Water and Sanitation Program –
East Asia and the Pacific

Commissioned by:

German Technical Cooperation

Federal Ministry
for Economic Cooperation
and Development

Department of the Interior and Local
Government (DILG)

1st International Symposium on Low-Cost Technology Options for Water Supply and Sanitation

Bohol Plaza, Panglao Island, Bohol, Philippines
12-14 October 2004

PROCEEDINGS OF THE 1ST INTERNATIONAL SYMPOSIUM ON LOW-COST TECHNOLOGY OPTIONS FOR WATER SUPPLY AND SANITATION
12-14 OCTOBER 2004

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FOREWORD

Deutsche Gesellschaft fur Technische
Zusammenarbeit (GTZ) GmbH

Commissioned by: Federal Ministry for Economic Cooperation and Development

Dear friends and colleagues, ladies and gentlemen:

Welcome to the first International Symposium on Low-Cost Technology Options for Water Supply and Sanitation 2004 in Bohol.

Thank you for coming to what promises to be a big gathering of so many different stakeholders in the water supply and sanitation sector from the Philippines, Asia and Europe for the first time.

Most governments in the developing world have already taken great efforts to increase the access to water supply of the growing human population, especially the poor, marking some improvement since the sector goals were formulated four years ago at the water summit (Millennium Development Goals). Unfortunately, the sanitation sector has lagged behind significantly. Improper sanitation, non-existing sewer systems and little hygienic education has led to an increase in water-borne diseases and death in recent times.

In the Philippines there is a lot to be done in this regard, as there is a host of sanitation issues that needs to be addressed. But constructing traditional sewer collection systems with conventional treatment plants may not be the most appropriate solution as it might turn out to be impossible to build and maintain, as well as not financially viable, especially in rural and suburban areas. A change in paradigm might be necessary, as other more appropriate, environmentally sound and more affordable solutions have to be considered.

This is what the symposium intends to achieve: to present alternative low-cost options for water supply and sanitation. Many methods like wetland treatment plants, ecological sanitation (Ecosan), biogas and rainwater harvesting will be presented and their feasibility in the Philippines will be discussed here.

The German Technical Cooperation (GTZ) Water, Sanitation and Solid Waste Program, a technical cooperation program commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ), supports the introduction of such methods to the Philippines by providing technical advisory services in the construction of pilot plants, organization of trainings and dissemination and in bringing the different stakeholders, technicians and decision makers together, as in events like this Symposium.

Let us work together to help the Philippines to come one step closer to a better health of the populace and a cleaner environment for the benefit of both the present and future generation.

Let me also take this opportunity to thank the men and women from the Water Supply and Sanitation Program Management Office of the Department of Interior and Local Government, the Water Sanitation Program of the World Bank, and the German Agency for Technical Cooperation who jointly organized and implemented this event.

I wish you an interesting and productive symposium in Bohol.

Andreas Kanzler
GTZ Program Director
Water, Sanitation and Solid Waste

Republic of the Philippines
PROVINCE OF BOHOL

His Excellency, Dr. Axel Weishaupt, the German Ambassador to the Philippines, Director Andreas Kanzler of the GTZ Water, Sanitation and Solid Waste Program, Assistant Secretary Austere Panadero of the Department of the Interior and Local Government, Governor George Arnaiz, officers of the World Bank Water and Sanitation Program for East Asia and the Pacific, and the DILG's Water Supply and Sanitation Project Management Office, my fellow participants, friends, ladies and gentlemen, a pleasant good morning…

Bohol is privileged to be the venue of two major gatherings sponsored by the German government. The DED Asian Conference which opened yesterday and this international symposium of GTZ which begins today are two of the important events in the province for the month of October. These events only demonstrate the strong ties between the Philippines and Germany which can be traced back to the days when our national hero Dr. Jose Rizal was in 19th century Germany.

We need not elaborate on historic events ladies and gentlemen. But I would say that Germany is at present the third biggest donor to the cause of Philippines development, with the Visayas heavily benefiting from German generosity. We would like to see that in the future, German and Filipino relationship would continue to flourish and for Germany to be always on the side of the Philippines especially in these times of looming crisis.

You hold this international symposium at a time when the need to further develop our water resources and improve the sanitation of our communities and environment is imperative. Today we hope to learn from this symposium and hopefully, ladies and gentlemen, this gathering can further propel Bohol towards progress and prosperity as we learn about the requirements of Philippine water resource management and conservation. A review of low-cost technologies for the development and improvement of our sanitation conditions would greatly enhance the capacity of our people to promote sound sanitation practices not only in the cities but more so in the rural areas.

It is in this light ladies and gentlemen that I welcome you to the land of history and natural beauty as we pray to the Lord that all these undertakings of the German people in the Philippines will continue and prosper.

Thank you and good morning to all.

Gov. Erico B. Aumentado
President, League of Provinces of the Philippines
President, Union of Local Authorities of the Philippines
Chairman, Central Visayas Regional Tourism Council

MESSAGE

Federal Republic of Germany

Good morning ladies and gentlemen.

As a representative of the German Government, I would like to express how pleased I am that such an important issue as water supply and sanitation, especially for the benefit of the poor is taken up here during your symposium today. I am surprised to see so many decision makers and stakeholders from various departments and different provinces, as well as NGOs of the Philippines, together with representatives and experts from international and German development and research organizations such as WSP, GTZ, DED, USAID, BORDA and the Umwelt Forschungszentrum Leipzig. Thanks to the initiative of GTZ and WSP this **first International Symposium on Low cost Technology Options for Water Supply and Sanitation in the Philippines** has become a reality. This time we have with us also the private sector, which plays an important role in the implementation of water and sanitation projects

For more than 30 years GTZ (Deutsche Gesellschaft fuer Technische Zusammenarbeit), commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ) is supporting the Philippine Government to improve the condition of live for their people – especially of the poor. Water was in many projects one very important issue.
Still today, the water, sanitation and solid waste sector has a high importance for the German Government. It is one of the 4 focal areas of the development cooperation with the Philippines.

The water program in its actual design was set up in 1998. Together with our local partner organizations, we learned many lessons about the right way to approach the problems in the sector: one is the **community based approach** – means mainly: involving the people, the other is the holistic approach of **Integrated Water Resources Management**, the basic principle of our future cooperation in the sector. Therefore the DILG-GTZ Water Program successfully implements and extends its activities in the Visayas Region to advice the sector planning organizations, towards better performance and management on solutions in the field of water and sanitation.

The second organizer, the Water and Sanitation Program of the World Bank has joined its efforts with the Australian Government, to work together on the issue of water supply and sanitation in the Philippines, expressed in the creation of WPEP (Water Supply and Sanitation Performance Enhancement Project).

Undoubtedly, in the last years the idea gets more credit, that sharing experiences and networking leads to valuable synergetic effects – and networking has no boundaries.

Let me present you some facts that highlight the need for increased efforts in the field of sanitation and wastewater treatment:
Urbanization in South-East Asia is progressing rapidly. Nearly 60% of the 76 Million people in the Philippines are living in urban areas. Compare to Thailand, for example the rate of urbanization there is only 22%. This creates extreme problems and challenges in water supply, transportation, health, and very much also in sanitation. The issue of sanitation is taken extremely seriously by the German government as 5-6 million people in developing countries die each year from water-related diseases - contributing to over 25% of all preventable illnesses in the world.

I would just like to talk a little about German policy on Water at the Global level. Jointly with other European countries, the Federal Republic of Germany proposed the development of a new partnership on fresh water and sanitation, involving developing countries, civil society and the private sector at the World Summit on Sustainable Development, which took place in Johannesburg some 2 years ago.

The BMZ, the Federal German Ministry of Economic Cooperation and Development, promoted the development of a water initiative as a key agenda point for the World Summit on Sustainable Development. The overall target of this initiative is to reach the millennium development goal, to halve the proportion of people lacking access to safe drinking water by 2015, together with a complementary target on sanitation.

In particular, the sanitation sector requires huge investments in the future. Therefore, wherever new and adopted, affordable and reliable waste water treatment technologies are available, it should be given a chance to be tested here in the future in the Philippines. But the focus should not only be in treating the contaminated waste water, but wherever possible prevention of contamination should also be considered. In this context, ECOSAN (Ecological sanitation), which takes the whole cycle of water use into account and promotes the reuse of water and utilization of human and animal waste is - a change in paradigm towards the future.

For these reasons, the German Government will continue to support such initiatives and we hope that with such joint approaches, like the one here today in Bohol, we could contribute to the solution of these very urgent problems and hopefully “ignite” many activities in the Philippines to join forces and activities in the sector.

Thank you very much.

H.E. Dr. Axel Weishaupt
German Ambassador to the Philippines

Republic of the Philippines
Province of Negros Oriental

His Excellency, Dr. Axel Weishaupt, the German Ambassador to the Philippines, Director Andreas Kanzler of the GTZ Water, Sanitation and Solid Waste Program, Asst. Secretary Austere Panadero of the Department of the Interior and Local Government, Gov. Erico Aumentado, officers of the World Bank Water and Sanitation Program for East-Asia and the Pacific, and the DILG's Water Supply and Sanitation Project Management Office, my fellow participants, friends, ladies and gentlemen, a pleasant good morning…

Of all the social and natural crises we humans face, the water crisis is the one that lies at the heart of our survival and that of our planet Earth.

Without water, we will all perish. On March 5, 2003, Mr. Koichiro Matsuura, director general of UNESCO, warned that "over the next 20 years, the average supply of water worldwide per person is expected to drop by a third." So that the time would come when nations would be scrambling for a commodity more precious than crude oil—and that is WATER."

The Study further warns that as the population continues to surge in most parts of the world, the threat of "water wars" between nations and islands vying for the dwindling freshwater supply would become a reality. We see this happening now in some parts of the country, although not at the level of "war."

Moreover, it was noted that the demand for freshwater had increased six fold between 1990 and 1995 – twice the rate of the population growth.

This is a wake-up call for us. We need to start doing something NOW BEFORE IT IS TOO LATE!

We are fortunate and we are grateful to the German Agency for Technical Cooperation through its Rural Water Supply and Sanitation Program, World Bank Water and Sanitation Program for East Asia and the Pacific, and the DILG's Water Supply and Sanitation Project Management Office, for initiating this Symposium on Low-Cost Technology Options for Water Supply and Sanitation.

This symposium is indeed apt and timely as it allows international and local experts, policy makers, planners, and other stakeholders from different regions to share best practices and experiences and showcase different low-cost technology options which are appropriate for adoption in our country.

Before I forget and on behalf of the people of Negros Oriental, I must also express my appreciation and gratitude to the German Agency for Technical Cooperation and the Department of the interior and Local Government's Water supply and Sanitation Project Management office for bringing the water and sanitation program to Negros Oriental. The program has a lot of built-in activities, which enabled us to formulate our Provincial Water Supply, Sewerage and Sanitation Sector Plan, create our Provincial Water and Sanitation Development Council, conduct Sanitation and Baseline Survey and water laboratory assessment, and more importantly, establish our own Geographical Information System, which is a very useful tool in planning. For these and more, thank you very much!

If we are to consider the state of our water and waste-water today, we can see that there is so much to do, yet so little time to accomplish the things that need to be done. While we have made some headways at the local level on the aspect of water and sanitation and solid waste management, we feel that we could do a lot more through sharing sessions like these.

May this symposium serves as a springboard for continuing collaborative endeavors between and among donor institutions and international water bodies and agencies, in finding alternative options to address the problem of dwindling water supply as well as provision of safe and potable water to our people.

Thank you and good day!

Hon. George Arnaiz
Governor, Negros Oriental

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF THE INTERIOR AND LOCAL GOVERNMENT
5th Flr., A. Francisco Gold Condominium II, EDSA corner
Mapagmahal St., Diliman, Quezon City

Guten Morgen!

His Excellency Dr. Axel Weishaupt, German Ambassador to the Philippines, the Honorable Governors, Governor Erico Aumentado and Governor George Arnaiz, participants and guests, Good Morning!

On behalf of the Water Supply and Sanitation Program Management Office of the Department of the Interior and Local Government, a strong partner of GTZ in its efforts to assist Local Government Units in instituting reforms in the water and sanitation sector, allow me to wish you all a pleasant day in this beautiful island of Bohol.

Because Assistant Secretary Austere Panadero could not be here with us today as he had to attend to some urgent matters in the department, allow me then to convey to you his message for this three (3) day Symposium on Low-Cost Sanitation Technology Options.

It is a reality that the snail pace development in the Philippine sewerage and sanitation sector can be traced primarily to the high cost of investment for off-site systems and the limited attention given primarily by the government to the sector.

It is a reality also that efforts in the sector are mostly directed toward water supply improvements. But oftentimes we fail to address the negative effects of improving water supply services. Like wastewater and of course sanitation issues.

There is now an urgent need to identify available low-cost technology options on wastewater treatment and sanitation in the region and be able to advocate for these to the general public, particularly to the Local Government Units.

This conference aims to introduce low -cost approaches such as decentralized wastewater treatment and sanitation now available, which can be adopted even by underprivileged communities.

One of the 10-pt. Agenda of the President is to provide access to potable water supply and sanitation services to all *barangays*. I then enjoin our LGU partners to give priority attention and initiate actions for improvements by increasing investments and supporting advocacy programs in the sector.

II am hopeful that all relevant insights we shall gain from this conference will be disseminated to stakeholders who are in most need of them.

On behalf of DILG, I wish to thank the German Technical Cooperation, GTZ, through its Program Director Mr. Andreas Kanzler, who has initiated this undertaking and is host to this three-day conference. Likewise, the Water and Sanitation Program of World Bank who is also a partner to the advocacy works in the sector. And of course, to all of you who have come to participate in this worthwhile event.

Finally, may this learning exercise be also a venue for a healthy discussion in coming up with good strategies for the adoption of these approaches particularly for the community-based wastewater management and sanitation.

Thank you and may you all have a pleasurable stay in Bohol!

Austere Panadero
Assistant Secretary
(thru Ms. Rebecca Ravalo,
Program Manager, WSSPMO)

1ST INTERNATIONAL SYMPOSIUM ON LOW-COST TECHNOLOGY OPTIONS FOR WATER SUPPLY AND SANITATION
12-14 OCTOBER 2004
BOHOL PLAZA, PANGLAO ISLAND, BOHOL

October 12, Tuesday			
7:30-9:15	Registration (Dayo Hill B Grand Room)	Secretariat	
9:15 –10:15	**Welcome Address**	Gov. Erico Aumentado	Province of Bohol
	Messages	His Excellency Dr. Axel Weishaupt	German Ambassador to the Philippines
		Gov. George Arnaiz	Province of Negros Oriental
10:15 – 10:25	Objectives of the Symposium	Mr. Austere Panadero, Assistant Secretary Jemima Sy, Team Leader	Department of the Interior and Local Government Water and Sanitation Program, World Bank
10:25-10:40	Tea/ Coffee break (Dayo Hill A)		
10:40 –11:15	**The GTZ Water Program in the Philippines and its focus on Sanitation**	Mr. Andreas Kanzler, GTZ Program Director	GTZ Water, Sanitation, Solid Waste Program
11:15-11:50	Sanitation Issues in the Philippines	Ms. Elisea G. Gozun	
11:50-12:25	**Eco-Sanitation:** Principles and technologies	Mr. Florian Klingel	GTZ- Eschborn Germany
12:25-1:15	Lunch Break (Dayo Hill A)		
1:15:1:50	**Reedbed** advantages and preconditions	Dr. Roland Mueller	UFZ Leipzig – Halle GmbH, Germany
1:50- 2:30	Constructed Wetlands as a Technological Tool for Waste Water Treatment in Combination with Pathogen Removal: **First Experiences from a Mexican-German Co-operation Project**	Dr. Roland Mueller	UFZ Leipzig – Halle GmbH, Germany
2:30-3:05	Engineered **Reed Beds** for the treatment of domestic sewage	Mr. Gerardo Parco, Professor	University of the Philippines (Diliman)
3:05-3:20	Tea/Coffee Break (Dayo Hill A)		
3:20-3:55	Experiences on **DEWATS and CBS** Implementation	Mr. Frank Fladerer, Country Representative	Bremen Overseas Research and Development Association (BORDA) Indonesia
3:55- 4:30	The **GTZ Ecosan Programme** and other worldwide Ecosan project examples	Mr. Florian Klingel	GTZ-Eschborn Germany
4:15-5:00	Wrap Up	Ms. Pet Misa	
6:00-7:00	Cocktail Party (Pool side)		
7:00-8:00	Dinner (Dayo Hill A)		

October 13, Wednesday			
8:15-8:30	Opening of the 2nd Day (Dayo Hill B Grand Room)	Ms. Pet Misa	
8;30-9:00	**Expensive but Necessary: Considerations for Financing Sanitation**	Jemima Sy, Team Leader	Water and Sanitation Program (WSP), Philippines

	Market Place (Dayo Hill B)	Market Place (Dayo Hill C)
9:10-9:40	Presentation on the Development of a Sanitation Sourcebook and Decision Aid by World Bank and GTZ Presenters: Engr Virgilio Sahagun (World Bank Consultant), Engr Lito Riego de Dios (Dept. of Health (DOH), Engr Jose Roncesvalles (Local Water Utilities Administration (LWUA)	**Planning a BIOGAS Plant**: From Waste to Wealth Presenter: Mr. Rommel Urgel University of San Carlos, Cebu City, Philippines
9:50-10:20	Initial findings of the **Sanitation Assessment** done within Negros Oriental and Bohol Presenters: Ms. Sheree Ann Pagsuyoin University of the Philippines (Diliman); Ms. Anne Kleyboecker GTZ Program Trainee	**BIOGAS Application** in Piggery Farm in Bantayan Island, Cebu Presenter: Mr. Wellington Lim Bantayan Island, Cebu, Philippines
10:30-11:00	Local Initiatives for **affordable wastewater treatment** (LINAW) Presenter: Ms. Lisa Kircher Lumbao, Project Manager LINAW- USAID, Philippines	**Rainwater Utilization** – a key to improve drainage, river and water resource management Presenter: Dr. Johannes Paul German Development Service (DED) Bais City, Negros Oriental, Philippines
11:10-1:40	CHAST - **Childrens' Hygiene & Sanitation Training** (an approach developed in North West Somalia) Presenter: Ms. Susanne Peters, CIM Expert Bohol PPDO, Philippines	**Rainwater Harvesting**: The Ecological Water Management Presenter: Engr. Nilo Jardeleza Kahublagan Sang Panimalay Foundation, Inc, Iloilo City, Philippines
11:40-1:00	Lunch Break (Dayo Hill A)	

1:10-1:40	Child-friendly Latrine Principle Presenter: Mr. Edgar Viterbo Country Adviser – WATSAN, Plan Philippines	**Appropriate Technologies** on Water and Sanitation developed or presently in use by PCWS Presenter: Mr. Carmelo Gendrano Philippine Center for Water and Sanitation, Philippines
1:50-2:20	"**When Municipal Solid Waste becomes Liquid Waste** – Options for Minimization and Treatment of Contaminated Water out of Solid Waste Disposal in the LGUs San Carlos City and Bais City" Presenter: Mr. Klaus Hanuschke, Expert German Development Service (DED), San Carlos City, Negros Occidental, Philippines	Utilization of **Hydraulic Ram Pump** for drinking and irrigation water Presenter: Mr. Ahmon Ledesma AID Foundation, Inc Bacolod City, Philippines
2:30-3:00	Rotating Biological discs as low cost solution in rural areas Presenter: Mr. Klaus Waizenegger Stengelin-Anlagenbau Germany	Technology and Experience of SODIS (Solar Water Disinfection) Program in Palawan Presenter: Mr. Felix Tañedo SODIS Program –Phil (Helvetas/Switzerland)
3:00-6:00	**Groupings** *(Splitting in 4 working groups)*	
7:00-8:30	Cultural presentation by Alicia Musika Kawayan (Dayo Hill B) Dinner (Dayo Hill A)	

October 14, Thursday			
8:15-8:30	Opening of the 3rd Day (Dayo Hill B Grand Room)	Ms. Pet Misa	
8:30 – 9:00	Group 1 - Reedbeds	Gerry Parco / Roland Mueller	
9:00-9:30	Group 2 - DEWATS	Frank Fladerer	
9:30-10:00	Group 3 - Biogas	Bobby Bajenting	
10:00-10:30	ECOSAN	Florian Klingel	
10:30-10:45	Awarding of Certificates to the participants	Ms. Pet Misa	
10:45-11:00	Workshop Evaluation	Ms. Pet Misa	
11:00- 5:30	Lunch in the Bus Field visits: • Tour of Bohol • Rainwater Harvesting • Recycling the Waste • BIOGAS • Sanitation Site	Secretariat	

Note:

(1) The presenters will deliver their presentations for 20 minutes only to ensure 10 minutes of short discussion.

(2) Exhibitors from different agencies and private (German and Philippine) companies will be participating to showcase their Products at the Lobby

Moderator
MS. CONSUELO E. MISA

Introduction

Development and population growth have created a dramatic increase in the demand for water supply and sanitation facilities all over the world. Since the formulation of the Millennium Development Goals four years ago, governments in developing countries have focused attention on providing the growing population with greater access to water supply. Unfortunately, there has been no corresponding increase in the efforts to provide sanitation facilities .

Water-borne disease caused by improper sanitation continues to be the leading cause of child mortality in developing countries. Traditional solutions such as large scale sewerage systems have proven to be impossible to build and maintain, and fiscal crisis further limits the feasibility of similar solutions.

Symposium Objectives:

In response to this scenario, the German Agency for Technical Cooperation's (GTZ) Water, Sanitation and Solid Waste Program, together with the Water and Sanitation Program of the World Bank and the Water Supply and Sanitation Project Management Office of the Department of Interior and Local Government (DILG), organized this symposium to present low-cost technology options for water supply and sanitation. Addressed at accelerating sanitation and water supply initiatives, the symposium brought together local and foreign experts in the field of water supply and sanitation and implementers of water supply and sanitation programs in the local and national government agencies in the Philippines, non-government organizations and the private sector to increase awareness of these low cost options, discuss implementation challenges, and define solutions to fast track the adoption of sanitation facilities and strategies in present and future water supply programs.

Highlights of the Symposium:

Ms. Elisea Gozun, former Secretary of the Department of Environment and Natural Resources (DENR), presented a status report on sanitation in the Philippines based on DENR monitoring reports to situate the relevance of the symposium in the Philippine setting. To address the issues raised in this status report, twenty-one presentations followed. These presentations were technology packages that covered not only the technical features of a water supply and sanitation option, but also critical considerations such as operations and maintenance concerns, social acceptability and social marketing, and institutional arrangements. The low-cost technology options for water supply and sanitation presented during this symposium included the following:

- Reed beds and Constructed Wetlands
- DEWATS and CBS
- Ecosan Programmes
- Biogas
- Rainwater Harvesting and Utilization
- Hydraulic Ram Pump
- Rotating Biological Discs
- Solar Water Disinfection

Majority of these technology options have been implemented in countries such as Indonesia, Mexico, Somalia, Germany and the Philippines, thus the presentations also shared lessons learned in addressing the social-cultural and institutional issues accompanying sanitation problems arising from domestic sewage and waste products of small and medium enterprises.

A Note on Financing:

In her presentation on the financing aspects of Water Supply and Sanitation Programs advocated for paradigm shifts in current thinking about investments, World Bank's Country Team Leader for Water and Sanitation Program in East Asia and the Pacific, Ms. Jemima Sy warned against the implementation of one standardized solution to sanitation problems and argued for a variety of appropriate solutions identified through social marketing and a healthy respect for informed choice. Building on this principle, she urged the public sector to redirect their financial investments towards raising awareness of sanitation issues in order to encourage the communities and the SMEs to take financial accountability for sustaining sanitation programs that benefit them.

Product Exhibition:

A side event in this symposium was the exhibition of water supply and sanitation products manufactured by two Philippine companies, two German firms and one American firm. Some of the products displayed were prototypes of waste segregation toilet bowls, samples lining materials for landfills, books, brochures and other reading materials on ecosan, biogas and other wastewater treatment facilities.

Focused Group Discussions:

To assist the symposium participants in taking concrete action to initiate and/or enhance water supply and sanitation solutions in their respective areas of work, focused group discussions were organized around technologies chosen by at least five participants. These technologies were: Reed Beds and Constructed Wetlands, DEWATS/CBS, Biogas and Ecosan.

In these small discussion groups, the symposium participants engaged the resource persons/experts in more detailed discussions regarding the technological option and derived insights on the following aspects: operations and maintenance and relevant institutional arrangements, social considerations (i.e. demand, social marketing) and financial strategies to ensure affordability and sustainability.

Next Steps:

One of the significant outputs of the focus group discussions was the identification of immediate next steps to facilitate the implementation of water supply and sanitation initiatives. Four items surfaced as critical areas for follow-up action:

- actual demonstration and hands-on familiarization with the technologies through a pilot site, preferably one that showcases a variety of complementary technologies, where possible;
- access to support services in the form of technical advice, information updates and exchange of experiences, possibly through networking;
- continuation of joint action through the formation of a working group (e.g. Philippine Ecosan Network (PEN): http://groups.yahoo.com/groups/ecosan-philippines); and
- promotion of water supply and sanitation initiatives through a written "Declaration of Commitment" (Bohol Statement) from the participants of the symposium translated into resolutions to elicit concrete support from relevant policy-making and decision-making bodies.

Field Visits:

This symposium culminated in field visits to low-cost water supply and sanitation systems within Bohol province. Symposium participants observed a biogas plant in Cortes and a sanitation system and a rainwater catchment facility in Dauis. The sanitation system is close to ecosan regarding the reuse of nutrients. They also visited the tarsier sanctuary in Corella.

Post-Symposium Evaluation:

At the conclusion of the event, participants were asked to rate the success of the symposium on a five-point scale (a rating of 5 means maximum satisfaction) along seven rating categories (achievement of objectives, relevance of the topics, selection of resource persons and value of their expertise, symposium format, venue and overall management of the activities). Participants were also asked to volunteer comments, observations, and suggestions for improvement.

In general, the participants' ratings clustered around the 4 and 5 levels of the 5-point scale. Accompanying remarks reinforced these ratings as participants reported that the symposium was impressive, the presentations were informative and very relevant, informal discussions took place and were very fruitful, and that the over-all organization and management of the event was excellent.

Improvements were recommended in the following aspects: the product exhibition, incorporation of application (hands-on) opportunities in the technology options presented, and in the selection of the venue (poor water quality).

When asked if they would attend a second international conference of the same nature, the participants responded with a unanimous "yes."

ABSTRACTS OF PRESENTERS

1. **The GTZ Water Program in the Philippines and its focus on Sanitation**
   By: Mr. Andreas Kanzler, GTZ Program Director

2. **Sanitation Issues in the Philippines**
   By: Ms. Elisea Gozun

3. **Eco-Sanitation: Principles and Technologies/The GTZ Ecosan Programme and other Worldwide Ecosan Project Examples**
   By: Mr. Florian Klingel

4. **Reedbed Advantage and Preconditions/ Constructed Wetlands as a Technological Tool for Wastewater Treatment in Combination with Pathogen Removal: First Experiences from a Mexican-German Cooperation Project**
   By: Dr. Roland Mueller

5. **Experiences on DEWATS and CBS Implementation**
   By: Mr. Frank Fladerer

6. **Engineered Reed beds for treatment of Domestic Sewage**
   By: Mr. Gerardo Parco

7. **Expensive but Necessary: Considerations for Financing Sanitation**
   By: Atty. Jemima Sy

8. **Presentation on the Development of A sanitation Sourcebook and Decision Aid by World Bank and GTZ**
   By: Engr. Virgilio Sahagun

9. **Initial Findings of the Sanitation Assessment done within Negros Oriental and Bohol**
   By: Ms. Sheree Ann Pagsoyoin and Ms. Anne Klyboecker

10. **Local Initiatives for Affordable Wastewater treatment (LINAW)**
    By: Ms. Lisa Kircher Lumbao

11. **CHAST – Children's Hygiene & Sanitation Training**
    By: Ms. Susanne Peters

12. **Child-friendly Latrine Principle**
    By: Mr. Edgar Viterbo

13. **When Municipal Solid Waste becomes Liquid Waste**
    By: Mr. Klaus Hanuschke

14. **Planning a Bio-gas Plant: From Waste to Wealth**
    By: Rommel Urgel

15. **BIOGAS Application in Piggery Farm in Bantayan Island, Cebu**
    By: Vicente Delector, Jr

16. **Rainwater Utilization – key to improve drainage, river and water resource management**
    By: Dr. Johannes Paul

17. **Rainwater Harvesting: The Ecological Water Management**
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18. **Appropriate Technologies on Water and Sanitation developed or presently in use by PCWS**
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19. **Utilization of Hydraulic Ram Pump for drinking and Irrigation water**
    By: Ahmon Ledesma

20. **Rotating Biological Discs as low cost solution in Rural Areas**
    By: Mr. Klaus Waizenegger

21. **Technology & Experience of SODIS (Solar Water Disinfection) Program in Palawan**
    By: Mr. Felix Tañedo

The GTZ Water Sanitation and Solid waste Program and its Focus on Sanitation

Andreas Kanzler

Safe drinking water is in short supply in the Philippines, particularly in rural areas. Water-borne diseases are prevalent. Sanitation and solid waste management are generally not ecologically sound, with the attendant impact on water resources. Though plentiful in some regions, water resources are increasingly under threat from over-exploitation. Moreover, development of the water sector in the Philippines is severely hampered by inadequate planning, institutional constraints and a shortage of financial resources.

The German Technical Cooperation (GTZ), commissioned by the Federal Ministry for Economic Cooperation and Development, is supporting the development of the Philippines since more than 30 years. Water supply, especially in rural areas was always an integrated part of the cooperation in many projects.

Since 1998 the GTZ Water Sanitation and Solid Waste integrates all activities in the different sectors, to ensure a maximum of cooperation and synergetic effects.
The programme comprises three components: component 1 is concerned with improving the general framework for integrated water resource management as a precondition to achieving sustainable water supplies; component 2 with strengthening a water association as a model for decentralisation; and component 3 with developing and introducing adapted technical and institutional solutions for water supply and sanitation in rural areas and small towns.

The programme provides methodological and specialist support. Its main components are advisory services and training. The project is assisting with the urgently needed reform of the water sector and is therefore highly relevant to development in the Philippines. The significance of the German contribution lies in its approach, namely that of promoting a dialogue between the macro, meso and micro levels (national, provincial and municipal level) throughout the entire Philippine water sector. There are three mayor pilot areas: Bohol, Negros Oriental and cebu/Bantayan. This approach is unprecedented in the Philippines and has not so far been adopted by any other donor.
Countrywide it can be estimated, that only 1 to 2 % of all sewer is being treated properly. Sewer treatment beyond septic tanks is virtually not existing, especially in rural and suburban or squatter areas. One of the goals of the program among others is to bring new ideas and methods of low cost sewer treatment (wetland treatment plants) and avoidance of producing sewer (ECOSAN) to countries like the Philippines and experience their suitability as instruments for solving the problems.

There is close co-operation with the Experts from DED (German Development Service) and CIM (Centrum für Internationale Migration und Entwicklung). The later one supports Integrated Experts into relevant positions in partner organisations. Co-operation is being sought in selected priority areas with water and sanitation projects of the KfW, ADB, World Bank, JICA, JBIC and AusAID.

Mr. Andreas Kanzler is the Program Director of the GTZ (German Technical Cooperation Agency) Water, Sanitation and Solid Waste Program for two years now. As a long-term resident expert in Paraguay, Nepal, Dominican Republic and United Arab Emirates he started to work for the GTZ in 1990. He graduated as a hydrogeologist with specific emphasis on Water Resource Management and is an expert in organisation development. He is 48 years old.

Mr. Kanzler will give an overview on the GTZ Water Program in the Philippines and its focus on Sanitation. The Program has three components. The first one is improving the general framework for integrated water resource management as a precondition to achieving sustainable water supplies. The second one is strengthening a water association as a model for decentralisation and the last component is developing and introducing adapted technical and institutional solutions for water supply and sanitation in rural areas and small towns

Eco-sanitation, Principles and Technologies

C. Werner, P. Bracken, H.P. Mang, F. Klingel

Ecological sanitation – a paradigm shift to reach the MDGs

The modern misconception that human excreta are wastes with no useful purpose has resulted in the end-of-pipe sanitary systems that we have today. In nature however, there is no waste. All products of living things are used as raw materials by others as part of a cycle. Considering the environmental damage, the health risks, and the worsening water crisis resulting from our present sanitary practices, a revolutionary rethink is urgently needed if we are to correct this misconception and realistically have a chance of achieving the Millennium Development Goals of providing sustainable sanitary services to over 1.2 billion people over the next 11 years. A new paradigm is required in sanitation, based on ecosystem approaches and the closure of material flow cycles rather than on linear, expensive and energy intensive technologies. This paradigm must recognise human excreta and water from households not as a waste but as a resource that should be made available for reuse.

Ecological sanitation is this urgently needed new holistic paradigm in sanitation. It is based on an overall view of material flows as part of an ecologically and economically sustainable wastewater management system tailored to the needs of the users and to the respective local conditions. The basic principle of ecosan is to close the nutrient loop between sanitation and agriculture. Closing the loop enables the recovery of organics, macro and micro nutrients, water and energy contained in household wastewater and organic waste and their subsequent productive reuse - if necessary after adequate treatment - mainly in agriculture or for other reuse options. An essential step in this cycle is the appropriate treatment and handling of the materials throughout the entire process, from collection through to reuse, ensuring a series of barriers are erected that will reduce the risk of disease transmission to within acceptable limits, thus providing comprehensive protection of public health.

Ecosan in practice

As an integrated alternative, the implementation of an eco-sanitation project requires an interdisciplinary approach that goes beyond the narrow disciplines and technological aspects of domestic water supply and wastewater management to address issues such as agricultural use, sociological aspects of acceptance and cultural appropriateness, health and hygiene, town planning, economic, institutional and legal aspects and small-enterprise promotion and more.
Eco-sanitation opens up a wider range of sanitation options than those currently considered. To optimise cost efficient, high quality treatment and recycling options, two principles are very often applied in ecosan systems: Firstly, flow streams with different characteristics, such as faeces, urine and grey water are often collected separately. This allows the application of specific treatment processes and optimised reuse. Secondly, unnecessary dilution of the flow streams is avoided, for example by using dry, low flush or vacuum transport systems. This minimises the consumption of valuable drinking water and produces high concentrations of recyclables. However, whilst often making treatment easier and less expensive, the separate collection and treatment of the flow streams is not a prerequisite in ecosan systems, and ecological sanitation is also possible in centralised and combined flow systems.
Ecosan systems strive for resource efficiency. In reducing unnecessary water consumption and avoiding the contamination of water bodies, ecosan systems can have an impact on reducing the costs of raw water treatment and drinking water supply. Additionally the recovery and agricultural use of the organics and nutrients contained in wastewater improves soil structure and fertility, increasing agricultural productivity and thus contributing to food security. The recovery of energy through the anaerobic digestion of faeces, organic waste and animal manure may also represent a significant step towards energy efficiency, providing biogas for cooking or possibly for electricity generation.
Ecosan approaches very often require marketing strategies for the recovered nutrients, innovative logistics to return them to farmland, and directions for their safe application in agriculture. These requirements often result in new service enterprises being established as a result of new ecosan schemes which can also serve to kick start other income generating measures, for example for the construction and easy and safe operation of the installations.

Mr. Florian Klingel is a project team member of the supra-regional GTZ ecosan-project. He has 4 years of professional experience in water supply and sanitation projects in Vietnam, Senegal and Nicaragua. Before entering GTZ, he worked for the Swiss institute EAWAG-SANDEC and the German consulting company GKW Consult. His professional background is environmental engineering. He is 30 years old.
He will make two presentations. The first one is on Eco-sanitation, principles and technologies. He will present ecological sanitation as a new holistic paradigm shift in sanitation to reach the MDGs (Millennium Development Goals) and give an overview on ecosan in practice. His second presentation will be on the GTZ ecosan programme and other worldwide ecosan project examples. At present, pilot demonstration projects are being prepared or implemented with the support of the GTZ-ecosan-project in more than 40 countries. Mr. Klingel will present some details on selected pilot projects.

Constructed Wetlands as a Technological Tool For Waste Water Treatment in Combination with Pathogen Removal First Experiences from a Mexican-German Co-operation Proejct

Roland A. Muller, Oliver Bederski and Peter Kuschk

KEYWORDS: **CONSTRUCTED WETLANDS, WASTE WATER TREATMENT, SANIZATION, FAECAL COLIFORMS, FILTER MATERIAL, *PHRAGMITES COMMUNIS,* IRRIGATION WATER**

Constructed wetlands are natural alternative to technical methods of wastewater treatment. However, our understanding of the complex processes caused by the plant, microorganisms, the soil matrix and substances in the wastewater, and how they all interact with each other, is still rather incomplete. From a particular point of view technologies are needed which combine the actual knowledge with site specific frame condition.

Apart from environmental political solutions and the development of water saving technologies, wastewater treatment technologies are needed tackling not only the problem of reducing organic load and removing nutrients but also reducing pathogenic germs. A main path of the contamination of drinking water and food usually originates from the traditional use of untreated wastewater for irrigation purposes or by leading untreated wastewaters into the environment. The World Health Organization therefore compiled guidelines for the hygienic quality of irrigation water, which are attainable however only by treatment of the raw wastewater.

Different types of constructed wetlands at two pilot plants in Germany and Mexico were feeded with municipal wastewater to compare sanitization performance. The pilot system is supplied with wastewater from a municipal sewage plant through a force main. The raw water undergoes mechanical pretreatment in a composer. The infrastructure allows comparing different performance conditions directly. Treatment efficiency could be optimized under practical and site specific conditions.

Dr. Roland Mueller is the Head of the Interdisciplinary Department UbZ – Environmental Biotechnology Centre, UFZ Leipzig since 1999 and the project leader of BDZ e.V. Training and Demonstration Centre for Decentralised Sewage Treatment since 2002. Dr. Müller graduated in Microbiology and did his PhD thesis on “Kinetical studies for the degradation of chlorinated and methylated benzoates by Pseudomonas spec. B13 FR1 (SN42P)” at the National Research Centre for Biotechnology Ltd. GBF, Division of Biochemical Engineering. He is 41 years old.

He will conduct two presentations. The first deals with the role of plants and micro-organisms at the removal of contaminants from polluted effluents in constructed wetlands. The oxygen input into the root zone, the uptake of nutrients and the direct degradation of pollutants from the plants as well as the role of micro-organisms will be all presented and discussed in relation to technology optimisation. The second deals with the first experiences from a Mexican-German cooperation project. Two pilot plants were constructed with different types of constructed wetlands in Germany and Mexico. They were fed with municipal wastewater to compare sanitization performance.

Experiences on DEWATS and CBS implementation in Indonesia

Frank W. Fladerer

The demand for wastewater treatment systems is increasing in urban and semi-urban areas within Indonesia where adequate wastewater treatment systems do not yet exist. Meanwhile, national and regional Governments passed new environmental regulations, which stipulate that dischargers of wastewater such as communities, institutions and industries will be held responsible for wastewater pollution and must therefore treat wastewater on-site before it is released into the environment.

Efficient wastewater treatment technology is said to be costly. Highly sophisticated and efficient wastewater treatment concepts and systems have been developed by a number of specialized companies based in industrialized high-income countries.

These systems rely on costly imported parts, need high-energy inputs for operation and require sophisticated maintenance services to ensure continuous on-site operations. In most casts, such requirements are unsuitable for communities, institutions as well as small and medium sized enterprises in developing countries within South and South-East Asia.

Within the public funded cooperation between the German and Indonesian non-for-profit organizations BORDA and its Indonesian NGO-partners, mainly funded by the Federal Government of Germany, the Decentralized Waste Water Treatment (DEWATS) cooperation project has been designed and implemented for these potential clients. BORDA started in 1994 to develop reliable and cost-efficient wastewater treatment systems, which could efficiently treat highly polluted organic wastewater.

The aim of the cooperation project is to support communities, institutions and small and medium enterprises in planning, designing and constructing of effective, efficient and cost-efficient appropriate waste water treatment systems which are based on a modular, partly standardized technical design.

Since 1994, DEWATS applications have been implemented for more than 30 clients in India/China and for more than 80 Indonesian clients representing communities, hospitals and agro-industries which discharge wastewater with high organic loads.

Large-scale infrastructure development projects usually provide sanitation services to up to 60-70% of the urban population but, however generally not to the urban poor. Due to socio-economic, legal and technical factors, expensive centralized sewerage systems cannot be considered serious technical options to improve sanitation in poor settlements. A new approach to cope with sanitation issues in high density populated urban areas in a sustainable manner. Present and future successful project implementations therefore depend on the active cooperation of communities and local governments to mainstream CBS as a viable technical option in areas, where neither individual on-site systems nor centralized sewerage systems can fulfill the need of stakeholders for basic sanitation.

CBS projects are based in a holistic and demand responsive approach. Instead simply providing technical sanitation infrastructure, CBS-projects aim to improve hygiene behavior and sanitation infrastructure in a more integrated and sustainable manner. CBS projects generally focus on poor and densely populated areas and hence reflect preferences of the target communities.

The CBS approach is an alternative option that fills the significant “gap” between inappropriate on-site sanitation (e.g. absorption pits) and the shortcomings of conventional centralized sewerage collection and treatment systems. As a result of many pilot and demonstration projects, BORDA and its network partner organizations have succeeded in adapting the CBS concept to requirements of city as well as state administrations.

Basic key features of CBS are Demand-Responsive Approach (DRA), Participatory Planning, Financing of primary infrastructure (matching funds), Informed Choice on technology and operation system (IC), Professional Design and Workmanship as well as proper Operation and Maintenance models.

The presentation will show the basic philosophy of DEWATS and CBS, will discuss main steps for its implementation, describe the different hard-and software modules and show positive examples as well as lessons learnt during the last 5 years of implementation in ndonesia.

Mr. Frank Fladerer is the Country Representative of Bremen Overseas Research and Development Association (BORDA) to Indonesia since 2004. He used to be the Team leader for the GTZ project "Drinking Water Quality Surveillance" carried out in Riau, Bengkulu, Yogyakarta, Bali and NTB province of Indonesia. He is a Civil engineer with specialization in various aspects of water and waste management. He is 37 years old.

In 1994, BORDA started to develop reliable and cost-efficient wastewater treatment systems, which could efficiently treat highly polluted organic wastewater. DEWATS (Decentralized Wastewater Treatment) applications have been implemented for more than 30 clients in India/China and for more than 80 in Indonesia. A new approach to cope with sanitation issues in high-density populated urban areas has been developed since. The community based sanitation (CBS) approach fills the significant “gap” between inappropriate on-site sanitation and the shortcomings of conventional centralized sewerage collection and treatment systems. The presentation will show the basic philosophy of DEWATS and CBD, discuss main steps for its implementation, describe the different hard- and software modules and show positive examples as well as lessons learnt during the last 5 years of implementation in Indonesia.

Engineered Reed Beds for the Treatment of Domestic Sewage
Gerardo F. Parco

Engineered Reed Beds are natural treatment systems, which are widely used for the removal of contaminants from domestic and industrial wastewater. These systems are long, plastic lined channels filled with appropriate soil media. Reeds are allowed to take root in the media leading to a subsurface zone filled with root material.

The removal of contaminants happens through different mechanisms. The major mechanism for removal of organic contaminants is rhizodegradation. This is a general term that describes the breakdown of organic compounds in the root zone. The reed plant used in chosen for its ability to form root structures that encourage the growth of both aerobic and anaerobic cultures. This leads to aerobic and anaerobic microenvironments within this zone.

The specific reed used is *Phragmytes spp.* This is an endemic species in the Philippines. There are three common sub-species of *Phragmytes*. There are several existing engineered reed beds in the Philippines. They are used mostly for the treatment of industrial wastewater. The use of the engineered reed beds for the treatment of domestic wastewater is not common in the Philippines. A new project of UP, GTZ and ADB will be establishing the first such treatment unit to demonstrate the advantages of this system.

Mr. Gerardo Parco is an Assistant Professor in the Environmental Engineering Graduate Program of the College of Engineering, University of the Philippines, Diliman. The main research interests of Engr. Parco are in the areas of Biological Nutrient Removal, Treatment of Wastewater using natural systems such as wetlands and reed beds and the development of compact wastewater treatment systems. He is a regular lecturer in the Environmental Engineering lecture seminar of the National Engineering Center of the University of the Philippines, and the Philippine Institute of Chemical Engineers (PIChE). Engr. Parco has served as Environmental Consultant to a number of companies and institutions. He also works for the GTZ and was in charge of the Sanitation Baseline Study. Engr. Parco is a graduate of the Philippine Science High School and did his B. Sc. Degree in Chemical Engineering at UP Diliman. His graduate studies were done at the University of Hong Kong. He is 40 years old.

Mr. Parco will speak about engineered reed beds for the treatment of domestic sewage. He will give an overview on the basic principles of an engineered reed bed. Their use is not common for the treatment for domestic wastewater as they are mostly used for the treatment of industrial wastewater in the Philippines. A new project of UP, GTZ and ADB will be established, which comprises the construction of such a domestic wastewater treatment unit.

Sanitation: Expensive, but Necessary
Considerations in Financing Sanitation
Jemima Sy

Official statistics suggest that somewhere in the order of 2.4 billion people do not have access to "improved" sanitation. Eighty percent (1.9 billion) live in Asia. Over the past twenty years progress has been slow. Between 1990 and 2000 an estimated additional 1 billion people have gained access to "improved" sanitation, but this has been insufficient to keep pace with population growth. However, the reported success of the East Asian region where percentage coverage doubled, provides a somewhat distorted picture. The rapid rate of improvement in the better performing countries (e.g. Malaysia, coastal China and Thailand) belies the severe deficiencies in sanitation in the low-income countries in the region such as the Philippines.

The sanitation sector therefore presents one of the most significant service delivery challenges associated with poverty reduction in the Philippines. The lack of adequate sanitation in both rural and urban areas has had severe and continuing health and environmental consequences.

While the impact of inadequate sanitation services is great, investment in the sector is not forthcoming. To reach the goals of the new Clean Water Act, it is estimated that annual investment in the sector must reach Php 35 billion from its current historical level (between 1999-2003) of Php 5 billion.

The presentation offers a perspective on financing sanitation projects. First, it reiterates the need for increased investment in sanitation and hygiene to avert economic losses brought by poor environmental health. The presentation then discusses issues related to sanitation financing and investment decision-making. In the context of a wide gap in financing services and the constraints faced by the public sector, a financing strategy to support sanitation services is not only concerned with finding the money, but mobilizing & leveraging resources from all sources, especially from the households; using available funds efficiently and laying incentives to ensure improving performance and sustained services.

Ms. Jemima Sy is the Country Team Leader and Institutional Development Specialist in the Water and Sanitation Program – East Asia and the Pacific (WSP-EAP) of the World Bank. Her key skills areas are law and regulatory reform for natural resources; institutional development (national-local government relations, capacity-building); communications and research regarding water supply, natural resources law, participatory and qualitative and basic quantitative techniques; program development, design and management in the fields of water supply and sanitation, rural incomes, environment, health, HIV and population and non-government facilities. She did her Master of Law and Bachelor of Arts (communication) at the University of the Philippines.

The presentation will offer a perspective on financing sanitation projects. First, it will reiterate the need for increased investment in sanitation and hygiene to avert economic losses brought by poor environmental health. Ms. Sy then will discuss issues related to sanitation financing and investment decision-making. In the context of a wide gap in financing services and the constraints faced by the public sector, a financing strategy to support sanitation services is not only concerned with finding the money, but mobilizing & leveraging resources from all sources, especially from the households; using available funds efficiently and laying incentives to ensure improving performance and sustained services.

Development of Sanitation Sourcebook and Decision Aid

Virgilio A Sahagun, Antonio E. Kaimo, Joselito M. Riego de Dios and Joey C. Roncesvalles

In 2003, the Water Supply and Sanitation Performance Enhancement Project (WPEP) completed a study on urban sewerage and sanitation. The Study confirmed the prolonged lack of activity and investment in the sector primarily due to the scarcity of adequate and simplified information on appropriate, low cost sanitation options for the disposal of excreta and wastewater. Thus the need to develop a sourcebook for sanitation and provide the basis in selecting the appropriate technology.

The proposed Sourcebook will function as a tool for analysis and advocacy by setting out the basic knowledge and principles about sanitation issues relevant to planning and informing about practiced solutions in specific and typified situations. The Sourcebook builds on existing bodies of knowledge and reference materials on technical sanitation options developed by academic, research and technical assistance agencies. The Sourcebook will be most useful to sanitation service providers, planners and investment decision-makers in the government as well as the private sector.

The Sourcebook seeks to typify the sanitation situation in four communities and small enterprises in order to provide a context for assessing options and decision-making. In this initial project phase, the typified situations are: blighted settlement (residential) community, coastal residential community, public hospital and public market. The development of the Sourcebook has only commenced. In this presentation, the focus will be on the technological choices for sanitation.

The sanitation options cover (a) Toilet systems – individual and community, (b) Collection systems – conventional and small bore sewerage, (c) treatment systems – anaerobic reactors, septic tanks, constructed wetlands, etc., and (d) Disposal/reuse of effluent and sludge – soil infiltration, waterways, sludge drying bed, etc. The description and technical features of each of the options are provided.

Draft Selection Matrix - Tables 1, 2 & 3 - are presented to aid in the decision process in the choice of the most appropriate sanitation option. Each Table is a matrix of the sanitation options against parameters descriptive / definitive of the site situation. Tables 1 & 2 present the most common sanitation alternatives while Table 3 presents alternatives for ecological sanitation or closed loop systems.

To select the most appropriate sanitation option, a three-level analysis is presented: (i) 1st Level – Determine several applicable technology options suitable to the Site or community situation; (ii) 2nd Level – Subject the 1st –level choices to cost and affordability analysis; and (iii) 3rd Level – Subject the 2nd –level choices to community acceptability.

The Guideline for the use of the Selection Matrix is presented, including an example of the selection process using a typical residential community situation.

Mr. Virgilio Sahagun is a Hydrologist and Teamleader at the Radian Consulting, Inc. since 2001. He provides technical input and project reviews to various local projects of the firm, in particular hydrologic studies for flood control and drainage of private development projects, site investigations, etc. Mr. Sahagun took part in the development, drafting and finalisation of the sanitation sourcebook, which is a GTZ and World Bank project. He holds postgraduate credits in engineering, graduated in water resource engineering and did his Bachelor of Science in agricultural engineering. In addition he is a member of the Philippine Water Works Association and is 51 years old.

His presentation will deal with the initial findings of the sanitation sourcebook. It will function as a tool for analysis and advocacy by setting out the basic knowledge and principles about sanitation issues relevant to planning and informing about practiced solutions in specific and typified situations. The sourcebook will be most useful to sanitation service providers, planners and investment decision-makers in the government as well as the private sector.

Assessment of the Sanitation Infrastructure and Practices in Negros and Bohol

Sheree Ann Pagsuyoin and Anne Kleyböcker

A Baseline Assessment of the Sanitation Infrastructure and Practices was carried out in the Provinces of Bohol and Negros Oriental from July to September 2004. The study was carried out through household surveys; focused interviews with key persons; conduct of focused group discussions; and site inspections of sanitation facilities, agricultural areas, and water sources. Pertinent data were also gathered from the different offices at the barangay, municipal, and provincial level. The common toilet facility for both provinces was found to be the water-sealed pour-flush pit latrine, and is usually located outside of the house. The people generally prefer washing for anal cleansing. In some areas where water is scarce, wiping with indigenous materials such as coconut husks, leaves and corncobs is preferred. Almost half of the population is using urine to fertilize backyard ornamental plants. While there is openness to handle and use human excreta for agricultural purposes, respondents would like to see an actual working ecosan system before they embark on similar endeavours. Technical training, health-related concerns of excreta handling as well the costs of installation and maintenance were among the raised issues.

Ms. Pagsuyoin-Latayan is a faculty member at the Department of Chemical Engineering, University of the Philippines-Diliman. She is currently finishing her M.Sc. degree in Environmental Engineering at the same institution. Her thesis work is on the adaptability of ecosan systems to selected municipalities in the Bohol Province. Her fields of experience include wastewater engineering, electronic waste management, acid mines and sanitation systems. She is 26 years old.

She will present the background and accomplishment of the Baseline Assessment of the Sanitation Infrastructure and Practices, which took place in the Provinces of Bohol and Negros Oriental from July to September 2004. The study was carried out through household surveys, focused interviews with key persons, conduct of focused group discussions and site inspections of sanitation facilities, agricultural areas and water sources. Pertinent data were also gathered from the different offices at the barangay, municipal and provincial level.

Ms. Anne Kleyboecker is a trainee at the GTZ Water, Sanitation and Solid Waste Program since the end of August this year. Together with two students of the UP (University of the Philippines) she conducted a sanitation assessment in Bohol. From May to July she did an internship at the supra-regional GTZ ecosan-project. She studies civil engineering with the specialisation in water supply, wastewater management and geotechnical engineering at the Technical University Berlin and is 26 years old.

She will present the initial findings of the Sanitation Assessment done within Bohol and Negros. Ms. Kleyböcker will talk about the common sanitation infrastructure, which was found in the provinces, the attitudes and behaviour of their inhabitants and the assessed applicability of ecological sanitation in relation to the concerns of the people. She will discuss the recommendations based on the findings of the assessment team.

Local Initiatives for Affordable Wastewater Treatment (LINAW)

Lisa Kircher Lumbao, Project Manager

Domestic and industrial pollution caused by rapid urbanization and industrialization pose significant health risks and long-term economic consequences for the Philippines. According to the World Bank, only 6 out of 115 Philippine cities have sewerage systems, resulting in a high incidence of water-bome diseases responsible for over 30% of all reported illness from 1996 – 2000, and P2.3 billion a year in lost income. To address this enormous problem, the Philippine Congress has passed the Clean Water Act that requires local government units (LGUs) to play a central roe in water quality management.

LINAW

Recognizing the impact of water pollution on quality of life in urban areas, four Philippine LGUs are taking a proactive role in developing innovative solutions for reducing pollution. Naga, Iloilo, Dumaguete and Muntinlupa Cities are engaged in Local Initiatives for Affordable Wastewater Treatment (LINAW), a two-year project to identify and develop solutions to wastewater pollution. In particular, they are pilot testing small-scale, low-cost treatment systems and developing plans and projects for longer-term solutions to their domestic wastewater challenges. LINAW is supported by the United States Agency for International Development (USAID) through the United States-Asia Environmental Partnership (US-AEP).

Program Activities

Under LINAW, the four participating LGUs are developing strategies interventions and solutions based in a participatory action planning process where city officials and stakeholders work together to identify and develop priority projects. LINAW assists LGUs in the process through:

- Targeted technical assistance, including project design and packaging support;
- Site visits to learn about best practices;
- Participatory planning workshops;
- Information and resource materials on technology and financing options;
- Public awareness campaigns; and
- Sharing project results in both local and national forums.

Operating under a two-track program, LINAW supports development of short-term projects that address immediate pollution problems selected by the cities, including public markets, slaughterhouses and new relocation site developments. For the second track, LINAW addresses medium term efforts to develop septage management systems, which require more comprehensive assistance in planning, project design, technology and financing solutions, project packaging, and outside funding.

Ms. Lisa Kircher-Lumbao is an environmental and communications specialist with over 12 years of experience working in the Philippines and other Asian countries. Among other things she is the Project Manager of LINAW-USAID (Local Initiatives for Affordable Wastewater Treatment – United States Agency for International Development) in the Philippines, which is promoting the adoption of low-cost technology for wastewater treatment in Naga, Iloilo, Dumaguete, and Muntinlupa. Ms. Lumbao holds a master degree in environmental management from Yale University and is certified as a Qualified Environmental Professional.

She will introduce LINAW and its program activities. LINAW is a two-year project supported by the USAID through the United States – Asia Environmental Partnership (US-AEP). Operating under a two-track program, LINAW supports development of short-term projects that address immediate pollution problems selected by the cities. For the second track, LINAW addresses medium-term efforts to develop septage management systems, which require more comprehensive assistance in planning, project design, technology and financing solutions, project packing and outside funding.

"When Municipal Waste becomes Liquid Waste – Options for Minimization and Treatment of Contaminated Water out of Solid Waste Disposal in the LGUs San Carlos City and Bais City, Negros Island"

Klaus Hanuschke

Changes in lifestyle caused by development, urbanization, population growth and industrialization change the volume and types of solid waste in many countries. Increasingly, people consume more goods and services needed. This results in greater resource wastage and consequently increases solid and liquid waste production. However, many municipalities in the Philippines are incapable to upgrade their solid waste management accordingly. Uncontrolled waste burning as well as scattered or uncontrolled waste dumping remains the common waste management practices. Consequently, the actual leach ate generation and mobilization of contaminants out of solid waste is not known.

The RA 9003 otherwise known as the *Ecological Solid Waste Management Act of 2000,* assigns LGUs with the implementation and enforcement of ecological solid waste management systems within their jurisdictions. So far, only some LGUs started to implement modernized SWM systems. Consequently, many municipalities continue to practice uncontrolled waste disposal, without any knowledge about generation and remain of leach ate production. The latter may affect the quality of surrounding water resources and inhibit avoidable risks especially for the water supply. The German Development Service (DED) supports LGUS San Carlos City and Bais City in their efforts to improve environmental management systems focusing on solid and liquid waste. As part of that a Sanitary Landfill was constructed and implemented in Bais City in the year 2003. San Carlos City is in the planning stage for an Eco(logical)-Center with components such as Material Recovery Facility (MRF), Composting Area, Sanitary Landfill and Waste Water Treatment Facility.

Out of the common practice of uncontrolled dumping leach ate is trickling in the underground where it is contaminating the groundwater aquifers or caused by dumping in riverbanks it is polluting rivers and consequently the costal area. The also common practice of dumping household waste in the closest drainage system affects negatively the efforts of LGUs in sanitation and wastewater treatment.

Based on the situation of the LGUs San Carlos City and Bais City the potential of leach ate generation out of domestic type waste and options for monitoring, control and site improvement are discussed. Suggestions for low cost options of minimization and treatment of leacheate are submitted.

Mr. Klaus Hanuschke is a DED (German Development Service)/GDS Consultant assigned in the LGU (Local Government Unit) of San Carlos City, Negros Occidental, Philippines. He consults the LGU and Local Waste Management Board in their Solid Waste Management Project and the City Engineering Department in Waste Water Management. Mr. Hanuschke has been in the Philippines since 2003 and works for the DED. He studied civil engineering with specialisation in environmental engineering (underground engineering, water management, waste management). He is 38 years old.

His presentation deals with observations towards leachate generation out of solid waste disposal and low-cost options for minimization and treatment of leachate in the LGUs San Carlos City and Bais City, Negros Island. The DED supports the said LGUs (Local Government Unit) in their efforts to improve environmental systems focusing on solid and liquid waste. As part of this support a Sanitary Landfill was constructed and implemented in Bais City in the year 2003. San Carlos City is in the planning stage for an Eco(logical)-Centre with components such as Material Recovery Facility (MRF), Composting Area, Sanitary Landfill and Wastewater Treatment Facility.

Biogas Technology: From WASTE to WEALTH
Romel Urgel

1. What is BIOGAS?

Biogas, which is mainly methane, is a gas produced from the digestion of organic materials in an oxygen-free environment (anaerobic fermentation).

2. Why Should I be Interested in Biogas?

Proper Disposal of Organic Waste:

Household waste, especially from backyard piggeries and poultries, are usually disposed in open-dug pits which are messy, odorous and often are breeding grounds for mosquitoes, flies, rats and pathogenic bacteria. This system of waste disposal threatens the ground water through the infiltration of pollutants.

This scenario creates health hazards as well as potentials for conflict with neighbors.

Energy from Biogas:

Methane, which is a main component of biogas, provides cooking fuel for household use as well as energy for other gas-operated appliances such as: refrigerator, iron, and lamps. On a large scale, this can even provide power to run generators and provide electricity.

Organic Fertilizer and Pesticides:

The digested waste from the system is 90% pathogen free and very high in nutrients, which are vital for plant growth. As opposed to open composting, nutrients from the waste are merely broken down into simpler forms and are not oxidized. This translates to its high value as an organic fertilizer, soil conditioner and as a biological pesticide.

3. How Much Do I Stand To Save If I Have A Biogas Digester?

4. What Are The Raw Materials for Biogas Production?

5. Schematic Diagram of Biogas Production

6. Biogas Models (Backyard & Big Farms)

Mr. Romel Urgel is the Science Research Specialist 1 from the Department of Energy, Special Project Renewable Energy Management Division since 1997. He is responsible for the promotion of the Renewable Energy System (RES). Mr. Urgel gives lectures, trainings and handles the technology tranfer of RES. In addition his duties are consultancy, design and installation of RES, linkages and networking with LGUs, NGOs and POs for promotion of RES. He holds a Bachelor of Science in mechanical engineering and is 43 years old.

His presentation, entitled “Biogas: From Waste to Wealth” promotes the biogas digester system as an acceptable and appropriate technology for proper waste management. It will also discuss the definition of biogas, the digester system, raw materials for biogas production, biogas applications, the energy from biogas and the utilization of digester slurry and effluent.

Child-friendly Latrine Principle

Edgar Viterbo, Plan Phils.

Global water consumption is fast accelerating and in 20 years time it will be twice the rate of population growth. As main stakeholders, children can play a vital role in their sector at their evolving capacities if represented in a community watsan program, to sanitation in particular. Program direction needs to take off on children's welfare while reinventing the family tradition to ensure sustainability.

Evolving from the cultural practice of sanitation into a perspective of social and ecological distinctions, child-focus watsan reinforces the community development sector in the Philippines in deviating but enhancing the watsan tradition with child-friendly features as its own uniquencess.

Children are in the heart of everything we do. As the main recipient of the watsan reformation, the children's needs are Interpreted with their non-homogenous state and strategically linked with the usual involvement of adult stakeholders. With the people empowerment aspect of the approach, children's needs are addressed and their participation facilitated in 3 different age ranges.

CONCEPT CHART

CHILD AGE	INPUT	PROCESS	OUTPUT
C1 (0-5)	Accessibility	Introduction and sustainability	Habit
C2 (6-12)	Education	Practice and interaction	Motivation
C3 (13-17)	Participation	Ecological development	Character

Child 1. Child focus watsan assists families to rediscover life's advancement through good health and environment. Their watsan facilities supported by related holistic programs are equitably provided to address the need of innocent children in the form of water supply and domestic latrine at home. Parents act as hygiene teacher.

Child 2. Child focus watsan espouses learning programs to enable children grow with their maximum potentials. The partnership between the second parents in the school and the first teachers at home brings in a venue and communication where a child can suggest and learn. Through the watsan facilities in the school a child discovers the importance of an carries out good grooming in an environment he also controls. He gets the message from school and brings it home where everyone confirms it not also learns.

Child 3. Child focus watsan encourages child's involvement in the community development while he continues to learn from school. His suggestion forms part of the options representing his sector and he provides efforts to implement on agreed watsan and other related projects. He learns the message from both the school and the community and shares them at home where he gets appreciated and trusted in.

What is child-friendly latrine principle?

Child-friendly latrine is the ACE latrine if the country aspires to help achieve the MDG target in the earliest possible time adopting as its entry point in a rural watsan programme. A child-friendly latrine in principle must highlight accessibility, cute and ecosan (ACE) features. This comprehensive concept can be observed as we appreciate it as an approach.

Accessibility – location, ownership and replication. Sitting the toilet at least a wall away from a house enables children including mothers to use it anytime of the day even on bad weather. The bucket latrine support becomes a thing of the past. Discouraging toilet sharing between neighbors or even families secures additional privacy especially for the adolescent girls.

House-attached latrine implies the real perception that it is a dwelling component or extension. It increases the floor area so to speak. Family's ownership is clearly manifested and therefore their contribution becomes mandatory or self-initiative even without requiring them. When erected adjacent a house it saves superstructure construction materials and if installed inside, needed counterpart becomes lesser but the excitement to own and use a latrine becomes greater.

Leading the family to maximize its counterpart according to capacity enhances sense of ownership of the project and of the process that concerned implementing agencies can harness as a strategy for replication to other programs area thereby scaling up. However, this requires hygiene advocacy intervention for sustainability where again children can play vital roles with what the school health education teaches.

Cute: configuration, made and function. The families popularly prefer seat type to the squat type water seal bowl to harmonize the practice of adopting water for anal cleansing. Its smaller size than the regular simply makes flushing and cleaning easier with only small amount of water. The ceramic water sea bowl's small size and narrow lid opening attracts kids to use it with confidence and comfort by installing it near a wall for their support. The bowl with its usual elegant white color and glazed finish is commercially available in town centers. Washing hands after defecating becomes convenient because the bowl is odor free and the families are willing to build water skinks nearby. It gives self-esteem to the family, since it looks like a city-style toilet.

Ecosan: The Transformation. While-child friendliness becomes a core aspect of the household sanitation, ecological values are also there to contribute to sustainability and replication. Features to safeguard the environment and boost attitudinal change are built-in through the following technical aspects:

Wastewater segregation. Turning away greywater from forming sewerage significantly immobilized pathogens from traveling farther underground when deposited with the feces inside drug pit. The wastewater is conveyed to separate disposal area. As it travels gradually thru a simple ditch towards a soakaway pit, the wastewater can naturally irrigated the vegetation along the path or around the disposal area.

Common dug pit. Sharing dug pit properly located with individual sanitary bowls saves are and serves more families. It also encourages cooperation and matures concern among stakeholders for proper operation and maintenance of their toiler as sanitation system.

Offset dug pit. Locating dug pit distant from the toilet has been in the beginning intended to address rural perception that fixing a bowl over is unsafe and non-hygienic. It also prevents nearby well from being contaminated. However, double pit will be ideal so that when already filled the system can essentially serve to:

- Facilitate composting thereby educating the community to treat waste as a resource.
- Ease maintenance and save cost of desludging, and
- Avoid the risk of handling sludge and dumpsite location problem.

Pit lining. Indigenous and recycled materials as an alternative for pit lining do not only reduce cost and simplify construction but are also environment-friendly important. Riprap, junked rubber tires, steel drums, bamboo and other wood poles can be adequate to resist soil collapse and provide pit wall stability.

Sand envelope. In areas where water table is less than 1.50m below dug or leaching pit bottom, an average of 0.80m thick sand surround is provided to control seepage of effluent. As the situation normally happens in coastal areas where sand is abundant, the same sand is to serve as the filtering materials by sieving to attain 0.8mm size when larger sand fraction exceeds 25%.

A child focus watsan aims to train children and share knowledge within the spheres of community, school and family where the latter acts as the basic part of a society. With good health and respect to the environment the future shall depend on the child when he eventually serves the country.

Mr. Edgar Viterbo is a technical coordinator (country advisor) for the Water and Environmental Sanitation Program at Plan International Phils in the Philippines since 2002. He is responsible for the concepts and the design of the country's Water and Sanitation Program in the Philippines. This includes quality control, monitoring, evaluation and the integration of other programs. In addition he provides support to the watsan program planning, implementation and human resource development by its units. He did his Bachelor of Science in civil engineering and is 48 years old.

The title of his presentation is "Child-friendly Latrine Principle". Plan believes children play a vital role in the interaction between the program implementers, the communities and local governance in enhancing hygiene. Through partnership a sanitation program with appropriate technology options can be sustainable and eventually replicable, if good and environmental friendly practices are improved and not disregarded. This trategy will enable families to understand that a toilet is vital among other sanitation components just like a kitchen or bedroom that is being regularly used, maintained and valued in a household.

Rainwater Utilization – a key to improve Drainage, River and Water Resource Management

Johannes G. Paul

Development relies heavily on the availability of fresh water resources. Insufficient water supply hinders economical development as low-grade water supply restricts efforts to improve the health sector and sanitation. Rainwater is available, but often not utilized, because it is regarded as nuisance, treated as a waste and disposed respectively drained into the closest drainage system or river and from there into the sea, where it is *"lost"* as fresh water resource.

Rainwater, before hitting the earth surface, is in general a pure water source. And rainwater utilization is a practice as old as human society. Rainwater harvesting was applied for centuries and in many countries. It was only in the 19th century that groundwater reservoirs could be tapped on a larger scale following the development of drilling and pumping techniques and the invention of steam, electrical and fuel-driven engines. Consequently, groundwater resources were considered as the main target for fresh water supply, whereas rainwater utilization became less favorable.

The options and benefits of rainwater utilization are discussed for the sample LGU Bais City. Bais City is located at the eastern side of Negros Islan, 45km north of Dumaguete City, which is the provincial capital of Negros Oriental. The local rainfall in Bais is approximately 1,200 mm/m^2. If the roofs of the 13,000 houses in Bais City would be used for rainfall harvesting, theoretically 760,000m^3 rainwater could be collected, based on an average roof area of 70 m^2/house and a collection or institutional buildings (schools, colleges, churches, markets, city buildings).

In the year 2000, the local water district supplied a total of 617,000m^3 fresh water. The comparison of provided water supply and the *"lost rainwater resource"* shows the immense potential to improve the local water supply, because rainwater is well suited to substitute the fresh water demand for less critical uses such as house and care cleaning, laundry, gardening, toilet flushing and animal raising. However, Bais City has more sealed surfaces.

According to the Bais City land use plan from 1996, almost 2,000 hectares are classified as highly sealed areas, which increasingly contribute to storm water run off instead of recharging groundwater reservoirs. However, the locations of area sealing often correlate with the main water consumption sites respectively groundwater extraction fields, where recharge is more critical. Assuming that 60 percent of the rainfall from these areas becomes drainage in Bais, a total discharge of almost 24 Million m^3/year results respectively 65,400m^3 average run off/day only from sealed surfaces.

Rainwater can be harvested at the points of consumption. Rainwater is a renewable resource and its utilization is linked with economical and environmental benefits. The set up of rainwater catchments systems can be designed in various scales and systems can be adapted to almost any requirement. Rainwater harvesting is in general a comparable simple and low invest technology for water supply and can easily be installed as decentralized water supply system.

Dr. Johannes Paul lives in the Philippines since April 2000. On behalf of the German Development Service he supports the City of Bais to improve the local Waste Management System. This project also aims to assist other LGUs in the Visayas to upgrade their Solid Waste Management. He holds both BSc. and MSc. in Geology from the University of Koeln in Germany and he did his Ph.D. in Environmental Engineering at the Washington International University, USA.

He will speak about rainwater utilization and will also present measures on how to improve drainage, river and water resource management. The options and benefits of rainwater utilization will be discussed for the sample LGU Bais City. Rainwater is a renewable resource, which can be harvested at the points of consumption. The utilization is linked with economical and environmental benefits. Its catchment systems are well adaptable and require only a low investment on technology.

Rotating Biological Discs (RBD) as low cost solution in rural areas

Klaus Waizenegger

STENGELIN GmbH & Co. KG was established in 1864. It is a medium-sized private company specializing in process development and manufacture of mechanical equipment in the section of environmental technology. During the past years approx. 2,000 waste water treatment plants have been equipped with STENGELIN technology.

Besides large municipal wastewater treatment plants which are equipped as activated sludge plants or as sequencing batch reactors, STENGELIN also has a patented Rotating Biological Discs system for the biological wastewater treatment of small plants. This type of plant is always applied where a very reliable treatment for small units with approx. 50 up to several thousand connected inhabitants with a simple and cost-saving technique is needed. The RBD units may either be installed in locally manufactured concrete tanks, or in precast concrete tanks, or in steel tanks. The energy consumption of the biological stage is only between 10 to 15 Watt per inhabitant and day – nearly unbelievable but true-!!! The use of solar power for the biological stage is therefore supposable.
The construction works for the plants may be executed with simple means on the plant site. The mechanical equipment including the RBD rollers may be produced in a large scale by local manufacturers using STENGELIN know-how.
The purification capacity of the RBD system has proved of value in over 1500 wastewater treatment plants worldwide. The degradation rate of the wastewater pollution is, based on the biological oxygen demand as an important parameter for the wastewater pollution, most regularly over 98 %. With this cost-saving, reliable plant technique a very important contribution may be made to the protection of the ground water and river waters also for small units due to the extensively biological degradation of the wastewater constituents.

Tuttlingen, September 2004
STENGELIN GmbH & Co. KG

Since 1989 Mr. Waizenegger is the single shareholder of Stengelin GmbH & Co.KG in Tuttlingen Germany. In addition he is a member of the Chamber of Industry and Commerce section Villingen – Rottweil – Tuttlingen (Chairman of the building committee) and a member of the VDMA (German machinery and plant manufacturers association; Vice President of the board of the group of process engineering). This year Mr. Waizenegger is nominated by the Chamber of Industry and Commerce as sworn expert witness for wastewater treatment plants. He graduated in civil engineering with specialization in traffic engineering, domestic water supplies and industrial management. He prepared a joint venture in Taiwan and did different projects in the United Arabian Emirates, Bulgaria and Russia.

His presentation deals with rotating biological discs as low-cost solution in rural areas. Besides large municipal wastewater treatment plants, which are equipped as activated sludge plants or as sequencing batch reactors, STENGELIN also has a patented Rotating Biological Discs system for the biological wastewater treatment of small plants. This type of plant is always applied where a very reliable treatment for small units with approx. 50 up to several thousand connected inhabitants with a simple and cost-saving technique is needed. The RBD units may either be installed in locally manufactured concrete tanks, in precast concrete tanks or in steel tanks.

Children's Hygiene And Sanitation Training (*CHAST)*

A newly developed approach for promoting personal hygiene among children living in the rural areas of Somalia

Susanne Peters

CHAST is a newly developed approach for promoting personal hygiene among children living in the rural areas of Somalia. Based upon the well-established Participatory Hygiene And Sanitation Transmission (PHAST) approach, **CHAST** uses a variety of exercises and educational games to teach children aged between five and 12 about the direct links between personal hygiene and good health.

CHAST grew out of a series of sessions held with schoolchildren in Northwest Somalia in the latter half of 2002, during which the exercises and lessons of PHAST were reviewed and adapted to suit the needs and understanding of young Somali children. The ensuing exercises seek to deliver fundamental hygiene lessons and information in a fun and memorable way – and a way that is conducive to the hygiene-conscious practices of daily Somali life and traditional Islamic culture.

By giving children practical lessons and tips on means to improve their own cleanliness and hygiene, **CHAST** aims to create a new channel for delivering these messages directly into local homes. The child-to child approach extends the normally used definition, ensuring that children's training on Hygiene and Sanitation will also have an impact on their families and peer groups.

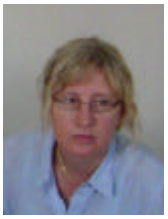
CHAST is based on the proven premise that personal hygiene practices are usually acquired during childhood – and that it is much easier to change the habits of children than those of adults. Because the PHAST approach was initially designed for adults, it has been carefully revised and adapted to suit the needs of young children. While children have less knowledge and experience, fewer responsibilities and a different conception of time and the future, they are also naturally inquisitive and eager to learn. The **CHAST** approach takes advantage of these natural attributes.

CHAST encourages children to actively participate in open discussions and, wherever possible, to share their experiences and ideas with their peers. Three characters – Aisha, Jama and Ali – have been created to encourage the children to speak out on specific topics, while a puppet named *Luuf* is passed around to encourage young or shier children to take part in the discussions.

In the **CHAST** exercises, children are encouraged to work independently in pairs or in small groups, and then to present their thoughts and findings to the larger group. Above all else, **CHAST** tools are meant to be fun – involving games, exercises and role-plays that prompt the children to discuss and genuinely understand the key issues related to personal cleanliness and hygiene.

The PHAST methodology is an innovative approach developed in 1993 to promoting hygiene, sanitation and community management of water and sanitation facilities. It is an adaptation of the SARAR[1] methodology of participatory learning, which builds on people's innate ability to address and resolve their own problems. It aims to empower communities to manage their water and to control sanitation-related diseases, and it does so by promoting ***health awareness and understanding*** which, in turn, lead to environmental and behavioural improvements. PHAST uses methods and materials that stimulate the participation of women, men and children in the development process. It relies heavily both on the training of extension workers and on the development of graphic materials that are modified and adapted to reflect the actual cultural and physical characteristics of communities in a particular area.

The PHAST Approach ('Participatory Hygiene and Sanitation' Transformation')



Ms. Susanne Peters is a CIM Expert and works for the PPDO (Provincial Planning Development Office) of the province of Bohol since August 2004. She worked in Somalia for four years before she came to the Philippines. She worked for Caritas Switzerland / Caritas Luxembourg and was a Water Delegate for the EC-funded projects, Rural Water Supply and Community Management; Water, Sanitation and Hygiene 'WASH'; and Rehabilitation of Rural Schools in Northwest Somalia. Her areas of expertise are project management, inclusive of financial management and accounting, rural water supply, including hygiene and sanitation promotion and monitoring, design and construction of irrigation infrastructure, watershed management and erosion control measures (hydrology, climatology and aerialphotography interpretation). She graduated as a civil engineer specialised in water engineering.

Ms. Peters will present a newly developed approach for promoting personal hygiene among children living in the rural areas of Somalia. A variety of exercises and educational games are used to teach children aged between five and twelve about the direct links between personal hygiene and good health. CHAST is based on the proven premise that personal hygiene practices are usually acquired during childhood – and that it is much easier to change the habits of children than those of adults.

Elisea Gozun

Ms. Gozun is the former secretary of the Department of Environment and Natural Resources (DENR) from 2002 to 2004. The Clean Water Act was enacted during her term. She also used to be the Philippine Coordinator for World Bank projects. She holds the Bachelor of Arts and the Bachelor of Science (social work). In addition she studied environmental management (thesis candidate). This year she was certificated as Doctor of Environmental Management (Honoris Causa).

Felix Tañedo

He is the Project Leader at the HPPO (Helvetas Philippines Programme Office) Program for Governance & Rural Empowerment Support Services (PROGRESS) since 2002. In this context he is involved in the SODIS (Solar Water Disinfection) Program. Mr. Tañedo did his Bachelor of Arts at the University of the Philippines. He is 48 years old.

He will speak about the technology and the experience of the SODIS Program in Palawan. The HPPO (Helvetas Philippines Programme Office) plans to implement solar water disinfection (SODIS) projects in the provinces of Northern Samar and Palawan for the remaining two and a half years of progress as an alternative technology of water treatment. SODIS will not only address the lack of access to water supply schemes but also improve household hygiene practices and the reduction of waterborne diseases such as diarrhoea, amoebiasis, gastroenteritis, etc. in the beneficiary communities of the two provinces. In addition Mr. Tañedo will give an overview on the SODIS principles.

Ahmon Ledesma

He works for the AID Foundation, Inc. Bacolod City in the Philippines since 2002. As the Foundation's section coordinator, Mr. Ledesma is responsible for promotion and marketing. He is a Bachelor of Arts (philosophy) graduate. In addition he attended several seminars and trainings such as Basic Ecology, Malagasy Early, Rice Planting System, Legal Arsenal on Environmental Law and IFOAM (International Federation of Organic Movements). As a resource person, Mr. Ledesma shares his experience on Organic Farming Principles and Concepts to NGO's, cooperatives, POs (Provincial Offices) and DAR (Department of Agrarian Reform) – ADB (Asian Development Bank) ARCP (Agrarian Reform Communities Projects). He is 43 years old.

He will present the hydraulic ram pump as an important water pumping technology for upland communities. The presentation will be a combination of a sample of the upliftment of an upland farmer through the use of a ram pump on one hand. On the other hand he will speak about how this pump works, its advantages in operation, repair and maintenance and the advantages of local manufacturing. The presentation will also deal with the possible outputs and the parameters for a ram pump system.

Carmelo Gendrano

He is a water and sanitation expert at the Philippine Centre for Water and Sanitation (PCWS) since 1998. His educational background is agricultural engineering and environmental management (undergraduate). He is 49 years old.

Mr. Gendrano's presentation deals with the experience of this water NGO in developing and using appropriate technologies in its work. Cited are existing best practices, computer-based design decision systems using benefit-cost approaches; and specific technologies such as ferrocement. Possible future directions in appropriate technology development and dissemination will be suggested at the end of the presentation.

Nilo Jardeleza

Mr. Jardeleza is a civil engineer in private practise. He is not only a farmer and businessman, but also an instructor at the College of Engineering, Western Institute of Technology since 1997. As a member of the KahulaganSang Panimalay Foundation, Inc. he is the trustee since 1990. He is 51 years old.

His presentation deals with rainwater harvesting. He will explain the ecosystem and discuss different rainwater harvesting methods such as for domestic supply, for commercial and industrial use, for agricultural use and for the community. Finally he will present different types of jars such as the ferrocement jar, the thai jar and the non-steel cement jar.

Areas for follow-up action and framework for facilitating Sanitation Programs

Introductory Presentation

On what topics would you like to organize focus group discussions?

Initial Ideas for the Groupings

- DEWATS/CBS
- Reedbeds – rural and urban
- Financing mechanisms
- Social Marketing for Sanitation
- Raw Water Pricing
- Ecosan
- Biogas
- Rainwater Harvesting

Final Groupings and Resource Persons

- DEWATS/CBS - Frank Fladerer
- Reedbeds in Urban and Rural Settings – Roland Mueller and Gerry Parco
- Biogas – Rommel Urgel and Bobby Bajenting
- Ecosan – Florian Klingel and Anne Kleyboecker

Focus: What are the main implementation issues and solutions in the areas of:

- Technology (i.e. operations and maintenance, relevant institutional arrangements)
- Social (i.e. demand, social marketing)
- Financial – affordability and sustainability

Reed Beds Group

Engineered Reed Bed System
Group Discussion Results

Demonstration Project

- Interest is high for the

Communities interested in Demo Project

- Bantayan
- Bohol
- Victorias
- Negros Oriental

Project Concept

- Small scale
  - 50 households
- Formation of community council
  - Monitoring of the reed bed
  - Social marketing of the system
- Financial scheme should be presented
  - Cost per household
  - Secondary benefit of the system

Issues of Reed Bed systems

- Area requirement
  - More applicable for rural areas or urban fringe
- Need for pretreatment
  - Septic tank still necessary
  - Management of septage
- Technical support
  - Need for continuing technical support

Financing scheme

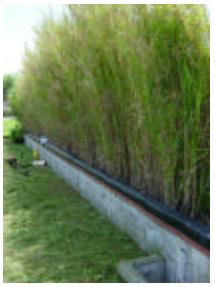
- Possible interest for SME - integration
- LGU money
- Cost recovery schemes

Enhancement of Reed Bed Systems

- Use of reed bed as borders
- Harvesting of useable parts of plants. e.g. Brooms from flowers.
- Linear plots of bed systems. land used as reed

Main Advantages

- Low maintenance and operating cost
- Aesthetically appealing
- State of the art



To do:

- Communities: Selection of possible sites for a demonstration area (November 15, 2004)
- Roland: Possible Integration of German companies
- Gerry/GTZ: Support /advising the communities for site selection / technical guidelines
- GTZ: Synergisms to other activities (common demonstration site???)

DEWATS Group

Participants

- Provincial Government of Negros Oriental
- LINAW
- City Government of Dumaguete
- Department of Health
- DILG
- Local Water Utilities Administration
- NGO (PWCS)
- University of San Carlos
- (GTZ - Environmental Program Indonesia)
- BORDA
- Stengelin WWT Technology

Technical Topics

- Questions on the Flexibility of the system
- Calculation and design parameters (e.g. retention time)
- Modifications:
  - prefabricated plastics
  - local materials for Anaerobic filter media
- How to dispose the sludge
- Reuse of Water, use of sludge as fertilizer, use of biogas
- Sanitation mapping

➢ There is a handbook with technical details, a revised version will be available in March
➢ DEWATS – Learning
➢ FF will provide files for including into symposium documentation

Social aspects

CBS principles:

- selection of client and beneficiaries - Demand responsive approach
  - For cities
  - For Communities (community self survey and others)
  - Gain communities commitment (tools)
- Guide ICC, jointly decide, agree upon financial planning, contributions for construction and O & M, O&M System and schedule = participatory planning
- O&M costs fully covered by beneficiaries

FF will provide files for inclusion into symposium documentation

Financial aspects

- Total costs of the system
  - Approximate cost per household is $180. Ideal number Of households is 100-200
  - A large system for septic sludge treatment serving 400,000 people would cost about $80,000
- Services by BORDA/partners
- Financing schemes models for different beneficiaries
  - Private/SME:
    - For A BOT financing scheme may be considered by BORDA for hospitals and other commercial establishments
  - New housing complexes (lower middle class) full cost recovery is possible
  - Poor urban settlements
- Financing: Matching funds for multi-source funding and/or PPP

Direct further Action

- The group was interested in establishing pilot projects in the Philippines
- 4 cities have already committed to pilot test DEWATS (3 LINAW cities - Iloilo, Naga, Muntinlupa and Sta Rosa BORDA will provide assistance through e-mail until January when they will establish an office here. LINAW will also assist them in 2 non-LINAW cities
- LINAW will spread information on DEWATS and other Low- cost options through the League of Cities of the Philippines and League of Municipalities and Philippine Association of Water Districts

1.
2. Technical:
   - Tailor-made
3. Financial:
   - Set of financing packages/schemes
4. Organizational:
   - BORDA set up in the Philippines
5. Action:
   - Finalize 1…3
   - Multi City/SME seminar
   - Respond on demand (15-20%)
   - ACT AND IMPLEMENT ASAP!!

BIOGAS TECHNOLOGY GROUP

1. Appropriate in Rural areas because availability of construction masons, workers and materials.

2. As a waste management to recycle / reuse for agricultural production, thus no discharge, no disposal to pollute the environment.

3. Urban settingpossibility of applying biogas in a holistic approach

4. Urban resettlement sites to incorporate biogas digesters fro sewerage treatment

5. BIOGAS in slaughter house

6. Easy operation and maintenance

IMPLEMENTATION ISSUES

- No IEC materials for social marketing
- No institutional mapping of Biogas Implementation
- No continuing research & documentation
- No implementing Mechanism

NEXT STEPS

- massive training materials
- Production of IEC
- Creation of Technical Task Force
- Incentive mechanism for implementors
- Come up with resolutions to DA,DILG,DE & OP,DENR,DEPED

SUPPORT NEEDED

LGU's to support activities

Can GTZ help out funds for reproduction, and others

For BIOGAS program (specific allocation)

Assistance for Ms. Sy in drafting the resolution

ECOSAN Group

Participants

Name
Alikpala, Ramon B. (Mr)
Baguilat , Teodoro Jr (Mr)
Cabanes , Romeo B. (Mr)
Cabrido, Antonio T (Mr)
De Castro, Leo (Mr)
Doloritos, Glicerio P. (Mr)
Lopez, Edgardo (Mr)
Mundhenke, Uwe (Mr)
Sahagun, Virgilio
Tagniam, Charlie
Victoria, Jesse Dela
Villamor , Rosavilla (Ms)

? Is ecosan a useful approach for the Philippines?

- ecosan projects?
- What are the strategies to introduce ecosan to the Philippines?

Is ecosann a useful approach for the Philippines?

Yes, because:

- it allows saving of water (important in areas with scarcity of water, such as Bohol)
- it is a solution to avoid frequent pollution of groundwater through seepage of wastewater from pit latrines, septic tanks,etc.
- poor farmer communities benfit from free fertilizer
- low - cost and advanced sanitation solution

What are the challenges for the implementation of Ecosan projects

Technical challenges:

- technical issues are not the major challenge, appropriate technologies are available
- situation (urban/rural, coastal/upland, etc.)
- pilot projects needed (especially urban)
- technology needed for safe handling/transport faeces
- information for technical design or supply of ecosan components needed

OUTPUT OF THE DISCUSSION

What are the challenges for the implementation of ecosan projects?

Social/Institutional challenges:

- sustainability of dissemination and awareness raising measures questionable if people's needs not properly assessed
- poor people easily practice reuse because they can't afford mineral fertilizer and/or flushing water, not because of environmental concerns, what to do with (less poor) people who have the choice?
- agriculture policy promotes and supports the use of mineral fertilizer

What are the challenges for the implementation of Ecosan projects

Social/Institutional challenges (2)

- water sealed toilets are provided for free, pit latrines recommended/provided for people with no sanitation
- change in behaviour difficult to obtain (people need to see direct benefit for themselves)
- difficult to introduce new concepts without political support
- regulations/laws not adapted to ecosan concepts
- successful examples needed to convince people
- are we ready to handle our waste?

What are the challenges for the implementation of Ecosan projects
Financial challenges:

- people need direct (economic) benefits (external positive impact is not the main concern for people)
- economic benefits need to be demonstrated clearly to convinvce people
- public financial support needed, especially in urban areas where public services (such as cdlection of dried feces etc.) are needed
- no extra cost when switching to the new system

What are the strategies to introduce Ecosan to the Phils?
On Political Level:

- Provide financial incentives (raw water pricing, tax advantages, subsidies, etc)
- Establish legal framework favouring ecosan solutions
- Promote ecosan solutions instead of environmental risky technologies (pit latrines)
- Push for organic farming, change practice of mineral fertilizer promotion

On project level:

- Gain political support
- Form cooperatives, or use existent cooperatives
- Implement pilot projects in different situations (Urban, rural, costal, farming communities, etc)
- More education and knowledge sharing

Next Steps

- Promotion on political level
- Initiatives for pilot project development: CAPS (already started), GTZ (in preparation), LGUs (hopefully), others (which ones?).
- Formation of an ecosan core group
  - Goals: knowledge exchange, promotion activites, joint pilot project development, marketing, etc.
  - Coordination of formation of the group, definition of objectives and first activities: CAPS (Leo De Castro)
  - Possible first activites: organise an national ecosan symposium engaging LGUs, GAs, NGOs, etc.; regional exchanges, e.g. round table discussions (health and sanitation ropund table Ifugao, Teodoro Baguilat Jr.), development of materials dissemination , etc.
- Who is interested in being active in the Ecosan core group? Discussion possible during the field trip!

Support by GTZ:

- Initiation of pilot project(s) in the Visayas
- Support to the ecosan core group
  - access to information and to the international network
  - follow up of formation of the group and its first activities
- Other needed?

Outputs and Next Steps

Outputs and next Steps

Demo sites (combined technologies)

- Follow-up contacts for support services, knowledge-sharing
- Resolution "Bohol Statement"
- Core group (Ecosan)

Strategic Framework Pillars

Resolution to Promote Ecologically Sound Water Supply and Sanitation Practice

The TARSIER STATEMENT

Technologies and concepts for Alternative/Appropriate Response for Sustainable and Integrated Environmental Recovery): A resolution adopted on the occasion of the First Symposium on Low-Cost Technology Options for Water Supply and Sanitation held from October 12-14, 2004 in the Province of Bohol, Philippines

WHEREAS, cognizant that even as we live in one archipelago with diverse cultural norms and values, socio-economic conditions and environmental settings, we firmly believe that we inhabit one natural and human eco-system;

WHEREAS, this belief bequeaths unto us the collective yearning to chart a common vision and work agenda in harnessing but at the same time conserving our natural resources particularly finite water resources for the survival and progress of mankind;

WHEREAS, integral in the optimum utilization of our water resources is our generation's immediate challenge of addressing mitigation of water wastage, wastewater treatment and reuse;

WHEREAS, there is also the compelling need to integrate proper sanitation concepts and designs in order for water programs to become truly sustainable and ecologically-sound;

WHEREAS, imbibing the above-mentioned philosophy, we, the 100 symposium participants from local government units (LGUs) and national government agencies, international and local experts, and representatives from NGOs, business sector, academe and other international and national civil society groups, have come together in this forum with a shared aspiration of accelerating water and sanitation programs and services in the Philippines;

WHEREAS, likewise, we realize this urgent need to unite under the banner of water and sanitation in order to achieve a cleaner environment and healthier population in line with the National Government's 10-Point Agenda, the Clean Water Act of 2004, the Ecological Solid Waste Management Act of 2000, and the United Nations Millennium Development Goals (MDG).

WHEREAS, based on the presentations, the personal exchange of ideas and our group deliberations, we have come up with the following points of agreement:

a. Stress on the environment is caused by increasing populations and inappropriate sanitation interventions;
b. The absence or inadequacy of sanitation facilities and services leads to significant health losses quantified at the cost of P3.3 billion a year;
c. A wide disparity exists between the treatment of sanitation programs vis-à-vis water in terms of public and private investments and policy emphasis;
d. There must be a shift in the current sanitation strategy to make a difference in health and environment particularly in adopting a philosophy that "closes the loop" through segregation, treatment, recycling and reuse of waste;
e. Formulation of sanitation schemes and interventions must consider the low economic conditions of the populace and the marginalized sector of society;
f. There is a roster of affordable low-cost technological options in sanitation that can be made available for adoption by urban and rural communities;
g. Low-cost technologies can only work if they could be matched with the various classifications of Philippine communities (i.e. upland, coastal, rural, urban, etc) taking into the account the specific needs, settings, cultural norms and values and technical requirements of the particular locality,

WHEREAS, we embrace the immediacy of specific and concrete action in promoting the use of environmentally sound and affordable solutions in the fields of sanitation, wastewater and sewage treatment, water recycling and reuse to improve public health and prevent an irreversible ecological collapse;

THEREFORE, in pursuit of the above premises, we, the stakeholders in the water supply and sanitation sector, resolve as it is hereby resolved, to:

a. Zealously disseminate information and share knowledge about the principles and concepts and low cost-technologies in water and ecological sanitation, recycling and reuse and other waste management systems;
b. Bear the initiative and determination to undertake pilot demonstration projects in these fields by the year 2005 or earlier in our respective towns, cities and provinces;
c. Coordinate efforts to influence and effect policy-decision making, legislation and regulation in the national and local levels;
d. Strive to open avenues for technical and logistical assistance coming from national and international agencies for local governments, small communities and civil society groups who wish to pursue water and sanitation projects;
e. Organize national and regional networks as an initial concrete step to follow up this recent initiative especially in continuing discussions that shall lead to planning and implementation of water and sanitation programs; and
f. Convert human wastes, by means of appropriate sanitation technologies, into a resource and translate into economic activities through the generation of biogas and organic fertilizers, recycling and reuse;

RESOLVE FURTHER to furnish copies of this resolution to members of this assembly and to endorse the same including the recommendations of the technical working groups in this symposium to the Office of the President and her cabinet members, the Honorable Members of the Philippine Senate and House of Representatives, the Judicial branch and law enforcement bodies and other concerned government agencies.

Note: *The foregoing statement is only a draft and is subject for further review before being finalized and distributed.*

SYMPOSIUM EVALUATION

POST-SYMPOSIUM EVALUATION

The following table is the consolidated evaluation ratings given by the participants based on the criteria enumerated. Highest rating in this five-point scale is five.

	1	2	3	4	5
1. Extent to which symposium facilitated the current state of decision making/planning/implementation of an appropriate water supply and sanitation system in your area	0	0	14.51%	53.22%	32.25%
2. Relevance of topics/presentations to your work	0	1.6%	18.75%	48.39%	40.32%
3. Extent to which symposium added value to your current level of know-how/experience on water supply and sanitation	0	4.8%	12.90%	35.48%	46.77%
4. Appropriateness of the selection of resource persons to your needs	0	0	11.29%	56.45%	30.64%
5. Format of the symposium (topics, presentations, exhibition, simultaneous marketplace, focus group discussions, etc.)	0	0	11.29%	54.84%	33.87%
6. Conduciveness of the venue for learning and sharing	0	0	16.13%	41.93%	41.93%
7. Rate the overall management of the workshop	0	0	1.6%	58.06%	40.32%

Summary of Recommendations

for Next Symposium

In their evaluation forms, the participants posed several concerns and recommendations. These are clustered into nine categories.

a. Financial:
   1. More discussions on financing and other aspects of sanitation, not just wastewater.
   2. Possibilities for funding not discussed.
   3. Ways to mobilize funds was not discussed.

b. Policies:
   1. There should have been a review or critique of the existing laws and policies.
   2. Sanitation regulations and policies. Legal issues on water treatment.
   3. What would NWRB have to say regarding these technologies?

c. Local Government Units
   1. I believe that some LGUs would like to know about other appropriate technologies on water supply systems and sanitation.
   2. Water supply was not presented nor discussed by any one of the speakers. This topic is very useful to us LGUs particularly the treatment of drinking water.
   3. Matching communities and technologies so that community planners would know offhand which is good for their area.
   4. For the LGU participants it would have been better for the presentations to be more tailored to their interest – more hands-on advice on what they can do on the ground.

d. Agriculture and aquaculture

   1. There was no discussion on the implications of gray water treatment for aquaculture.
   2. Agricultural chemicals for me are more lethal. However, deaths and diseases are not documented very well.

e. Health and safety
   1. Health issues – benefits/impacts of each technology.
   2. Biogas technology. Safety threat from leakage of gas was not discussed.

f. Gender
   1. Social and gender aspects/considerations.

g. Water Supply
   1. Most focus was on sanitation and less on water supply. Very few water supply system alternatives were offered.
   2. How to optimize water supply. About pilot projects, be sure it will answer needs and problems; some of the proposed pilot projects do not have the same environmental situation where the data was gathered, like poor and highly urbanized areas.
   3. Watershed management should also have been looked into.

h. Technology

   1. Old technologies not offered.
   2. Basis for wastewater treatment. Many participants don't know the basis. Wastewater treatment is still kind of magical for many participants.
   3. Most of the technologies mentioned are new and new models can be called "best practices".
   4. Focus on technologies for established poor communities.
   5. Collection treatment of sludge out of wastewater treatment
   6. It would be better to strike a compromise between natural techniques and technical plants.
   7. The disposal aspect of treated water particularly in industrial volume.
   8. Some technical terms should have been defined like what do we mean by BOD?

i. Monitoring

   1. Water quality monitoring is necessary to see the efficiency of these technologies in complying with environmental laws, rules and regulations.
   2. There should be feedback from the frontline implementing agency on the problems encountered in the project. It should be documented and a plan of action should be made.

DIRECTORY OF PARTICIPANTS

1ST INTERNATIONAL SYMPOSIUM ON LOW-COST TECHNOLOGY OPTIONS FOR WATER SUPPLY AND SANITATION

12-14 OCTOBER 2004

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1st International Symposium on Low-Cost Technology Options for Water Supply and Sanitation

12-14 October 2004

Bohol Plaza, Panglao Island, Bohol

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1ST INTERNATIONAL SYMPOSIUM ON LOW-COST TECHNOLOGY OPTIONS FOR WATER SUPPLY AND SANITATION

12-14 OCTOBER 2004

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