expanding its shores. Similarly, the demon Apaosha which causes the sea arid or dry or waterless is nothing but the phenomenon of upheaval which generally precedes the phenomenon of subsidence.

But the most vivid description of the natural element of water is represented by the female divinity called 'Aredvi' in the Avesta, with the epithets 'sura' and 'anahita' ('brave and pure'). In later forms, she is known as 'Avan'. At the outset, on the physical level, she is portrayed as a beautiful maiden, highly girded up with different types of ornaments, and riding a chariot with four horses. She is the co-worker of the mother Earth, and presides over all

types of flowing water and liquids, fluids and saps in Nature. A large Yasht is dedicated in the honour of the divinity. As stated in the Avan Yasht, she helps in the purification of the seeds of men, the well-being of pregnant women's wombs, provision of substantial milk to mothers after child-birth as well as facilitating easy child-birth.

In this way, she helps all mankind through generations to come. She pervades over not only masses of flowing water in this physical world but also over body fluids, bearing in mind that the earth comprises nearly 70% water masses as also the human body. The major part of the Avan Yasht comprises of historical value starting from Ahura Mazda himself and prophet Zarathushtra and then all other well-known Iranian Kings and heroes who worship her and ask for such boons as would benefit the mankind. This itself shows the tremendous importance of the elements of water. An interesting concept among this is that the evil rulers also tried to worship her and asked for the boons, which would cause destruction to nature and the Iranian civilization, but such boons were not granted to them by Avan.

This female divinity Avan, through her physical image, and through the characteristics and functions described in the Yasht, has made a huge impact on the followers of the Zoroastrian religion. Historically speaking, she is one of the two Iranian divinities (other being 'Mithra') to have influenced the Greeks and the Romans, who had come into contact with the Persians through wars and other such factors, that temples were consecrated in her honour in the name of 'Anahita'. Even at present among the Parsi Zoroastrians worldwide, she shines as one of the most popular divinities. Her name is commonly assigned to female members of the community, and a full month in the Parsi calendar is assigned to her.

She is like a super heroine particularly among the female members who revere and worship her in their search for a suitable male match, in giving easy child-births, providing abundant milk and so on. On one particular day in her month, a sort of her birthday is being celebrated in a unique manner. A majority of the members of the Parsi Zoroastrian community congregate in masses at the beaches, sea fronts, river and lakesides and besides any other natural source of water in their vicinities, and offer prayers to her, and praise her. Decades ago, the great American industrialist and philanthropist Andrew Carnegie had the privilege to witness one such occasion in Bombay, and it is worthwhile to understand the impression of such a spectacle generated in his mind, in his own words.

He states:

"This evening we were surprised to see, as we strolled along the beach, more Parsees than ever before, and more Parsee ladies, richly dressed, all wending their way towards the sea. Here on the shore of the ocean, as the sun was sinking in the sea, and the slender silver thread of the crescent moon was faintly shining on the horizon, they congregated to perform their religious rites. Fire was there in its grandest form, the setting sun, and water in the vast expanse of the Indian Ocean outstretched before them. The earth was under their feet, and, wafted across the sea, the air came laden with the perfumes of 'Araby the Blest'. Surely, no time or place could be more fitly chosen than this for lifting up the soul to the realms beyond seas."

Carnegie added, "I could not but participate with these worshippers in what was so grandly beautiful. There was no music save the solemn moan of the waves as they broke into foam on the beach. But where shall we find so mighty an organ, or so grand an anthem? How inexpressibly sublime the scene appeared to me and how insignificant and unworthy of the

unknown seemed even our cathedrals made with human hands, when compared with this looking up through nature unto nature's God! I stood and drank in the serene happiness, which seemed to fill the air. I have seen many modes and forms of worship – some disgusting, others saddening, a few elevating when the organ pealed forth its tones, but all poor in comparison with this. Nor do I expect in all my life to witness a religious ceremony which will so powerfully affect me as that of the Parsees on the beach of Bombay.”

According to the Zoroastrian religion, every fire temple is required to have a well as a natural source of water, sometimes more than one. The presence of water is the main requisite for all the rituals and ceremonies. The higher ceremonies begin with the ritual drawing of water from the well, and ends with ritual re-pouring of the same into the well. Different types of natural sources of water are described in the scriptures like the flowing waters, the spring waters, the waters of seas and oceans etc. with the scientific explanation about how the flowing waters being beneficent over the stagnant waters.

The Parsis in India had settled down primarily in the southern parts of Gujarat on the western coast. This geographical area is considered to be a natural, fertile region with innumerable rivers and rivulets flowing through the same. The Parsis, through their innate reverence for water, helped the region to flourish and prosper. But as they spread out to different areas later on, they had to deal with more dry and arid regions with hot and long Indian summers. They therefore adapted to these situations with measures like rain harvesting and storage of water through different devices.

One such old tradition is to be found in the city of Bharuch in Gujarat, and the ‘tanka’ system developed there by the Parsis is considered to be architectural marvels and worth emulating the same in present circumstances. The Parzor project supported by UNESCO is seized of this matter, and working upon it (Another speaker in the workshop would dwell upon this in detail). A Parsi gentleman by the name of Mr. Khambatha has been doing pioneering work in the matter of rain harvesting in and around a place called MHOW in Madhya Pradesh and elsewhere.

A religion is known as the ‘living religion’ when its tenets are followed properly by the members of the community, and certain traditions, customs, practices and institutions are established accordingly on a practical basis. Like the element of fire being venerated in Zoroastrianism as a central factor has resulted in establishments of the fire-temples and ways and means of worshipping the same. Similarly, the natural element of water is considered the life force for mankind, and therefore has been attributed with utmost importance. The members of the Parsi Zoroastrian community are taught from the childhood by the means of stories and practices for giving due reverence to the water.

The Zoroastrian religion lays great stress on the concept of cleanliness and purity, both physical and spiritual. It teaches that the purity of the mind and soul could be achieved only through the purity of the physical body. The well-known French scholar Prof James Darmesteter has stated that for the Parsis the axiom ‘cleanliness is next to godliness’ is not sufficient. For them ‘cleanliness is godliness itself’. And for this purpose of keeping the physical body pure, the use of water is greatly imperative. Accordingly, the aspect of personal hygiene also attracts much significance. In order to achieve the desired levels of hygiene and purity, a series of religious observations (known as ‘tariqats’) are prescribed.

For the priestly class, these ‘tariqats’ are to be followed on a very high level. Some of these common ‘tariqats’ entail frequent washing of hands, feet and other open parts of the body

like after coming out of toilets, before partaking of the meals, after the meals and so on. The life span of individual members and thereby that of the whole community very much depends on the adherence of such observations in the nature. And the Parsee community is indeed a shining example in this matter. The prosperity of a country or a nation also depends upon the climate with its water content. There are several examples in the history of the world where the once-prosperous nations had their downfall with the climatic change as one of the major factors. The case of ancient Iran is also one such example.

Secular Contributors

20. Clean Water Now!

CWN. Evert Groeneveld, the Netherlands

The topics of water, sanitation and hygiene on the one side and children on the other are of the greatest importance for the health conditions of the coming generations. By organizing this workshop the Alliance of Religions and Conservation (ARC) has shown that these topics lie at the surface of its consciousness and close to its heart. As these are also the paramount concerns of Clean Water Now (CWN), this Holland-based NGO has dedicated itself to bringing clean healthy drinking water to children in some of the many parts of the world where the quality of drinking water is threatened.

Our mission is to make access to, and availability of, safe drinking water as simple and cheap as possible, and we do this by developing and distributing the 'Naiade' disinfecting unit, developed by Clean Water Now! And its partner, the Dutch electronics company, Nedap, which is described in this paper.

CWN is very honoured to be invited to contribute to this workshop and participate actively in the important goals of the workshop and of ARC. We were asked, by Allerd Stikker of EMF, and by Martin Palmer of ARC to give you information about three areas of our work;

- 1. How the Naiade disinfecting unit offers safe drinking-water**
- 2. Our experience with the unit up till now**
- 3. The Clean Water for Children Foundation**



1. How the Naiade disinfecting unit offers safe drinking water

Clean Water Now has developed a unique solution to the problem. The Naiade is a stand-alone unit that uses solar energy and ultra violet light technology to strip the available water from biological pollution and worm-eggs. Through the use of solar energy the Naiade can be installed at any place, anywhere. Even when villages are remote with no electricity, the Naiade only requires the energy of the sun! It also uses no chemicals; so there is no chemical waste and no chemical pollution.

How it works:



- **Simple and easy** Water is poured into the Naiade at the top. There are several effective purification steps, among which a sophisticated filtering system and a UV reactor. Clean healthy drinking-water flows from the tap, the solar panel produces the required energy. And as there are no moving parts, the Naiade requires a minimum of maintenance. Although it works with solar energy thanks to a back up car battery it can still provide safe water at dawn or dusk, and in heavy monsoons.

- **Automatic stop.** The water circulation stops automatically when the filter is clogged or removed or when the UV light does not meet its specifications
- **High Quality.** The quality of the water coming out of the tap is guaranteed. Especially for schoolchildren it is of the highest importance to be sure about the quality of water they drink.
- **2500 litres a day.** The unit treats up to a maximum of 2500 litres of water a day. Storage reservoirs can be used for untreated as well as for disinfected and dewormed water in order to avoid “traffic jams”.
- **Sustainability :** the Naiade lasts for over 10 years. The UV lamp has a lifespan of between two and three years.

YOUTUBE video: <http://www.youtube.com/watch?v=1Njq4hQYQw0>

Practical benefits

- Safe drinking-water for over 10 years
- Low maintenance costs
- Easy availability of spare parts
- Stand-alone operations, independent of energy resources
- Takes two hours to install
- Easy to operate
- Robust design
- Leaves the healthy minerals in the water
- Additional modules available to remove arsenic and fluoride
- Additional modules planned for removing chromium from the water and for improvement of taste and smell

Results

- Significant reduction of diarrhoea and tropical diseases like cholera, typhoid fever, hepatitis A and dysentery
- Better health for children and adults
- Lower child mortality
- Less drudgery for children and women
- Less deterioration of the environment
- Better productivity and economic development
- Re-use of water in water-scarce areas

Costs

A Naiade costs €3500 ex-factory, plus transport and customs duties. So in schools with 1000 students the Naiade can provide each student with 2.5 litres safe drinking water a day for less than 1p per week. According to World Health Organization statements, every euro spent on water quality results in a €10-20 reduction of medical costs, and an incalculable improvement in productivity and economic development. Financing is often most effective through microcredit, and with NGO or intragovernmental agency support can be a great tool for development.

Testing and awards

The Naiade has been tested very positively in the field by many independent bodies. These include: the University of Istanbul; the UNESCO-IHE Institute of Water education; the official water research centre of Ghana; the Ministry of Water and Livestock Development Tanzania; ATIRA (Ahmedabad Textile Industry's Research Association). It has received the European Commission international award on sustainable development.

2. Our experience with the unit up till now

As this paper is written in June 2009 the Naiade is operational in 27 countries including: Afghanistan, India, Pakistan, Sri Lanka, Indonesia, Brazil, Uganda, Surinam, Mexico, Colombia, Morocco, Senegal, Sudan, Mozambique, Uganda, Ghana, Cameroon, Benin, Mali, Egypt, South Africa, Burkina Faso, Nigeria, Zimbabwe, Madagascar, Tanzania, Rwanda and Kenya.

So far the Naiade has done what it promises. It is of real benefit to children and from written feedback from users in Zimbabwe, India, and Burkina Faso we learn of the great and fast impact on the health of schoolchildren, of less absenteeism and better school results. The NGO Gram Vikas situated in Orissa, India, reported a reduction of diarrhoea of 90% in schoolchildren following the installation of a Naiada. At school and at home, the importance of a steady supply of clean, healthy water 24 hours a day can hardly be overestimated.

Up till now the installation of the Naiade has been without any complication and it can be installed within two hours. Of all the units installed not one problem with the filters has occurred. In Afghanistan the Dutch Military Forces started supplying the local people with 4 Naiade units which they located in small medical clinics. Last October the American Forces ordered 18 units for the same purpose.



3. Clean Water for Children Foundation

This is a way of getting more Naiades into schools. Each school will pay a monthly sum over 10 years, which would include the cost of the unit, transport and customs, the costs of installation, introduction, regular testing by a laboratory, maintenance and the costs of spare parts. The foundation will remain the owner of the units. We imagine that the idea of such a foundation may also be of interest in some of the regions to which this conference reaches out, with the local Religious Community as the owner of the Naiade units, hiring them out on a long term basis to schools.



Future

Apart from the quality aspects of drinking water CWN believes a separate workshop should address the quantity aspects of providing enough water, and of distributing it fairly. CWN also recognises that real stewards of the environment also look after the interests of flora and fauna, to make sure that there is enough water available for all life.

Information and contact:

www.cleanwaternow.nl

http://www.cleanwaternow.nl/pdf/CWN_brochure_english.pdf

Using Naiade solar-powered water filter in schools

Introduction

Gram Vikas is an Indian rural development NGO working predominantly in the state of Orissa. One of the principal causes of poverty in Orissa is ill health, caused primarily by water-borne diseases, due to having to drink and use very polluted, un-protected water. Gram Vikas use water and sanitation activities as an entry point for whole village development. They work with communities to enable every person in a village to be able to access good quality sanitation facilities, as well as a clean, safe, piped water supply.



Photo: Naiade water filters

In addition to water and sanitation activities, Gram Vikas have established four residential schools aimed at enabling tribal children to access a good quality education. In these schools Naiade solar-powered water filters have been installed (photograph 1), allowing 100% of the students and teachers to drink safe, clean water.

The filters work by having a UV light attached to a battery that disinfects the water. A solar panel, which for security reasons is placed on the school roof, is attached to each battery, which powers the light.

These filters have been in use for the past two years, and are working extremely well with no defects, supplying a total of 1047 students and 46 staff with safe, drinking water. Table 1 shows the breakdown for each school.

Table 1: Schools where water filters are installed and number of people accessing clean drinking water:

School	Number of filters	Number of beneficiaries
Thuamul Rampur	2	207
Kankia	2	502
Rudhapadar	1	153
Koinpur	1	281
Total	6	1143

Health implications of the water filters

To ensure all of the children and staff have access to clean, safe water 24 hours a day, there is a system in place where some of this water is bottled during the day for night use. Ensuring 24-hour access to safe water has had a dramatic impact on incidences of illness in the school, with the number of cases of diarrhoea and dysentery reducing by 90%, and no cases of Typhoid or Jaundice (Hepatitis A). All of the students and staff are residential and do not go home during the term time, therefore it is very easy to monitor and keep accurate health records of the students.

It is noticeable that when the students do go home to villages which have not implemented Gram Vikas' water and sanitation programme, then many of the students suffer again from common problems caused by water-borne diseases, such as diarrhoea and dysentery.



Photo: Hygiene education



Photo: Spreading the hygiene message in local villages

In addition to the water filters, much attention is paid to hygiene and sanitation education (Photographs 3 & 4). Students are taught about the importance of washing hands with soap before eating and after using the toilet. Lessons are given about the importance of keeping hair clean, as well as cutting nails regularly. The idea behind this education programme is not only to pass important health and hygiene messages onto students, but it is also hoped that when the students return to their villages, they will act as health and hygiene ambassadors, encouraging their parents to also follow such practices. In villages where

Gram Vikas are working, health and hygiene education is carried out in the villages too, so in these cases the students can help to reinforce the message.

The water filters do much to protect the children from worms as well, but to further increase this protection, twice a year, all children in the residential schools are given de-worming tablets. These tablets are very effective, but unfortunately quite costly.

Maintenance of the water filters

The 90% reduction in common waterborne diseases such as dysentery and diarrhoea show how important these water filters are to the schools. Another benefit of the water filters is that they require only a very limited amount of technical knowledge, and are extremely easy to maintain.

The schools have to carry out three main maintenance tasks to keep the filters in good working order:

1. The container needs occasional cleaning
2. The solar panel needs cleaning to remove the build up of dirt and dust and maintain the efficiency of the panel
3. The filter bags need to be washed, and can then be re-used after washing.

The only maintenance that requires a trained technician is the replacement of the UV light, which disinfects the water, and needs to be replaced around every 14 months.



The main problem the schools have experienced is the potential theft of the solar panels. To try and limit the possibility of theft, the solar panel is therefore put on the school roof and locked away at night.

Photo: Students of Kankia High school with their water-filter

24. The Importance of School Water Supply, Sanitation and Hygiene (WASH)²⁴

UK Department for International Development DFID. Stephen Young, UK

Introduction

A lack of water supply and basic sanitation and hygiene (WASH) kills thousands of children and vulnerable people every day and leads to poor health and malnutrition for many more. 10% of the global disease burden can be attributed to inadequate access to WASH. For example, an estimated 88% of diarrhoeal disease is caused by unsafe WASHⁱ. An estimated 2.5 billion people, representing 38% of the World's population lack access to improved sanitation facilities while 1 billion of the World's population lack access to safe waterⁱⁱ. This has a profound effect on the ability to meet development targets such as the Millennium Development Goals and in particular in ensuring access to education and gender equality and empowerment for women.

WASH and Education

Education is vital in supporting individuals and communities to escape the cycle of poverty and ensure sustainable development. Many schools in developing countries have inadequate WASH facilities or serve communities which have a lack of access to adequate WASH. This leads to poor health, absenteeism from school, low academic performance, and unequal access to education for girls and those who are particularly vulnerable such as the disabled. Schools often lack drinking water, hand washing or sanitation facilities or facilities are of inadequate design and insufficient in quality or quantity.

Poor health as a result of helminth (worms) and diarrhoea caused by inadequate WASH hinders the ability of children to participate in school and denies them their right to basic education. Sustained exposure to water related health hazards such as chemical contamination of water from lead and arsenic, diarrhoeal disease and malaria infections results in absence from school and in the case of arsenic can limit cognitive developmentⁱⁱⁱ. Poor environmental conditions in school buildings and grounds also affect the ability to teach and learn effectively. Girls and female teachers are significantly disadvantaged if there is inadequate provision of WASH, particularly when they are menstruating. Inadequate WASH design can mean a lack of dignity and girls and women at risk of abuse. This may result in absence from school or dropping out from schooling altogether.

Children are often responsible for collection of household water requiring them to walk considerable distances in the morning and evening. While the average distance people walk to collect water in Africa and Asia is 6 km, seasonal shortages and inadequate maintenance

²⁴ This note has been prepared by Stephen Young, DFID Senior Water and Sanitation Adviser and by Cara Flowers of Harewell International on behalf of the DEW Point Resource centre. The report has drawn on inputs from a range of DFID advisory colleagues and other officers. The views expressed in the paper, however, are entirely those of the authors and are not presented as official DFID policy.

of infrastructure can mean that in practice children walk further^{iv}. This can prevent them from attending school and limit their concentration and academic performance once they are there. Poor WASH will continue to affect children and teachers if the wider community does not support school WASH initiatives. Yet, school WASH can act as a springboard (alongside other initiatives) in support of community WASH initiatives. It is clear that the provision of adequate school WASH is essential for access to sustainable, equitable education and to ensure that the benefits of any development intervention are realised.

The cultural and religious significance of WASH

Water has great cultural and religious significance and this is often reflected in rituals, stories and religious beliefs. For example, in Japan a ritual prayer is held each spring at the shrine of Takaokami, the god who brings rain^{vi}. Many religions highlight the importance of water and the link between cleanliness and godliness both in their rituals and their religious texts. For example,

“Then will I sprinkle clean water upon you, and ye shall be clean”

The Bible, Ezekiel 36:25.

The Qur’an and Hindu texts such as the Bhagavad Gita also make this connection,

“God loveth the clean”

The Qur’an, Sura 9.

“One may cleanse himself daily by taking a bath in water, but if one takes a bath even once in the sacred Ganges water of Bhagavad Gita, for him the dirt of material life is altogether vanquished.”

Gita-mahatmya, 3.

Many religious texts describe water as a gift from god emphasising an imperative to look after water resources. This is often reflected in the belief that water should be available to everyone and not bought and sold as a commodity^v. Cultural values such as this can have a significant impact upon appropriate strategies for WASH development.

3.1 How culture and religion affect WASH

Religious and cultural beliefs also shape behaviour in relation to WASH. For example, the Bunna of Ethiopia believe that anything from the ground is dirty and will drink contaminated surface water in preference to uncontaminated from a borehole source^{vi}. Diseases are perceived to be caused by deceased ancestors and not contaminated water. This demonstrates the importance of ensuring that development of WASH policy, programmes and infrastructure takes account of the religious and cultural context.

Cultural and religious beliefs are often intrinsically linked and both impact upon water use and sanitation and hygiene behaviour. It is also recognised that humans have an innate sense of disgust that probably has its roots in disease avoidance. We tend to value cleanliness and avoid things considered to be dirty or associated with dirt and this is often reflected in cultural beliefs and practices. These beliefs can be useful in shaping positive sanitation and hygiene behaviour but may also lead to embarrassment and avoidance when discussing some aspects of hygiene such as menstruation. Cultural taboos surrounding contact with menstruating women and a belief that they should be segregated can

accentuate this. It is therefore important to recognise not only environmental sustainability but also the cultural suitability of WASH practices^{vi} (see Box 1).

Box 1

The impact of cultural and religious preferences on community water supply (CWS): Case study from Machaki village in North West Frontier Province, Pakistan^{vii}

Discussions with 20 village elders regarding sanitation and dirty washing water and urine in the streets proved to be the starting point for development of a CWS programme in Machaki. Open defecation was a common practice and thorough discussion on the health impacts led them to conclude that they would like improvements. Nawab highlighted several cultural and religious factors affecting technology choice and hygiene behaviour. These included:

- A desire to keep body and clothes clean for prayer as ordained by the Koran and hadiths (Sayings from the prophet Mohammed (Peace Be Upon Him)).
- Sayings from the Prophet Mohammad PBUH stating that toilets should face away from Mecca.
- Strong psychological and religious concern regarding the impurity of faeces.
- The council of male elders who were responsible for village decision-making.
- Cultural taboos meaning women were unable to discuss sanitation with men yet women were responsibility for household sanitation.
- A wastewater use decree from the Council of Leading Islamic Scholars (CLIS) in Saudi Arabia.

As a result, the community designed a unique water supply system. This included a wetland treatment system and household latrines demonstrating a flexible context specific community designed response to CWS.

WASH in schools

4.1 Best Practice

Implementing effective and sustainable WASH activities in schools involves attention to physical infrastructure and support for institutional development as well as cultural and religious beliefs which affect who is educated, where and how. The following areas represent some factors for consideration:

Gender equity and dignity. This means ensuring that gender equity is considered throughout WASH design, implementation and review. For example, from planning appropriate locations of latrines to sustainable provision of materials to aid girls and women in managing their menstruation.

Access for all. Access for all regardless of sex, social status, age, physical and mental ability. This may mean consideration of technical designs, training and sensitisation within schools and awareness raising.

Institutional capacity and cross-sector communication. Communication within and between different organisations and government sectors is integral to success of WASH.

Hygiene and sanitation education. This must recognise that sanitation and hygiene behaviours are social phenomenon as much as technical challenges. With this in mind, cultural and religious acceptability and appropriate social marketing techniques are important considerations.

Appropriate physical infrastructure. This includes technology choice, location and operation and maintenance as well as consideration of when and how technology is introduced with a view to phased incremental improvements in WASH.

Monitoring, evaluation and action. A monitoring and review process that allows for correction in the system and continued improvement.

Sustainability. This refers to the environmental, financial and operational sustainability of any system. This means consideration of whether the environment can support the system and whether people are able to finance and maintain it. Additional to this might be institutional sustainability meaning attention to the social structures required to ensure long-term functioning of WASH.

These measures need to be implemented within the context of a positive policy environment at local, national and regional level which encourages WASH strategies that pay attention to cultural and religious beliefs and promote equity of access for all. This might be demonstrated through setting school specific standards and defining steps on the path to WASH supported by planning and assessment of needs both by government and school communities. Government goals cannot be achieved without local support and involvement and so roles and responsibilities of government, donors, schools and communities must clearly be defined and links between different sectors encouraged.

Gender equity and dignity

Gender equity is a question of dignity and rights. Women and girls have the right to safe, appropriate water and sanitation facilities to enable them to practice menstrual hygiene. Lack of support for girls to manage their menstruation is linked to the dramatic decrease in girls' attendance at school from puberty onwards (see Box 2). Cultural and religious values will impact upon the hygiene behaviour of women and girls and affect WASH development. For example, girls and women may be forbidden from discussing their needs in public or with men. Women and girls may also experience segregation and seclusion when menstruating or may face prohibitions on using sanitation facilities which are in public view. However, there are positive lessons to learn from cultural traditions surrounding menstruation. For example, Gumuz women in Ethiopia use pounded tree bark as disposable sanitary pads. These are more hygienic than cloth strips, environmentally friendly and free^{viii}. Tackling gender equity within schools must involve men through a focus on encouraging male teachers to educate children in hygiene and sanitation and lead by example in safe water and sanitation practices even if these practices are considered to be women's work.

Box 2

Schoolgirls, health, wellbeing and dignity in Africa

It is estimated that half of all girls in Sub-Saharan Africa who drop out of primary education do so because of poor water and sanitation facilities while it is estimated that a further 10% of school-age girls in Africa do not attend school during menstruation or drop out completely at puberty because they have no access to clean, private sanitation facilities at school^{ix}. In 2005 WaterAid conducted a study in Benishangul-Gumuz Regional State (BGRS), Ethiopia. Of the 32 schools studied, latrine to student ratios ranged from 1 latrine per 46 students to 1 for 386^{viii}. Where facilities were available, broken or non-existent toilet doors, a lack of dedicated male and female toilets, and few female teachers hindered their use. Girls and women teachers were often culturally limited to using toilets at night or felt there was insufficient privacy to use available facilities.

Access for all

Facilities should also be accessible to all regardless of sex, social status and physical or mental ability. This means attention to design and use of facilities. For example, consideration of the proportions of facilities to ensure they are comfortable, not intimidating and easy to use. Modifications might include reducing latrine wall height, making the latrine drop hole smaller to tackle phobias related to falling down^x, fitting handrails or ropes, providing ‘tippy taps’²⁵ ^{xii}The location of facilities must also take account of ease of physical access along with cultural considerations and awareness that children may be vulnerable to bullying or abuse if the location and monitoring of facilities is inappropriate. Other adaptations might include modifications to taps to make them easier to use for those with missing limbs. Adaptations such as this are generally low cost but make a big difference in ensuring access to facilities and so to school education^{xii}.

Institutional capacity and cross-sector communication

Paying attention to institutional capacity means ensuring that there is a positive policy environment that enables standards setting and creation of guidelines to improve WASH. This involves ensuring that appropriate support is available to all involved in ensuring long-term sustainability of WASH facilities including access to further information for sanitation and hygiene promotion as well as support for maintenance of physical infrastructure. Schools are usually the responsibility of Ministries of Education while sanitation and hygiene policy tends to sit within Health Ministries and water supply often in a third separate Ministry. Therefore, coordination between different sectors and ministries within a country and between different donor agencies is vital in order to ensure that WASH is mainstreamed into development initiatives and efforts are coordinated.

Hygiene and sanitation education

While infrastructure such as toilets and taps are important, it is equally necessary to ensure that behaviour change is part of any WASH strategy. Schools have a responsibility to educate children in life skills under which sanitation and hygiene fall. There is recognition that sanitation and hygiene behaviour are largely social phenomenon and so attention to social marketing tools and practices within schools is important^{xiii}. Children can be powerful communicators of health messages in support of good hygiene and sanitation practice in their communities^{xiv}. Key to ensuring that WASH messages are communicated accurately and appropriately is ascertaining school and staffing and training requirements.

Appropriate physical infrastructure

Appropriate physical infrastructure refers to technology location, choice, operation and maintenance as well as the way in which technology is introduced. For example, where possible latrines should be made from locally available materials facilitating easy repair and replicability^{xv}. This goes hand in hand with monitoring and evaluation as continual review of facilities should lead to changes in physical infrastructure where appropriate. This approach allows for phasing technology adoption to allow for incremental improvements as demand

²⁵ A tippy tap is a small suspended jerry-can with modified, moulded handles that provide a limited flow of water when tipped.

increases and resources become available. Physical infrastructure should be affordable and easy to use and maintain. This is especially important in a school environment where physical structures must be robust and able to support rigorous use yet easy to fix without specialist knowledge in the event that they break down.

Monitoring, evaluation and action

Monitoring and evaluation is the long-term continual assessment and review of WASH facilities and services being provided. It is integral to ensuring success of school WASH in the long term. Monitoring and evaluation of school WASH ideally involves coordination from school to national level. This will involve support in establishing school health committees and a monitoring system with easy to observe and report indicators. Ideally, this activity will be supported by the local environmental health department. The following areas are suggested for assessing WASH provision in schools: institutional capacity, water quality, water quantity, access to facilities, Hygiene promotion, Toilets, Disease control, Cleaning and waste disposal and Food storage and preparation^{xvi}. Monitoring and evaluation ideally leads to action to remedy any problems when they occur.

Sustainability

Sustainability refers to the long-term success of the WASH project in achieving its targets. These might include reduced diarrhoea incidence and improved awareness of the importance of WASH. Like gender, sustainability cuts across all aspects of water management and the design, operation and maintenance of facilities. Sustainability of WASH is especially important for schools as the long-term success of WASH depends on a combination of physical and social infrastructure and appropriate institutions and support structures to ensure continuity in provision and incremental improvements in WASH standards.

DFID's experience

The UK Department for International Development is committed to supporting the provision of WASH in schools. This is in the context of enabling attainment of the Millennium Development Goals (MDGs). MDG 2: Access to universal education and MDG 7, target 10: To reduce by half the proportion of people without access to safe drinking water and sanitation are both relevant to WASH in schools (See Box 3).

It will not be possible to achieve universal education without equitable access for all to water and adequate hygiene and sanitation. DFID's 2008 Water Policy Document recognises this and includes an aim to *"ensure that every school and health clinic has a safe water supply and well maintained toilets, separate for boys and girls"*^{xix}. DFID also recognises that it is necessary to integrate sanitation in health and education programmes in support of national policies on WASH in schools. This approach is also supported by DFID's 2006 Girls Education Strategy within which DFID made a commitment to make sure that gender equity and support for promotion of clean water and sanitation facilities are part of education sector plans. DFID recognises that the introduction of WASH in schools can lead to improvements within local communities while local community support is integral to ensuring the success of school WASH initiatives¹⁶.

Box 3

The Millenium Development Goals (MDGs): WASH and Education

In 2000 the international community committed to the millennium development goals with the aim of attaining the targets contained within them by 2015. They focus on the most pressing global development challenges. Two key goals relate to WASH and education:

MDG 2 is to achieve universal primary education. A key target under this goal is for all girls and boys complete a full course of primary education.

MDG 7 is to ensure environmental sustainability. MDG 7, target 10 is to reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation^{xvii}.

In addition, **MDG 3** is to promote gender equality and empower women. Two key areas that will enable this goal to be attained are gender sensitive WASH and access to education. DFID is supporting the Global Framework for Action on water and sanitation which seeks to build political support for the WASH sector and to improve the allocation and targeting of finance^{xviii}.

Promoting female education

In Malawi and Nigeria, DFID supports the construction of separate latrines for girls and boys in schools. In India, support to UNICEF's Child Environment Programme has resulted in the proportion of schools with minimum School Sanitation and Hygiene Education (SSHE) facilities increasing from 41% to 73% between 2004 and 2008/9. Concurrently, the proportion of households adopting essential hygiene practices rose from 26% to 45% over the same period. Hygiene education has now become a critical aspect of life skills education in many schools.

Community involvement

DFID has been involved in further researching Community Led Total Sanitation (CLTS), piloting the approach in Yemen and allocating resources to researching the opportunities for scaling up the success of CLTS. There are clear benefits of community involvement in WASH and these are reflected in DFID's support to Yemen (see Box 4). Ensuring that school sanitation is linked to the community has yielded positive results in Malawi where school sanitation clubs have been effective in maintaining school and community support for WASH.

Box 4

Yemen – Education benefits from improved water collection^{xix}

Despite traditional rainwater harvesting practices, Al-Qatab village in Yemen suffered from seasonal shortages of water with cisterns running out of water in the driest part of the year. As a result, villagers had to travel 2 hours by foot to the nearest source. A new cistern, hand-pump, precipitation tank and livestock water basin was provided via the DFID funded Social Fund for Development. This has made water collection easier. As this was the responsibility of women and children, school enrolment has increased and hygiene and environmental health has improved.

Cross-sectoral links

In Kenya, DFID provided support in developing a WASH strategy for schools. Provision of adequate water and sanitation facilities in schools is now a key strategy in the DFID supported Kenyan Ministry of Education's Sector Support Programme. As part of a sector wide approach (SWAP) for WASH, a pilot involving the provision of sanitary napkins in schools is being undertaken.

Faith based organisations

In many parts of the world, faith based organisations are the only institutions with a consistent presence. Therefore, they are often well placed to provide continual support for WASH. DFID also recognises the value of faith-based organisations in implementing WASH activities at national and local levels in country. This is reflected in DFID's work both directly and indirectly with many faith based organisations (See Box 5).

Box 5

DFID's support for International Faith Based Organisations

DFID knows that Faith based organisations have a valuable and vital role to play in supporting WASH initiatives in education. DFID has public partnership agreements with several Faith based organisations including Islamic Relief, Christian Aid, World Vision and CAFOD as well as other international non-governmental organisations such as WaterAid who work closely with faith based groups in developing countries. Core funding to faith based international organisations for 2008 to 2011 totals £67,280,000.

DFID Funding

DFID partners with and provides funding for several organisations that implement WASH activities. This includes partnering with UNICEF the World Health Organisation (WHO) and the Water Supply and Sanitation Council (WSSC). In Africa alone, DFID has committed £1 billion to the water sector between 2009 and 2014 which is expected to result in water and sanitation provision for up to 25 million more people. In addition to this DFID has committed funds for WASH provision in schools to activities in countries. Examples of DFID's support to country WASH in education initiatives:

Burundi – From 2008 – 2011 DFID has committed £6 million to improve education through support to the National Education Plan. More than 200 latrines have been rehabilitated and there are plans for 75 new schools with water and sanitation facilities including separate toilets for boys and girls.

Kenya – DFID is currently contributing to the water sector through £55 million committed from 2005 – 2010 to provide support to infrastructure and water and sanitation development via the Kenya Education Support Programme. This will cover over 4,500 primary schools. School based hygiene promotion will form the basis of support for maintenance of the infrastructure installed.

Pakistan – In Pakistan, DFID education programmes in Punjab and Balochistan involve significant WASH activities including improvements to school infrastructure and a particular focus on access for girls.

Malawi – £2.5 million has been invested by DFID in school water and sanitation as part of its funding to the education sector over the last three years resulting in sanitation delivery to 400 schools.

Nigeria – DFID works in partnership with UNICEF in Nigeria. This joint initiative has focused on water and sanitation in schools via a water and environmental sanitation programme which provided water points, sanitation facilities and training for hygiene skills in 400 schools.

DFID country involvement

Kenya: Universal Education and WASH demand

The introduction of Universal Primary Education in Kenya resulted in a 39% increase in the number of children in primary schools between 2002 and 2007^{xx}. This has strained existing WASH facilities considerably and unavailable or poor infrastructure has been identified as a major constraint to improving education access^{xx}. DFID is working with the Kenyan government and other development partners in Kenya as part of the Education Sector Support Programme. This has a budget of £24 million to develop primary school infrastructure including sanitation and hygiene promotion. The programme aims to improve child health, attendance, performance and retention of all learners including girls, boys and those with special needs^{xxi}.

The Kenyan government has chosen to allocate £6 million for WASH promotion alone. This includes a variety of different activities from latrine design, grants for schools and strategy development to teacher training on the subject. The Kenyan Ministry of Education WASH Promotion Strategy advocates adoption of cultural practices that enhance positive WASH behaviour and support for culturally appropriate facilities. The long-term sustainability of this initiative is being strengthened through development of a baseline survey by the Ministry to ensure that the needs of schools are being met and to identify those in most need of support.

India: WASH in support of school attendance

While there has been rapid economic growth in India, 400 million people still live in absolute poverty. The Government of India has been successful in reducing the number of children aged 6-14 remaining out of school from 25 million in 2003 to 5 million in 2009. However, there is still further to go. DFID works with UNICEF and the Indian Government to improve access to education, with particular emphasis on girls. This is through support to the Government's elementary education for all programme, Sarva Shiksha Abhiyan (SSA) and expansion of the Education for Women's Equality programme, Mahila Samakhya. Critical to the success of both programmes is support in tackling violence against women and barriers to women and girls' access to education. Many girls experience violence at school or must leave school early if there are no WASH facilities. Support for WASH in schools is integral to overcoming these challenges. The project has contributed to an increase in provision of girls' latrine facilities. 28% of schools in India had separate girls latrines in 2003-2004. This increased to 37% of schools in 2005-2006. While in the district of Andhra Pradesh, provision of sanitary napkins and disposal facilities has been shown to increase school attendance while support for self-help groups making sanitary napkins has proved successful in enabling women and girls to manage their own menstruation in an affordable sustainable manner.

Nigeria: Girls education

In 2004 7 million children of primary school age were not attending school. Of these 4.3 million were girls. To tackle this situation the Nigerian Government committed to improving girls education. In response, DFID contributed £25 million to a joint Government of Nigeria, DFID and UNICEF partnership Girls Education Project. In 2007 this involved a commitment of 1 billion naira for borehole and latrine construction. Separate toilets for boys and girls along with hygiene education also formed part of the project. As a result of the project, girls' primary school enrolment in Katsina, Sokoto and Niger states has risen 82% from 24,001 in 2004-2005 to 46,567 in 2007-2008^{xxii}. The inclusion of WASH in the project has been critical to achieving this.

Conclusions

A reliable clean water supply and access to facilities to practice sound sanitation and hygiene are essential to long-term poverty reduction underpinning good health, food security, economic growth, education and environmental sustainability. Education is vital in breaking the cycle of poverty. However, without adequate WASH that pays attention to equity of access and environmental, financial and operational sustainability access to education and the benefits of WASH are severely compromised. It is clear that critical attention needs to be given to water, sanitation and hygiene in international policy and local action. Schools are an ideal place in which to promote good WASH practice and to introduce measures that will enable the broader benefits of WASH and education to be realised for the whole community.

19. Micro solutions have macro effects

EMF. Allerd Stikker, Ecological Management Foundation, the Netherlands

In 2000, the Millennium Development Goals for drinking water were established during a ministerial UN conference in New York. In 2002, those for sanitation water were added during the UN conference on Development and Sustainability in Johannesburg, ten years after the first conference on this theme was held in Rio de Janeiro. The Millennium Development Goal for water is to halve by 2015 the number of people in the world without sustainable access to safe drinking water and sanitation in 2000. Taking into account the ongoing growth of the world population – around seventy-five million per year – and predominantly in developing countries, this means that in those fifteen years, of which nine have now already passed, an additional one and a half billion people should have access to safe drinking water and an additional two billion access to sanitation water by 2015, as compared to 2000. These are monumental targets, affecting the so-called “bottom of the pyramid”.

When one discusses the scarcity of clean water in the World with a Westerner, his or her response is often one of disbelief. To many people in our society the problem of water scarcity seems complex and distant. Most of us don't even know what they pay for the

water they use. Do you realize you pay four hundred times as much for a bottle still water as for clean tap water? Bottled still water costs US\$ 4 per litre, tap water less than a U.S. penny per litre.

In September 2005, at the UN meetings in New York on Millennium Development Goal progress reviews, an evaluation of the results on water so far at the time did not look encouraging. Global statistics on drinking water in the developing countries appear to show progress, mainly resulting from actions in earlier years, while sanitation results are lagging behind. An important observation is that when India and China are taken out of the statistics on drinking water, the other regions are way behind target, and in Africa the situation has actually deteriorated.

What is the reason for this?

Firstly, major clean water scarcities are menacing exactly those rural and periurban areas where a large portion of water/deprived people are living. They are part of the bottom of the economic pyramid. They are not reached by the conventional, centralized, macro infrastructure instruments that make up the bulk of new provisions.

The Asian Development Bank made this very clear in a statement in December 2005: “the range of technology and management choices must be broadened to include developing innovative, low-cost technical choices that can be implemented by poor communities”.

Secondly, financing the necessary investments falls dramatically behind expectations. A commission chaired by former International Monetary Fund (IMF) managing director Michel Camdessus estimates in the report “Financing Water for All in 2003” that for the next decade US\$ 75 billion over and above the present annual investment levels will be needed to reach a better water situation in the world, including water for agriculture and industry. But water is not a favoured sector in the international community, because of doubtful local governance and political pricing policies, to name a few reasons. Actually Camdessus summed up fourteen critical barriers that have to be surmounted to achieve the necessary finance target. Good governance was high on this list.

Thirdly, as the still expanding population in developing countries need to be fed from irrigation intensive agriculture, more and more water is extracted from rivers and from the ground, leading to dirty and brackish water and lower water tables.

This was, by the way, the main reason for the downfall of the Sumerian civilisation in 1500 BC in Mesopotamia.

In developing countries between 80 and 95% of water withdrawal is for agriculture, usually irrigated in a very inefficient way. For China it is 87% and for India 93%.

Water for drinking and for industries in and around urban areas are and will increasingly being treated, recycled and reused, but rural irrigation will remain the major factor in water withdrawal.

Therefore, “more crop from a drop” is on top of the irrigation agenda of the international community.

After Emf had decided in 2004 to start looking into micro water solutions in developing countries, it was surprisingly, contacted almost simultaneously and independently by a number of Dutch inventors. It appeared that new innovative and affordable small-scale water technologies, wind- or solar-powered, simply designed, and able to turn brackish

groundwater and seawater or dirty river and lake water into safe drinking and sanitation water were being recently developed in the Netherlands.

The technologies were in different stages of maturity but not far from the point of market entry and all were in need of extra finance for the next steps, including demonstration pilots. The techniques were all fitting very well within the concept of the micro water solutions for developing countries.

In the Workshop in Salisbury practical examples of social and technical innovations will demonstrate how families, communities and schools can today derive clean sustainable water supply from river water, groundwater, rainwater and in the future from seawater.

The micro approach also opens up opportunities for private investors, Micro Finance Institutes (MFI) and individuals and other social and faith institutes to participate in smart, small-scale water projects in developing countries.

As many micro solutions have a macro effect, they can make a substantial difference.

23. Water supply, sanitation and hygiene facilities and related education in faith-based schools

IRC. Annemarieke Mooijman and Christine Sijbesma, International Water and Sanitation Centre, The Netherlands

Introduction

The holy city of Varanasi in India is known for its *ghats*, the sites where the River Ganges purifies the bodies of the live bathers and the ashes of the cremated dead. Close to them is the huge square mouth of the city sewerage system, which disgorges its load of blackwater into the river, irrespective of its religious functions. This combination of spiritual purity and environmental reality is not unique to India. In many countries the water sources used for religious functions are at the same time contaminated by people's wastes. Environmental challenges taken up by the faiths are widespread: water is a source of inspiration, a challenge and a threat in indigenous beliefs, Baha'i, Buddhism, Christianity, Hinduism, Islam, Judaism and Taoism²⁶.

Spiritual linkages between faiths and waste are less evident. Where found, connotations are largely negative. Waste is associated with impurity; because it causes bad smells and pollution and attracts vermin, many religions prescribe the avoidance of physical contact with wastes for cleanliness and spiritual reasons. Brahmins, e.g., must defecate beyond the distance of an arrow shot from their home, and never in a temple enclosure, at the borders of a river, pond or spring, or in a public place. During the act, Muslims cannot face towards

²⁶ Lida Scheldwald & Linda Reijerkerk, *Water: a way of life. Sustainable water management in a cultural context*. London: Taylor & Francis, 2009

Mecca and Hindus must not face celestial bodies, a temple, priest or holy tree²⁷. Most faiths also have waste cleaning rituals before religious functions or do not allow such functions in an unclean state. At the same time, many cultures have valued and used dry human and animal waste as fuel and wet waste as manure.

Understanding of how uses of water and waste can transmit disease is much more recent. Only in 1854 Dr. John Snow found out that one pump was the common link in the deaths of 500 people in ten days, because of pollution by the excreta of patients who used nearby soakpit latrines²⁸. Table 1 explains how different diseases are spread from one patient to another through water and waste.

Table 1: Transmission of infectious disease via water and waste

Type of disease	Transmission mechanism	Diseases transmitted
Water-borne	Drinking contaminated water	Cholera, Diarrhoeas, Dysentery, (Para)Typhoid,
Water-washed (water-scarce)	Lack of washing with water and soap/soap substitute	Cholera, Diarrhoeas, Dysentery, (Para)Typhoid, Eye infections (Conjunctivitis, Trachoma), Skin infections (Ringworm, Scabies, Yaws), Louse-borne infections, Plague (via fleas), Acute Respiratory Infections
Water-based	Transmitted via hosts (shellfish, snails) that live in water	Guinea worm (or Dracunculiasis), Schistosomiasis (or Bilharzia)
Water-related vectors	Transmitted by flies or mosquitoes that breed in water	Dengue, Malaria, Filariasis (or Elephantiasis), Yellow fever, River Blindness (or Onchocerciasis), Sleeping Sickness
Waste (Human faeces and faeces of pigs, chicken)	Via the 6Fs: Fluids (water), Flies, Fingers, Food and Fields (fertilized with raw manure)	Cholera, Diarrhoeas, Dysentery, (Para)Typhoid, Roundworm, Whipworm, Pinworm, Beef and pork tapeworm, Hookworm
Solid Waste (Refuse)	Transmitted in human excreta (often included in the waste) and via flies, mosquitoes, rats, dogs	Cholera, Diarrhoeas, Dysentery, (Para) Typhoid, Worm Infections, Dengue, Yellow Fever, Plague, Rabies, Scabies, Upper Respiratory Tract Infections

Of all cases of environmental disease, half are diarrhoeas and acute respiratory infections (ARI). They are also the most common causes of death of children under the age of five and can be prevented at low costs.

Building and maintaining water supply and sanitation facilities in schools

Linking faith with construction of water facilities and toilets in schools does not sound like an obvious link, yet it is important. Water plays a central role in many religions and beliefs around the world: source of life, it represents (re)birth. Water cleans the body, and by extension purifies it, and these two main qualities confer a highly symbolic (even sacred) status to water. Water is therefore a key element in ceremonies and religious rites²⁹. This is reflected in the way people use water, in the way they design water systems and the need for accessibility of water for cleansing after toilet use or washing hands.

Water provision for drinking water, hand washing, flushing and cleaning, school meal preparation, etc. and the provision of clean toilets and urinals in schools are needed to keep children healthy. Anybody who has children in school knows that schools are places where children get infected. Spreading of diseases can happen very quickly in schools. They are places where many children gather together for many hours a day in often cramped spaces with limited ventilation, bad hygienic conditions, no hand wash facilities with soap, toilets in

²⁷ Reginald Reynolds, Cleanliness and Godliness. Garden City: Doubleday, 1946.

²⁸ Maggie Black & Ben Fawcett. The Last Taboo: Opening the Door on the Global Sanitation Crisis. London: Earthscan, 2008.

²⁹ Quoted from: <http://www.worldwaterday.org/page/442>

bad repair etc.. A study in Colombia showed that there is a direct link between diarrhoea and hygiene³⁰ in schools: more than 40% of the cases in schoolchildren could be attributed to transmission in school rather than at home.

In addition to being important for the children's health, toilets and particularly hygienic toilets are important learning tools for children. Teachers can use them to teach children about hygienic behaviour and sanitation as well as about the importance of using toilets and avoidance of discrimination in their cleaning. If the example that children experience at school (often the only example of a toilet they see) is not a good experience (= dirty, smelly toilets), it will be difficult to motivate them to promote toilets in their own homes and community or to construct toilets when they are grown-ups themselves.

Still too often technical design choices for schools (and other places) are based on the available financial resources, physical condition and socio/economic circumstances, etc. Although this is understandable from a programmatic point of view, there are several design factors that go beyond those technical considerations and which are extremely important to for the *acceptance and sustainability* of the facilities³¹. Those factors are discussed in the text below³².

1. Facilities should encourage hygienic behaviour

If hygienic behaviour is too difficult to apply, it will be difficult to motivate children to follow all the steps needed - they will tend to skip some and thus take potential health risks. Therefore, facilities must be close to the schools, have sufficient capacity, be simple to use, provide for hand washing and anal cleansing, and water and soap should be available at all times.

2. Facilities are designed with involvement of the users

Active involvement of the users is essential in all phases of the design process. In most countries standardised designs are used for facilities in schools to reduce costs and control quality. For example the Government of India recently published a book with standard designs for public schools³³, but no standards for religious schools have been developed. Using standards can be a good solution, but applying a standard design too rigidly can lead to ignoring specific local pre-conditions and needs.

In general, when properly coached and guided, teachers and children are perfectly able to assess their existing practices and find solutions for their own needs. Their involvement during the design stage of hygiene, sanitation and water facilities will lead to better solutions and increased acceptance of these solutions.

3. Appropriate dimensions and adjustments for children

³⁰ Koopman, J. S. (1978) *Diarrhea and school toilet hygiene In Cali, Colombia. Am J Epidemiol*107:412-420.

³¹ Facilities refer to infrastructure for water provision, handwashing as well as toilets and urinals

Zomerplaag, J. and A. Mooijman (2005) *Child-Friendly Hygiene and Sanitation Facilities at Schools*, IRC International Water and Sanitation Centre in cooperation with UNICEF, available at <http://www.irc.nl/page/9587>

³² Facility refers to facilities for water provision, handwashing as well as toilets and urinals

³³ DDWS, DEEL and UNICEF (2008), *"An inclusive approach for School Sanitation & Hygiene Education. Strategy, Norms & Designs"*, UNICEF, New Delhi, India

Adapting designs for children is about making facilities accessible and comfortable for children. Children are smaller and are not as strong as adults. For the youngest children, facilities and adaptations should be made to allow for adults to supervise and/or help when children use the toilets, hand wash facilities or water points. Although it sounds obvious, this also has to be reflected in the designs.

In larger schools, it is recommended to build separate facilities for the younger children, the older children, separated for girls and boys (particularly important for adolescent children in all schools) and female and male teachers. In small schools, when the same facilities are used by different age groups, special provisions can be made to allow smaller children to make use of the facilities, such as a step in front of the seat or an additional seat cover with a smaller hole.

4. Enough capacity and minimal waiting time

For water use in schools, SPHERE³⁴ applies a ratio of 3 litres/student/day for drinking and hand washing. When there are not enough toilets, taps and waste bins for the number of school children, then children inevitably search for other places to urinate and defecate, 'forget' to wash their hands, throw garbage on the ground or drink water from unsafe sources. Ensuring the right capacity in facilities is usually not a matter of applying a simple ratio. Literature and country standards use a ratio of 1 toilet for 20-40 children. There are some other factors that determine the required capacity besides the total number of school children, such as the times when children are allowed to go to the toilet/drink water/ wash hands, number of classes and the future growth of the school population. Arguments that applying this ratio is too costly can be partly compensated by the construction of less costly urinals instead of latrines for both girls and boys. A study from UNICEF Bangladesh revealed that only about 6-10% of the children who visit a school toilet go there for defecation. Therefore, for 90% of the toilet visits, a urinal serves the needs.

5. Needs and roles of girls

Increasingly, evidence is available that the absence of toilets or of separate toilets in schools for girls is an important reason for parents not to send girls to school³⁵. If adolescent girls³⁶ attend schools during their menstruation, the availability of girls-appropriate toilets and water supply is essential to comfortably change and (often) dispose of sanitary pads and wash themselves in privacy. If not available, adolescent girls may be unable to remain comfortably in class. Although so far scientific evidence is limited, the lack of sanitary protection during menstruation is often mentioned by the girls as a barrier to their regular attendance in school. In reality this might also be motivated by religious and cultural beliefs and habits.

³⁴ <http://www.sphereproject.org/> The Sphere Project was launched in 1997 by a group of humanitarian NGOs and the Red Cross and Red Crescent movement. Sphere is based on two core beliefs: first, that all possible steps should be taken to alleviate human suffering arising out of calamity and conflict, and second, that those affected by disaster have a right to life with dignity and therefore a right to assistance.

³⁵ Another School Barrier for African Girls: No Toilet By Sharon LaFraniere The New York Times, Friday 23 December 2005 http://www.truthout.org/issues_05/122305WA.shtml; Lack of Sanitaries Force Girls Out of School . New Vision (Kampala), January 6, 2004, <http://allafrica.com/stories/200401060305.html>; Not only girls' toilets, but clean and safe girls' toilets in Notes and News No. 3, 2001, www.irc.nl; Afghanistan: Girls' school attendance doubles in two years, by Mary Kate MacIsaac - Communications Manager, Afghanistan, World Vision, May 17, 2006; Benson, Carol, Girls, Educational Equity and Mother Tongue-based Teaching, United Nations Educational, Scientific and Cultural Organization, Bangkok, 2005.

³⁶ This text has been adapted from: Kirk, J. and Sommer, M (2006), "Menstruation and body awareness: linking girls' health with girls' education" Gender and Health Special. Royal Tropical Institute (KIT), Amsterdam, Netherlands

This situation means that for many girls and young women it is preferable to stay at home during menstruation and not attend school at all. At home they do not have to worry as much about sanitary protection, nor about having adequately concealing clothing. Regular absence from school for several days a month (10-20% of all school days) can, even in the short term, have a negative impact on a girl's learning and therefore on her academic performance in school. Frequent absence will lead to insufficient learning for most girls and therefore poor results in the long term. Eventually this can even lead to dropping out completely.

The location of facilities is important. Girls and women will not use toilets or collect water from locations that are situated in an "unsafe" location because of the risk of harassment by older students, teachers or others or because of religious or cultural beliefs and restrictions that people should not be seen when visiting a toilet.

6. Special needs of children with disabilities

About one in five of the world's poorest people is disabled. Exclusion from basic facilities can result in isolation, poor health, and even poverty. The lack of proper school toilets can deter disabled children from even entering school. Only rarely, adaptations for disabled people are incorporated into the design of school facilities, although, in general, it demands little or no additional expense. Adaptations should be made for the following three main categories of disabled children, who have the potential to enter regular primary schools:

- Blind children and children with poor vision: special grips and guiding systems as well as proper lighting for the poor-sighted.
- Children in wheelchairs or with crutches: provision of ramps, wider doors, and special grips or foldable seats.
- Children with missing or paralyzed arm(s): lids, taps, and knobs that can be opened with one hand or operated with the feet and are not too heavy.

Faith representatives can play an important role in getting this group of children to school.

7. Stimulate children's learning and development, and ensure that educational tools are designed in an age-appropriate way

Younger children do not possess the same ability to learn complex concepts as older children, and they learn differently. This is also important for the design of facilities in schools. Learning and development can best be stimulated interactively by learning, showing *and* doing. Particularly, facilities can provide the opportunity for this interaction and are a potential extension of the learning environment and make it a powerful tool to develop appropriate hygiene habits.



Children are stimulated by their surroundings in various ways. Besides visual perception, this also occurs through sharing spaces with others, being responsible for keeping them clean, etc. The different means of stimulation can be categorized into the following types of development.

- **Environmental development:** Children receive information from the environment by seeing, smelling, hearing and touching and they use this information in their intellectual development. Spaces they encounter, including water, sanitation and hand wash facilities, can provide a range of positive and negative experiences related to colours, smells, shapes and sounds.
- **Social development:** The layout of spaces and the way they are used can encourage contact with others or offer seclusion. This is relevant for toilets, because they require both privacy and sharing with others.
- **Creative development:** Children's creativity can be stimulated by giving them the opportunity to make the spaces their own and letting them adapt them to better suit their needs. Children can decorate walls or solve functional problems themselves, which will encourage creative thinking.
- **Physiological development:** The use of facilities can help to develop necessary motor skills in young children, such as fine-tuning of the physical movements. Using the facilities requires large motor skills (climbing stairs, etc.) as well as fine ones (opening taps, etc.).

8. Appropriate locations for toilets and water supply

Even a well-designed facility has the risk of not being used, if it is located in a poorly considered place. Finding the right location for facilities requires looking at and consultations about different practical, environmental and cultural aspects. The children have to feel secure, need some privacy and it should be possible to supervise the younger children. Furthermore, facilities must be located away from potential flood areas and contamination of drinking water sources avoided.

9. Low-cost solutions without compromising quality

Best are those facilities that are affordable, durable, encourage proper use, and are easy to maintain and keep clean. For example: proper drains for excess water at wells, surfaces that come into contact with faeces or urine must be impermeable and easy to clean etc. Investing in good quality, sustainable facilities means investing in overall public health. Moreover, despite higher initial investment costs, money will be saved in the long run, because the facilities have a longer lifespan and require less maintenance. On the other hand, this does not mean that the most expensive options are best. It is always a matter of finding the right balance between costs and quality.

10. Prevent harm to the environment

Children are best sensitised to environmental issues in the school setting where they are learning about various issues related to daily living. It is important to reduce or prevent negative impacts on the environment, which pose hazards to public health at the same time.

Some facilities may contaminate soil and groundwater, while others may produce wastewater flows that must be managed. Environmental sustainability should be an integral part of the design, implementation, operation and maintenance of facilities, as well as the accompanying hygiene education program. The challenge is to promote awareness on environmental issues, while providing incentives and tools to address them.

11. Operation and maintenance plans

A well-designed facility will lose its purpose if it is not properly looked after. A good operation and maintenance plan and implementation will not only indicate who is responsible for cleaning, and maintenance but also the costs involved. It will also ensure that:

- It involves children, teachers, parents and the local committee in the continuous process of monitoring and improving hygiene practices at school;
- It is developed and agreed upon before the facilities are completed;
- It is non-discriminatory and protects the best interest of children at all times: child participation should never be child labour! And girls and boys should participate equally in cleaning and maintenance.

12. Have financial means to keep the facility clean and in good shape

For the development of long-term, sustainable and large-scale programmes, financial planning and management is crucial. Over recent years, most schools programmes in South Asia have been moving away from small-scale, fully subsidised programmes and have entered into a phase where programmes have to be transformed into financially sustainable ones. So far, many programmes have had difficulties in making the transition, due to capacity problems and the lack of financial planning and management. This can be overcome by addressing financial sustainability from the planning and start-up phase on. Clear financial policies can help to underpin a more efficient, equitable and sustainable use of resources through the promotion of *cost recovery* (e.g. a contribution to be paid by parents) and financing by religious institutions (if it is a religious school) or government partners (for public schools).

Integrating water, sanitation, hygiene and the environment in school education

Good education in school about water, sanitation and hygiene is as important as good sanitary facilities: both components go hand-in-hand. In 2002, UNICEF, the United Nations Children's Programme was cooperating with over 50 countries to achieve integrated WASHE (water, sanitation, health, hygiene and environment) programmes in schools, an increase of 43% in six years³⁷. Nine years of cooperation between UNICEF and IRC have resulted in a number of lessons on effective education programmes on water supply, sanitation and hygiene, especially in primary schools. These have been summarised below.

1. Adjust education to the child-development cycle

Children have different needs and potentials for learning at different ages. *Young children aged 2-4* enjoy learning new skills, playing with and handling objects. They like activities

³⁷ Every child clean through school hygiene. Background paper of an E-conference on school sanitation and hygiene education, UNICEF and IRC, 2002.

such as telling stories and singing, which develop their language skills, and miming and acting as adults, who are their ultimate role models. At this age they can learn how to use the toilet and wash their hands and take some responsibilities for hygiene. The teacher can also start playful activities to 'clean' the facilities or refill the water reservoir of a hand washing facility. These are, however, learning activities rather than participation activities. Squatting sideways over a squatting toilet enables young children to hold on to a handrail, which makes toilet use less challenging for them.

Children aged 5-8 are imaginative. They discover the world and their own capabilities in a playful way. In the meantime, they gain self-confidence and make the first steps towards independence. They experience the positive effects of personal care for their appearance and value this in a simple way: looking and smelling good means to feel good. In this age group, children can start to be actively involved in making and implementing simple plans for good hygiene, but they cannot yet take full responsibility. Physical games and activities are important to use pent-up energy. Sweeping the classroom, filling soap or water containers, putting different types of solid wastes in separate boxes and bins, etc. must still be closely guided by adults, including for safety reasons.

The age group of 9-12 years old can work well together with others and discuss experiences and practices with friends. They become aware of the consequences of poor hygiene practices and begin to see relationships between theory and practice, although abstract concepts are still difficult. They like watching and taking part in practical demonstrations and are very helpful. They also like to be given particular responsibilities. At this age, children also learn that different means or practices can lead to the same overall result and are open to comparing solutions.

Girls and boys can now be involved as groups in activities to plan, maintain and manage good hygiene and sanitation, do home assignments, such as simple structured observations for arithmetic and hygiene lessons, and do outreach activities with younger siblings at home. Knowledge on physical development and building of self-confidence and respect helps early maturing girls and boys. They are also helped by there being a trusted same-sex teacher to whom they can go for questions and with problems. Girls who start to menstruate need access to sanitary napkins. In some programmes, they learn how to make these themselves.

Twelve to fifteen year olds begin to develop social and analytical skills for exploring their position in the community. They can question gender and socio-economic differences and are aware of their own development and growth and develop a desire for gender-related privacy. They start to understand abstract concepts around hygiene, environment and social relations. Respectful learning about personal female and male hygiene becomes important, to begin with in same-sex groups and using indirect methods such as stories and drawings to facilitate discussion. Pre-adolescents like to have tasks and be trusted to carry them out. They begin to take their own responsibilities and develop a sense of social justice. At this age, girls and boys can be actively involved in the planning, construction, operation and maintenance of facilities. They can form their own school health clubs, enjoy outreach work in the community and can learn to use waste productively through practising segregation and recycling in school and at home.³⁸

2. Use participatory learning methods

³⁸ More details in Postma, Leonie; Getkate, Renate and van Wijk-Sijbesma Christine (2004). Life Skills-Based Hygiene Education: A guidance document on concepts, development and experiences with life skills-based hygiene education in school sanitation and hygiene education programmes. Delft, The Netherlands, IRC International Water and Sanitation Centre. (Technical Paper Series; no. 42). http://www.irc.nl/content/download/11504/168690/file/life_skills.pdf

Most teachers in primary and secondary school have been trained in traditional teaching approaches, in which there is very little room for active participation by the students other than answering questions. While class instruction has its place, children greatly enjoy and benefit from more participatory learning methods. These methods involve children actively in the learning process and allow them to learn from what they do themselves and from the other children. There are many participatory methods - some are listed in Table 2.

Table 2 Examples of participatory methods in schools³⁹

Participatory methods for ages 4-7	Participatory methods for ages 8-12
<ul style="list-style-type: none"> • Listening to and telling stories • Reciting poems and songs and singing songs • Drama/short skits • Seeing and doing various types of puppet plays • Simple sorting games • Language and number games and assignments • Reading and reacting to stories • Walks, doing simple observations • Skills demonstrations, with peer observation and analysis • Movement games, competitions • Conversations and discussions • Drawing, painting, colouring, claying • Doing simple tasks 	<ul style="list-style-type: none"> • Reading and analysing stories • Reciting poems, making and singing songs • Doing quizzes • Conversations and discussions • Drama, role plays, pantomime and dancing • Drawing and painting • Making various types of models • Writing compositions and creative writing • Brainstorming • Excursions • Skills demonstrations • Peer observations and analysis • Language and mathematics games • All kinds of competitions

3. No need to use costly equipment and material

Contrary to what is often thought, participatory education in water, sanitation, hygiene and the environment does not require special investments, such as a toolkit with specially designed and printed material. For many activities, teachers can use what is already available: blackboard, chalk, paper, pencils, water, sand, pebbles, etc.



Fig. 1 Well model with types of water use and types of pollution

³⁹ As above. The book also contains a description of many participatory learning methods.

Fig. 1, for example, shows a small model of a dug well made by students in Vietnam. On slips of paper, the children first wrote each purpose for which the well water was used (ways in which water goes out) and then on a second set of slips in which ways people contaminated this water (types of pollution going in). The teachers used this activity in environmental education with older children and also with the parents on parents' day.

In another game, children from a tribal region in North Vietnam sorted pencil drawings of different utensils for storing and drawing drinking water from the least to the most risky. Under each drawing they placed slips with the names of the utensils in their tribal language and other slips with the names in Vietnamese. The teachers later reused the papers for a competition by timing the speed with which the children could lay out the mixed-up drawings and slips in the correct position.

Learning can be combined with physical activity. In a lesson in a dry part of Sri Lanka, the teacher let two lines of 8-10 year old children race against each other to two buckets of water, where two children would stand ready to pour water over their hands, give them a small piece of soap to wash their hands and then pour more water to rinse off the soap (Fig. 2). The race stopped as soon as the groups had used up their water. Besides the expected winners on speed, the teacher announced as the real winners the group that had taken more time for hand washing and the group with the most hand washers: they won the prizes for the best hygiene and the most economic use of the water.



Fig. 2 Race on water use for hand washing, Karukapone primary school, Sri Lanka

4. Integrate WASHE education in the curriculum

Irrespective of the value of education on health and environment, good exam results are the prime objective of the teachers, children and parents. Including WASHE topics into the school curriculum and exam therefore makes all the difference. Integration is possible under different subjects, e.g. under science, social studies and/or civic education (Zambia).

5. Practice multi-purpose learning

Another way to make it easier for teachers and students to address water, sanitation, health and the environment (WASHE) as part of school education is to combine this learning with practising basic education skills such as reading, writing, arithmetic and geography. The above examples from Vietnam linked WASHE with writing, reading and language skills. Through simple home surveys, e.g. on what sources are used for drinking water, how the

water is stored and drawn, and if the family has a toilet, a bathing place and soap, students have gathered WASHE statistics and used them in class to practise counting, adding, subtracting and percentage calculating skills as well as discussing health risks and ways to measurably improve home conditions. Children have also learned to draw community maps, in which they noted water sources, open defecation areas and houses with sanitary and no, or unsanitary toilets.

6. Link with broader values and skills

Besides scholastic knowledge, attitudes and skills, children learn many other skills from their activities and interactions in school, which when developed well will serve them during their whole lives. The life skills approach (Table 3) uses learning methods that consciously promote these more generic skills for their current and future lives. A related approach is Value-Based Education, developed by the African Institute of Sathya Sai Education in Ndola, Zambia. As shown by its name, the approach bases water education on five basic human values and related sub values: *Truth* (with e.g. discrimination between true and false, good and bad, respect for all religions and secularism), *Love* (with sincerity, tolerance, friendship, kindness to animals), *Peace* (with freedom from jealousy, greed, pride, self-discipline, self-control and self-respect, power of concentration, silence), *Right Conduct* (with e.g. cleanliness, service to others, leadership, conservation of nature and the environment) and *Non-Violence*, with among other things, democratic decision making, sense of social justice, kindness, courtesy and concern for others⁴⁰.

Table 3 Five categories of generic skills developed through life skills education

Inter-personal Skills	Skills for Building Self-Awareness	Values Analysis & Clarification Skills	Decision-Making Skills	Coping & Stress Management Skills
<ul style="list-style-type: none"> - Empathy building - Active listening - Giving & receiving feedback - Non/Verbal communication - Assertion & refusal skills - Negotiation & conflict management - Cooperation & teamwork - Relationship & community building skills 	<ul style="list-style-type: none"> - Self-assessment skills - Identifying personal strengths & weaknesses - Positive thinking skills - Skills for building self image and body image 	<ul style="list-style-type: none"> - Skills to understand different social norms, beliefs, myths, ethics, culture, gender, diversity, poverty - Skills for identifying what is important, influences on values & attitudes, and aligning values, attitudes, behaviour - Skills for recognizing & acting on discrimination and stereotypes - Identifying & acting on rights, responsibilities & social justice 	<ul style="list-style-type: none"> - Critical & creative thinking skills - Problem solving skills - Analytical skills - Skills for generating alternatives - Information gathering skills - Skills for evaluating information e.g. the media - Skills for assessing risks & consequences - Goal setting skills 	<ul style="list-style-type: none"> - Self control skills - Coping with (peer) pressure - Time management skills - Dealing with emotions: grief, anxiety - Dealing with difficult situations (conflict...also loss, abuse trauma,) - Help seeking skills

Source: UNICEF Workshop on Life Skills Education, New York, 2000.

7. Practice learning in school

It is still quite common that children learn about water, sanitation and hygiene in school, yet cannot apply their learning in school, because they lack the fundamental facilities, or they are not functioning, are so dirty that they cannot be used, or have turned into health

⁴⁰ Victor Kanu, Water Education: A Human Values Approach, in UN Habitat, Water Education in African Cities, Report of an Expert Group Meeting. Johannesburg, Soth Africa, 30 April-2 May, 2001, pp. 20-33.

hazards. A good WASHE programme obviously combines good facilities, education and practices.

8. Recognise and prevent/stop misuse

Quite recently, more information has also become available on the negative effects that poor design and supervision of school water and sanitation facilities and a lack of communication and trust between teachers and students can have for vulnerable groups. Children can be quite cruel, and distant toilets are typical places where a group of boy-bullies or a girl 'queen' and her followers tease children that are younger, weaker or picked on for other reasons. Toilets are also typical locations for wrong student conduct - smoking, drinking, sexual behaviour – and group initiation. Colleagues in one workshop on WASHE also told about cases of misuse of power by teachers, such as sexual abuse of girls who have to bring water to the house of male teachers living at schools without water supply.

9. Monitor and evaluate conditions, practices and progress

WASHE facilities and education approaches can be simply evaluated and monitored for progress. Presence, functionality, hygiene and (non/partial) use of supply of (drinking) water, toilets and hand washing facilities with soap are easy to observe. For the evaluation of the education approach, the joint school WASHE programme of the Government of India and UNICEF used a participatory scoring system of five scales of 20 marks each, with at the lowest (0) level no hygiene education at all, while at the highest level (100) hygiene education was integrated in the curriculum, used participatory learning methods and materials, and teachers involved children in monitoring and upkeep of school sanitation facilities⁴¹

10. Reach out to homes and communities

Last, but not least, WASHE programmes offer good opportunities for two-way cooperation between the schools, parents, the religious community, local businesses and local institutions, such as councils and water/health committees with homes and community.

Parents and communities frequently support local schools in improving their WASHE facilities and school children bring information home and encourage improvements at home. The child-to-child programme promotes improvements especially through communication between children, e.g. reaching out to younger brothers and sisters. In programmes in Nepal and Pakistan, schoolteachers successfully promoted that parents built low-cost toilets and used them with all family members.⁴²

⁴¹ Jeremy Colin et al., UNICEF-Government of India Child's Environment Programme 1999-2003. Annexes to Part One: Evaluation Report, Loughborough University and IRC, June 2004.

⁴² See Chapters 9 and 14 in J Wicken, J, Verhagen, J, Sijbesma, C, Da Silva, C and Ryan P (eds) 2008. Beyond construction: Use by all, A collection of case studies from sanitation and hygiene promotion practitioners in South Asia. London, UK, WaterAid; Delft, the Netherlands, IRC and Geneva, Switzerland, WSSCC. <http://www.irc.nl/page/40450>



Conclusion

Good sanitation and hygiene habits and the protection of the environment are values common to all Faiths. So are many of the values developed in the life skills and value-based education approaches. With globally about 64% of schools being faith-related, there are unique opportunities and benefits from linking spiritual learning with learning on water, sanitation, hygiene and the environment, and the improvement of water and sanitation facilities in schools. Materials on designs, strategies, approaches and results are widely available⁴³; what remains is their adjustment and use in faith-based education and the development of school water, sanitation and hygiene education programmes as part of the education systems of individual faiths.

21. Micro Water Facility

MWF. Frederick Claasen, the Netherlands

⁴³ The most complete resource site is the IRC-UNICEF website <http://www.schools.watsan.net/> Here you find key publications and links to other websites. More can be found on the IRC web site <http://www.irc.nl/sshe>. The World Bank, WSP, UNICEF toolkit on hygiene, sanitation and water in schools for in-depth information on setting up activities in schools www.schoolsanitation.org. Some key publications are (1) Towards Effective Programming for WASH in Schools: A manual on scaling up programmes for water, sanitation and hygiene in schools <http://www.irc.nl/page/37479>. on school hygiene education <http://www.irc.nl/page/26444> and on child-friendly WASH facilities <http://www.irc.nl/page/9587>

Micro Water Facility supports innovative, small-scale technologies for improving access to clean drinking water and proper sanitation in developing countries. Micro Water Facility is a unique broker between parties that want to contribute towards realising the Millennium Development Goals.

Private initiatives can play a key role in increasing access to safe drinking water and proper sanitation. It is becoming increasingly clear that Southern countries offer a potentially interesting market as well, also referred to as the 'bottom of the pyramid' (BOP). However, placing products on these markets has proved to be difficult, usually because this requires a fundamentally different approach to product development, sales and distribution, pricing, service and maintenance. To be successful, products must be fully purpose-built/adapted to local needs and conditions. In other words, they must be 'appropriate technologies'.

It is not easy to meet these requirements and translate them into convincing plans. Potential financiers and project partners tend to be reluctant to make funds available for working up ideas and developing prototypes, carrying out pilot projects and training local partners. Micro Water Facility advises project organisations on the appropriate strategy to be followed and acts as an intermediary in finding the right partners.

Micro Water Facility is honoured to attend the workshop. We strongly believe solid local partnerships with trusted organizations that really understand local market conditions and the needs of local people make a difference between a good and a weak solution to the world wide water and sanitation stress. Religions have close and tight networks within communities at grass root level and are often seen as a trusted partner. These networks can play an important role in reaching the poor physically (distribution), making them aware of the importance of safe drinking water and proper sanitation (creation of effective demand) and educate poor people to take care of their own (capacity building).

The contribution of Micro Water Facility is to share experience about project and revenue models that really work at the bottom of the pyramid. Micro Water Facility would like to stress the importance of a 'social business wise approach'. Questions like "How do we create effective demand?" and 'How do we ensure water and sanitation services are financially sustainable?' are topics of interest for Micro Water Facility.

At the end of the workshops Micro Water Facility hopes to have enlarged its network and perhaps has found several partners that are willing to join a consortium to set up a business or a project. On the other hand, more on a strategic level, Micro Water Facility hopes to convince participants about the starting point that water and sanitation projects should be financially sustainable in the first place.

Topics of interest and expertise:

Innovative school projects:

Together with Clean Water Now (CWN), a Dutch based social venture, MWF developed a innovative model to increase access of safe drinking water to schoolchildren. CWN raised the Clean Water for Children Foundation (CWCF). CWCF wants to provide clean and safe drinking water to schoolchildren in India. CWCF will provide appropriate and high quality solutions and products fitting the local situation and meeting demands of its clients. The Naiade will be the first product in the CWCF water product portfolio. CWCF will combine the sales of products with smart financial constructions (like leasing, grants or micro finance) to

lower the barriers of the initial purchase costs. CWCF believes clients should be willing and able to pay for its products and services whether or not supported by grants or cross-subsidised by cash creating activities. This way CWCF will become financially sustainable, becoming less dependent on grants.

Akvo, innovative financial distribution models:

MWF supported Akvo in setting up a solid organization and attracting funds to finance Akvo's activities. The Akvo Foundation creates and shares internet tools designed to contribute to poverty reduction through supporting water and sanitation sector projects. Akvo does three things; helps others to share their knowledge, matches small (around EUR 5.000,- till EUR 10.000,-) funds to projects, and simplifies reporting and feedback. Organizations that need money for small-scale water and sanitation projects showcase their projects on the Akvo website, where it is visible for the entire world to see. Organizations, companies and individuals who like the project can then provide funds. Akvo collects the funds and sends them to the project organization. In this way, an individual project can attract funding from many different sources.

Micro Finance, investigating new methods to finance WASH projects:

Microcredit is arguably the best-known exponent of microfinance. True to its name, microcredit entails giving small loans to poor and low-income clients, who otherwise lack collateral or credit history to qualify for loans to help generate income.

Institutions that provide microcredit range from community-based loan organizations to NGOs and, more recently, to international banks and other financial institutions. Microcredit is often provided through 'cash flow based lending' in which the client and loan officer analyze the expected income flow and calculate the loan size and terms the client can afford. Microcredit loan interest rates and repayment terms vary, yet are generally set to ensure credit facility sustainability, ideally avoiding subsidized credit.

Micro Finance has not been used widely as a tool to finance WASH projects. This is due to the difficulty to link income generating activities directly to improved access to water and sanitation. MWF stimulates discussion and research in this field aiming to build a solid financial business case to MF organizations that will hopefully convince them to open up funds for WASH projects.

22. Smart Techs: new options to improve WASH in schools

SMART TECHS. Henk Holtslag and Walter Mgina, Tanzania

What is the Issue?

In Tanzania around 70 % of the primary schools in rural areas do not have adequate WASH (Water Sanitation Hygiene) facilities. Old pumps and water tanks are often no longer

working because nobody can carry out maintenance. For instance some 50% of the hand piston pumps are not working. Other developing countries face similar problems.

A key issue is the limited funds available, mixed with the high cost of installing and maintaining water and sanitation equipment. At Smart Techs, we came to the belief that new ideas were needed to improve this situation. And through innovative thinking, the cost of a number of water and sanitation options have been cut by half – and at the same time have made the technology more effective and easier to maintain than conventional options.

Some of the key areas in which Smart Techs have been most effective are manual borehole drilling, water filters, hand pumps (EMAS and Rope pumps) Ecosan latrines and hand washing options such as Tippy Taps.

What Are Smart Techs?

Smart Techs are innovative low cost technologies that can be managed by their users, because they are simple, affordable and available. Smart Techs are generally produced and/or sold by the local private sector meaning that spare parts are available resulting in a “**profit-based sustainability**”.

Can you Give Some Examples of Technologies?

An example of a Smart Tech is the **Rope Pump**, which upgrades ancient pump technology with new materials and designs in an effective way⁴⁴. The first Rope Pump was installed in Nigeria in 1990. Eighteen years on, there are some 80,000 rope pumps worldwide used by some 3 million people of whom 1.4 million are in Africa. One of the huge benefits of Rope Pumps is that they can be produced using local skills and materials. The shift from imported piston pumps to locally produced Rope Pumps led to the rural water supply in Nicaragua increasing three times faster than that of countries using conventional hand piston pumps. Rope pumps are between five and eight times cheaper than piston pumps and are much easier to repair because of their simplicity and the availability of spares at the local blacksmith. Where they have been installed properly, IRC research suggests that 95% of the pumps stay working. (IRC 2001).

Other new lower-cost water and sanitation options for schools are:

- 1. **Upgraded dug wells:** This uses simple technology to improve hand-dug wells by installing a cover and a hand pump. Additionally, if collapsing of the well is a problem, this technology enables it to be reinforced with the “underlining system” which make it possible to deepen the well without collapsing.
- 2. **Rota sludge and Baptist drilling.** This involves improved manual drilling options that can drill in compact clay and semi-hard ground layers to 50 and 80 meters deep, respectively⁴⁵.

⁴⁴ Based on Smart Water Solutions. www.NWP.nl

A hand operated Rope pumps can pump from 35 m deep. (60 m deep with 2 handles)

⁴⁵ Cost of machine drilled boreholes including a piston pump in Africa range from US\$3000 to \$10,000, depending on depth of water layer.

- Emas tanks, Wire cement tanks.** Underground or aboveground cement tanks to collect rooftop or ground runoff water. These tanks use wire instead of construction steel and local material as bricks or bamboo. The cost is 30-40% lower than Ferro cement tanks and volumes can be up to 60 cubic meters.
- Tube recharge:** A simple option to recharge the aquifer with 10 to 100 m³ of rainwater that otherwise would flow away to the rivers. Experiences in Zambia and Zimbabwe indicate that dug wells which previously went dry, now have water all year round. **Cost; US\$2-5**
- Filtron filter** A pot-shaped ceramic filter promoted by Potters for Peace. It eliminates turbidity and bacteria and now is locally produced in 20 countries
- Family life straw, Pureit and Siphon filters.** Small and effective water filters that produce 60-120 litres of safe drinking water per day. **Cost per filter: 10 - 35 US\$.**

Can you give some examples of Smart Techs water projects?

In the Njombe area of south Tanzania some 20 schools with between 200 and 400 students have a water supply from Rope pumps installed on hand drilled wells (boreholes). The shift from machine drilling to hand drilling and from imported piston pumps to locally produced Rope pumps caused the cost of school water points in this area to fall from 3000 US\$ to 600 US\$ each. The first pumps were installed in 2004 and today in 2009 90% of the pumps are still working. The pump maintenance - oiling and replacing the rope and washers - is so simple that it can be done by a teacher and up to four children. For sanitation simple pit latrines were built at a cost of around 60 US\$ per latrine. After using the latrine, children wash their hands with a "Tippy Tap", a hand-washing tool that costs just US\$5.

What other low cost options are there for every school?

There now are low cost solutions for almost every situation.

- If **water** is turbid or contaminated with harmful bacteria, it can be made clean and safe to drink with new filter options. One filter is needed for every 10-40 children depending on filter model, requiring a one-time investment of between 70c and \$1.5 per child
- Where ground water is at 60 m deep or less, dug wells or hand drilled boreholes can be made. Cost; US\$300 to \$1500 per well.
- Where water layers are deeper or in the case of very hard ground layers or water contaminated with chemicals as arsenic or fluoride, rainwater can be caught from the roof (or the ground) and filtered for drinking purposes.

Only if the options mentioned above are not adequate, should machine drilled boreholes be used.

- For **sanitation**; in most cases simple pit latrines can be made. Eventually using urine diversion and Ecosan. The human waste may even become income generating for the school if they are sold as fertilizer to farmers in the surroundings of schools.

- For **hand washing** a simple and popular option is a Tippy Tap at a cost of 10c per child, \$50 per unit

In all cases hygiene education is needed, but if combined with practical tools it is more easily adapted by children. Another advantage of introducing Smart Techs in schools is that children will convince their parents to start using these new options. For example, the Tippy Tap is disseminated in Mozambique via children's requests. (ADPP Itoculo)

Why aren't more schools provided with these options?

Mainly due to:

- Lack of awareness.** Local and national governments are hardly aware of the new options so do not include them yet in planning. It takes publicity and demonstration in real situations to make stakeholders aware of what is available. There are many wrong assumptions about "appropriate technologies." For example people remember the Rope pump from 35 years ago when it was introduced in Africa as a low lift pump only fit for family wells. Sometimes the rope pump does not count as an improved water source since it is an "open" pump and the well can be contaminated. Experiences indicate that both assumptions are not correct.
- Simple is not always easy.** One lesson learned in the past is that to make WASH facilities sustainable the most important condition is Reparability. Whatever technology is installed, the school should be able to manage the maintenance. (Simple, Affordable Available) A problem with low cost options like Rope pumps is that they are "too simple". Many think they can make it themselves. But although they are indeed simple, they are not easy. Basic construction and installation details are essential. For instance a small error in a bushing can cause the handle to break within two months. "The devil is in the detail" but if it is made right it will last for 20 years.
- Lack of capacity in some areas.** For successful dissemination of Smart Techs, capacity building is needed regarding technical, organizational as well as marketing and financial aspects. Training is needed in production, installation, quality control, maintenance management etc. To guarantee spare parts, training is needed in supply chain and financing systems.

Conclusion

With a wide-scale dissemination of Smart Techs, the cost of sustainable water and sanitation for schools, especially in rural areas, can reduce by 50% or more.

Recommendations

- Publication to schools, policy makers etc. on the huge positive economic impact of water and sanitation. This has been estimated as a benefit of between \$5-28 per \$1 invested. (SIWI/ WHO 2007)
- Evaluate existing low cost school WASH practices and compare these Smart Techs with conventional approaches and technologies.
- Disseminate existing information on Smart Techs through the SWS booklet.

- Wherever new water and sanitation facilities are installed, take in account the Reparability.
- Before installing new WASH facilities, investigate low cost options. For instance before starting a machine-drilled borehole, investigate if hand drilling is an option.
- Create Smart Tech centres specialized in school WASH that demonstrate options and have capacity to train local private sector in production, marketing, installation and maintenance via hands on training.
- Create “Millennium schools” in every region. They demonstrate new and sustainable WASH facilities, and can function as an example in that specific area.
- Create “Smart Financing Solutions” to fund investments in school WASH

	
<p>Drilling a 30 m deep borehole in Njombe</p>	<p>Rope pump installed at a school in Njombe</p>
	
<p>Pit latrines and Tippy Tap hand wash tool</p>	<p>Siphon filters in a school in Mozambique</p>

27. Adaptive Water Governance

UNDP

World leaders have pledged to achieve by 2015 the Millennium Development Goals (MDGs), including the over-arching goal of cutting extreme poverty in half. The governance of water has profound impacts on people’s livelihoods and their ability to break out of poverty.

Beyond the MDG water and sanitation targets themselves, achieving the eight MDGs very much depends on strengthening water governance at local, national, regional and global levels.

UNDP promotes equitable access to water resources and water and sanitation services as a fundamental requisite for human development. The global crisis in water and sanitation stems mostly not from physical shortages but from social and political insufficiencies and inequality. It overwhelmingly affects the poor. Governance reform, therefore, must be central to any strategic approach to addressing the crisis.

WATER GOVERNANCE PROGRAMME AT A GLANCE

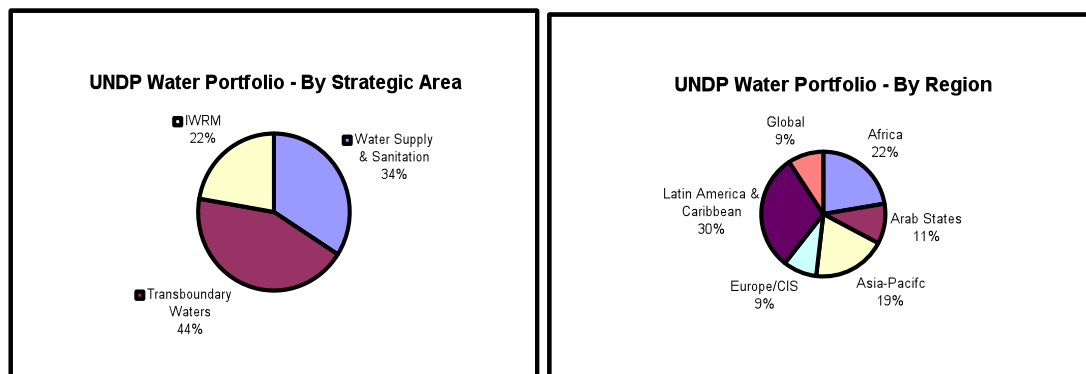
- **UNDP Water Governance Programme** is active in over 150 countries with a current portfolio of over \$500 million plus substantial co-financing.
- **UNDP Water Governance Programme** works in three strategic areas...
 - ✓ Water Supply and Sanitation
 - ✓ Integrated Water Resources Management
 - ✓ Regional and Global Cooperation
- ... and four cross-cutting themes:
 - ✓ Adaptation to Climate Change
 - ✓ Human Rights Based Approach
 - ✓ Gender and Empowering Women
 - ✓ Capacity Building and Knowledge Management
- **UNDP Water Governance Facility** at Stockholm International Water Institute provides policy support and advice on water governance reforms.
- **UNDP GoAL WaSH Programme** supports Governance, Advocacy and Leadership for Water, Sanitation and Hygiene to scale up safe and affordable services.
- **UNDP Community Water Initiative** with the GEF Small Grants Programme supports community action on water resources, water supply & sanitation.
- **UNDP's CapNet** builds capacity of institutions and individuals through 22 national and regional networks including 300 member institutions.
- **UNDP Transboundary River Basin Initiative (TRIB)** facilitates cooperation on shared waters for regional security and economic development.
- **UNDP's GEF International Waters** portfolio supports transboundary water and marine resources management programmes in 15 lakes/river basins/aquifers, and 10 Large Marine Ecosystems.
- **WaterWiki.net** offers innovative knowledge management for water professionals on water and development; supporting partners include UNICEF, WHO, UNECE, WWAP.
- **UNDP participates in** UN-Water, UN-Oceans, Global Water Partnership, WSP, World Water Assessment Programme, IW:LEARN, Global Forum on Oceans, Coasts & Islands, and GESAMP.

Beyond scarcity: Power, poverty and the global water crisis

- UNDP Human Development Report 2006

“I fully support the call for a Global Action Plan to tackle the growing water and sanitation crisis. As the 2006 Human Development Report highlights, each one of the eight Millennium Development Goals is inextricably tied to the next, so if we fail on the water and sanitation goal, hope of reaching the other seven rapidly fades. Either we take concerted action now to bring clean water and sanitation to the world’s poor, or we consign millions of people to lives of avoidable poverty, poor health and diminished opportunities, and perpetuate deep inequalities within and between countries. We have a collective responsibility to succeed.”

— Kemal Derviş, UNDP Administrator



UNDP Water Governance Programme (WGP) works in partnership with governments, UN agencies, international financial institutions, NGOs, bilateral and multilateral donors and the private sector in each of its strategic and cross-cutting areas. WGP uses a human rights based approach and promotes mainstreaming of gender issues and the empowerment of women. Incorporation of climate change impacts on water and marine resources is systematically integrated to put in place effective adaptation responses. WGP’s networks such as CapNet provide access to experience, expertise and tools so that good practices can be readily shared.

Water Supply and Sanitation

UNDP works to bring about the necessary improvements in water governance to scale up water and sanitation services for the poor. Through its MDG GoAL WaSH initiative, WGP focuses on coordinated country assistance by UN and other development partners and inclusion of water and sanitation in national development planning. Special attention is given to fragile states where water and sanitation challenges are greatest. At local level, WGP supports decentralized policy implementation and community action through the Community Water Initiative.

Integrated Water Resources Management

WGP assists countries develop capacities and implement integrated approaches to water resources management and development. Support to sector reforms focuses on policy, regulatory and institutional measures to manage competing demands and improve equity and efficiency in water use and management. WGP is working with over 50 countries, including all Small Island Developing States, supporting development and implementation of IWRM plans in the context of national development strategies.

Regional and Global Cooperation

Cooperation on transboundary waters management focuses on strengthening the joint management of rivers, lakes, aquifers and oceans by setting priorities, building consensus on governance reforms and investments, nurturing and strengthening institutions, and supporting the implementation of action programmes. UNDP has assisted over 100 countries in these efforts ranging from completion of transboundary diagnostic analyses to the preparation and adoption of regional water body legal frameworks.

UN Water

UN Water is the interagency mechanism that promotes coherence and coordination of UN system actions aimed at the implementation of the agenda defined by the Millennium Declaration and the World Summit on Sustainable Development. It comprises the 24 UN agencies active in water and sanitation, among them UNDP. UNDP takes an active part in the work of UN Water and has been a key contributor to its World Water Development Reports.

For more information please visit: www.undp.org/water

25. Religion and Water and the link with Hygiene Promotion: the case of Bangladesh

UNICEF. Hans Spruijt, Bangladesh

Bangladesh distribution of faiths: 89.7% Muslim, 9.2% Hindu and 1.1% others. Still, Christian: 1.6 million people.

Religion as an entry point

Most religions seem to recognize the importance of water and its necessity for life. Buddhism, Christianity, Hinduism, Islam, Judaism, Shintoism and Zoroastrianism most other religions are based on a set of morals on what is right and wrong, linked to deeper religious truths. Water serves as a symbol of purification and has connotations of being sacred. Living water is an ultimate concept of life-giving water, a spiritual concept linked to physical qualities of water seen in nature. Not only is there a link with spiritual truths, the sacred books also advise that “physical impurities” (including women’s monthly bleeding) need to be cleaned with water to render cleanliness.

Sacred books also refer to impure water leading to disease and death. Storms, the seas and lack of water (droughts) and disease transmitted through water are life-threatening externalities. Purity and hygiene are also laws that reflect on daily life. Man is the custodian of the world and provision of water, keeping it clean for living creatures to draw on for a healthy, fruitful life.

Aware of these links, between faith and water and cleanliness education of adults and children in schools, from a truly holistic point of view of man with body, soul and spirit should best base itself on these links and truths.

The practicalities that can be drawn from this:

- Sacredness and purity is the integral part of every religion. In religious scripture there are discussions on cleanliness
- Religious leaders are respected and faithful in the community. They contribute to the communities as change agents.
- A group of people have beliefs in a common way.

How religious leaders can contribute in the WASH program in Bangladesh:

- Disseminate hygiene messages in regular gathering and prayer session in the mosque
- Encourage people to wash their hand in six critical times with soap or ash.
- Interlink hygiene and sanitation messages with religious aspect.
- Disseminate messages and motivate community people keep the house compound clean and maintain personal hygiene as part of religious faith

Program Communication Intervention:

- Orient the religious leaders on sanitation, hygiene and safe water supply and the programmes incl. campaigns going on.
- Build the capacity to analyze the religious part of water and sanitation which make them capable to interlink with each other.
- Disseminate Behavioural Change Communication (BCC) materials for them to make the updated information available.
- Give the recognition to the best leaders for their contribution.

Intervention's Sustainability:

- Religious leaders live in the community
- Religious norms and practices are not separate from every day's life
- Community people are meeting with them at regular intervals
- Religious leaders are respectable in the community
- In Bangladesh, rural people regularly visit religious leaders for conflict resolution, spiritual treatment of diseases.

Work with the Imams:

1. An Imam of Mosque or Leader of another religion from each union and ward, received orientation on sanitation and hygiene issues during the Union WASH Committee and Ward WASH Committee training. The total number of religious leaders is 6300 in 630 unions.

Result: Imams are disseminating sanitation and hygiene messages after daily prayer, weekly prayer (Friday). They are motivating and influencing people to make themselves and their environment clean as a part of Faith.

2. A total 320 religious leaders from the ethnic minority communities of the Chittagong Hill Tracts received orientation on sanitation and hygiene. These started disseminating

messages. They are also playing a good role in the community to improve the sanitation and hygiene situation in their community.

3. On an average, there three mosques in each Ward in Bangladesh. So in total we are covering $5670 \times 3 = 17,010$ mosque through this project. Imams of this huge number of mosques could play an active role to behaviour and social change related with sanitation and hygiene.

Other examples in Bangladesh:

In Bangladesh there is a different success history related to the involvement of Imams in different development projects.

- Imams are trained on maternal and child health by the Health Ministry
- Imams are trained on HIV and AIDS by the Health Ministry
- Imams are trained on environmental protection by the Ministry of Environment
- Imams are trained on violence against women and children by the ministry of women and children affairs.
- There are other several trainings they have received.

The Islamic Foundation of Bangladesh was established in 1973 and from the beginning they are facilitating different development activities. Also there are different organizations of different religions that are also very influential in their community.

Good example/case Study:

The Ministry of Health initiated to train Imams on HIV and AIDS. After receiving the training they went back to their community and disseminated the messages regarding HIV and AIDS prevention.

There are different types of stigma and discrimination against different vulnerable groups like commercial sex workers, injecting drug users etc. One of the common trends observed was that the funeral ceremony of the commercial sex workers was fully prohibited in the common graveyard of the community. Trained Imams are started to work on this especially in brothel areas, making the community aware on human rights in terms of religion, motivate them to create space for the dead bodies of the sex workers and finally they were successful in changing the stigmatized mind set of the community.

28. Water, faith and education

WORLD BANK. Leonard Abrams, Senior Water Resource Specialist, Africa

Introduction

Water is a pervading factor in our lives, often in ways which are not obvious. The role which water plays in development is therefore also all-pervading. There is the most

obvious issue of water services for direct human consumption which is regarded as a key development goal and indicator. This usually includes basic water supply and sanitation which impacts on the health and productivity of individuals and communities. There is, however, a range of other development issues which depend upon water including food production, energy generation, industry, mining, urban service industries, health services etc.

In many developing countries inadequacies in the protection and development of water resources constitute a key constraint on development and growth. Climate variability – in which rainfall is a key element – impacts on many developing parts of the world resulting in repeated ‘water shocks’ such as droughts and floods. These shocks have been shown in sub-Saharan Africa to be the second largest impact on growth, second only to political instability and conflict. Beyond the issues of drinking water and the role of water in the economy, there is the central role of water in the natural environment. Entire eco-systems are primarily defined by rainfall characteristics, river basins, and water bodies such as lakes and estuaries. The role of water in the cycle of life is thus all pervading; it is little wonder that it occupies such a central role in many faiths and rituals.

How society protects, harnesses and uses water is therefore very important and can have a direct impact on the lives of everyone.

The World Bank and Water

The World Bank, like many organizations involved in development, has had an evolving approach to water over the years. After a period when infrastructure investment was regarded as the primary role of organizations such as the Bank, dam building was common. In recent years though, the emphasis shifted from large-scale infrastructure to service provision of basic water supply and sanitation. Through processes such as the World Commission on Dams we have all learned a great deal about best practice in water resource development. However, there is a growing realisation that in order to meet the needs of growing populations and to reduce the devastating impacts of poverty, infrastructure remains a key requirement.

The development of water resources can be used as an indicator of the wealth of a nation. A very stark figure is the volume of water stored in artificial reservoirs per capita population. In the relative temperate climates of North America the figure is estimated at 6,150 m³ per person. In Africa, which has a far more variable climate and therefore needs more storage to balance the water scarcity equation, the country with the highest storage per capita is South Africa with 788 m³/capita – Ethiopia has 47, Lesotho 11! There is therefore very little capacity to balance the dry and wet years and the economies of these countries are highly vulnerable to water shocks.

How do we undertake the investments that are needed in such a way that the benefits are maximized whilst the costs are minimized? Here ‘costs’ has a broad meaning – much broader than the monetary costs alone – we must include social, cultural, and environmental costs. The Bank has developed a set of Safeguard Policies which cover a wide range of issues – see the list of Safeguard Policies below.

The Safeguards are extremely rigorous and all projects are assessed to determine whether or not they trigger any of the Safeguards. If a project is deemed to trigger a safeguard, an extensive process of examination of impacts and mitigation measures are included as part

of the project. This is one way in which a level of ethical behaviour is codified into the work of the Bank.

World Bank Safeguard Policies

4.01 - Environmental Assessment	4.12 - Involuntary Resettlement
4.04 - Natural Habitats	4.36 - Forests
4.09 - Pest Management	4.37 - Safety of Dams
4.10 - Indigenous Peoples	7.50 - Projects on International Waterways
4.11 - Physical Cultural Resources	7.60 - Projects in Disputed Areas

Water development and use is not only about engineering and the natural sciences, however. Virtually everything to do with water relates to power, patronage, rights and privilege. This is not only in terms of who gets access to water to use it to their advantage, but also the impact which people may have on the water which is accessible to others. The degradation of upper catchment areas through deforestation, population pressure, poor land-use practices or the indiscriminate construction of dams may all have impacts hundreds of kilometres away – causing water scarcity, flash flooding, sedimentation of water ways etc. In Africa, as a post-colonial legacy, there are no major river basins which are not shared between two or more countries which has led to regional tensions and stalled progress. International waters has become an important area of work for the World Bank and a number of bi-lateral agencies – it is very complex; the politics of the situation are often far more difficult to resolve than technical problems.

The World Bank DDVE Unit

In recognition of the importance of ethics and values in development, the World Bank set up a new unit called the Development Dialogue on Values and Ethics – DDVE, in 2000. The unit initially focused mostly on outreach. Flagship initiatives included meetings between faith and development leaders co-chaired by World Bank President James D. Wolfensohn and Lord Carey, the Archbishop of Canterbury. The DDVE is rapidly becoming a recognised centre of excellence for evidence-based analysis of issues related to faith, ethics and development that contributes to better policies and programmes for poverty reduction, with a focus on the most vulnerable populations.

The DDVE focuses its work on three complementary thematic areas:

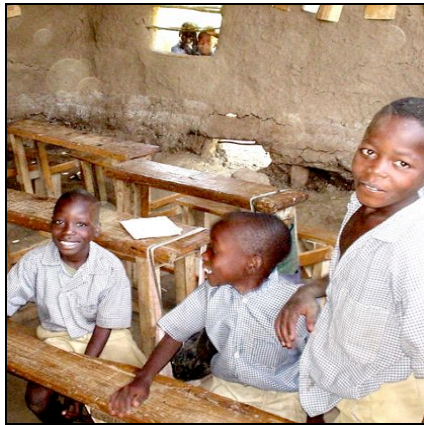
- i. (i) Conducting operationally relevant empirical research on service delivery by Faith Based Organisations (FBOs) in order to inform development policy and projects in developing countries;
- ii. (ii) Exploring how faith and religion affect the perceptions and behaviour of individuals, households and organisations and how this in turn affects development; and
- iii. (iii) Conducting empirical work on ethical dilemmas in development policy.

In the light of all this complexity, what is the role of education and, in particular, the role of faith based educational institutions?

Water in education

School level education provides the basis of knowledge on which to build life skills to

enable students not only to become productive members of society, but also to understand how they interact with the wider world around them. This includes both the factual realities as well as the value systems of their particular communities. Water in this context has a wide range of different impacts as we have already seen. People need to understand how water works in the world they live in - how water affects their lives, and how their actions impact on the lives of others. This is not just a subject for students of science and geography – everyone needs to know the basics. Understanding the basic natural science of water alone is not sufficient – there is also a need to inculcate the values related to water which will lead to equity and fairness in society in matters relating to water.



A classroom in Western Kenya damaged by floods.

During a site visit to a school and surrounding area in Western Kenya to address frequent flooding, a woman in a homestead held a conversation at a distance across the fields with the Head Teacher who was accompanying us. The Head teacher explained to the woman why we were there and she replied that perhaps we were the answer to their prayers for help with the flooding. Seeing a World Bank project as an answer to prayer was a new perspective.

Science of water

A basic education in the natural sciences should be provide to all pupils beginning with the simple reality of the hydrological cycle and progressing to more complex aspects. This, together with hygiene and other basic health education will assist in demystifying water issues and equip people to make more informed choices related to their wellbeing and development. Water education should not be restricted only to matters of potable water supply and sanitation – it needs to cover other aspects such as basic agricultural water use, water conservation, the cycle of water pollution, sanitation etc. Many of these practices are already contained in local customs and practices, both religious and secular. Providing some of the reasons behind these practices will help to instil them into the norms of behaviour of individuals in their communities.

Values and ethics of water

Creating knowledge and understanding about water is only part of the educational process – creating values is quite another thing. One of the basic teachings of most faiths is the imperative of dealing justly and rightly towards others; another is to look out in particular for the interests of those in society who are poor, oppressed and hurt. Who is our neighbour in the sphere of water? This raises a host of issues – how does the actions of farmers upstream impact on people

downstream? What impact will building a dam have on an eco-system on which others depend? How do you balance the need for decent, healthy water supplies in urban fringe areas with the impacts which abstracting a certain amount of water have on the rights and needs of others? The basic values need to be taught from an early age as fundamental tenets of behaviour. Such a foundation will then be much more likely to be worked out by leaders and communities in later life and be reflected in policy, legislation and how society organises itself.

Conclusion

Water is a very broad issue which impacts on almost every sphere of life and development. It must be approached from an integrated perspective which addresses the basic needs of people as well as being a key element of growth and development whilst ensuring the sustainability of the resource. There are two key areas in which school education can make a major input to water and development as a whole;

- 1) Teach the basic natural sciences related to water and its position in the broader environment; and
- 2) Teach the basic tenets of 'good neighbourliness' and concern for others which will pervade the worldview of successive generations. In this enterprise FBOs have a key role.



The backbreaking daily job of providing water in rural Mozambique

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