



## Regional challenges require teams of technical professionals

The theme of this issue of Technically Speaking is "Around the World" and, as such, the articles featured involve projects that have multi-jurisdictional impacts – ranging from large geographic regions that have been impacted by natural disasters, such as floods, tsunamis and hurricanes, to man-made events that cross political and physical boundaries, such as air emissions from landfills and power plants.

Golder's clients know that our traditional services involve understanding the physical, chemical and structural properties of air, water, rock and soil – physical media that change very slowly over time. This issue of Technically Speaking demonstrates how we have also responded to regional events that occurred relatively suddenly. We have learned from past experiences – what our clients tell us – that the timely response of teams of engineers and scientists, under the direction of experienced project managers, is of significant benefit to people in need due to natural disasters or man-made events.

Recent challenges some of our clients have experienced involve impacts to residential areas, farmlands, factories, refineries, pipelines, power plants, waterways and transportation infrastructure that were so extensive that the solutions required many people with varied technical backgrounds. Disaster response needs are vast and timely recovery requires a broad range of technical skills. With Golder's global network of operating companies and our focus on technical excellence, we are honored that our clients look to us to be part of the solution.

As the year comes to a close, we would like to take this opportunity to thank you again for placing your trust in Golder Associates.



Rick Firlotte  
President

### In this issue:

- Helping the growth of "green" wind and water power
- Effective disaster response in the U.S. Gulf Coast Region
- Protecting a delta and an energy resource in Indonesia
- Providing safe, emergency water for people in Guatemala
- Balancing local and global impacts of landfill gases
- Evaluating flood damage in eastern Germany
- Sharing water resources could lead to improved cooperation in Bosnia-Herzegovina and Croatia
- Understanding the impacts of a mine in Uganda



**Environmental assessment, Banda Aceh, Indonesia following the December 2004 tsunami. The project team included Martin Petersen (Golder UK) on the left and representatives of Oxfam and the UN Development Programme.**

## Helping the growth of “green” wind and water power



### **WIND AND WATER ARE BECOMING MORE VIABLE SOURCES OF ENERGY THROUGH A BETTER UNDERSTANDING OF THE TECHNOLOGIES AND ALSO OF THE POLITICAL AND REGULATORY HURDLES THAT MAY PRECLUDE THEIR USE.**

Wind power is seeing a strong growth in popularity, especially in Europe, in part because utilities using this method of power-generation are able to reduce their fossil-fuel emissions and gain carbon-trading credits for doing so.

Water power is also seeing renewed interest as well, particularly in the application of small, community-based installations that are able to provide power to perhaps a few hundred homes.

Many utilities are eager to diversify their energy sources away from fossil fuels such as oil, gas and coal, and in some cases away from nuclear energy as well. The key for many utilities is having a well balanced portfolio of energy sources, much the same as people diversify their financial investments.

What stands in the way of greater use of renewable energy sources are, in many cases, not technological issues. Rather, they can be the

limitations in the availability of quality sites for either wind or hydro power. This can be combined with community objections, e.g., the “not-in-my-backyard” syndrome, which can sometimes eliminate a potentially viable site due to aesthetic reasons or the perceived potential for adverse environmental impacts.

To help the growth of “green” energy, Golder supports the industry through many means including conducting geotechnical and wind potential investigations to determine the best locations, conducting environmental assessments, negotiating with regulatory authorities, working with community leaders to “sell” the idea, and making presentations at public meetings.

The result of these efforts is a greater use of renewable energy and a brighter future for the entire planet.



## Effective disaster response in the U.S. Gulf Coast Region

**CITY GOVERNMENTS, SCHOOL DISTRICTS, HOSPITAL AUTHORITIES AND TRANSPORTATION DEPARTMENTS OFTEN HAVE MANY FACILITIES DAMAGED DURING NATURAL DISASTERS SUCH AS FLOODS AND HURRICANES. JUST LIKE THE PEOPLE WHO LIVE IN IMPACTED AREAS, PUBLIC AGENCIES OFTEN NEED HELP WITH REBUILDING.**

Over the last couple of years, Golder has been working with Fluor Enterprises, under a Federal Emergency Management Agency (FEMA) Technical Assistance Contract, to help public entities recover from a series of disasters in the United States, including the recent hurricanes Katrina, Rita and Wilma. Golder is providing teams of Project Officers who are traveling throughout Texas, Louisiana, Mississippi and Florida examining damaged structures, developing damage and repair estimates and assisting public agencies in preparing aid applications.

This work requires individuals who are not just skilled in a broad range of technical disciplines, but who also have excellent interpersonal skills to assist them in working with many aid applicants who are under tremendous stress. Additionally, Golder provides Technical Specialists who lend their expertise on other disaster-related issues such as beach erosion and re-nourishment, flood mapping, foundation repair and soil subsidence, debris management and waste disposal, a particularly important issue with the massive destruction caused by Hurricane Katrina.

In most cases, the Public Assistance teams are assembled on very short notice and must travel to locations that are short on housing, utilities and amenities. The team members can count on long days and little time off during the first few months of disaster relief.

Despite the difficult conditions, the Golder people who work on these projects are strongly committed to helping those in need of assistance get back on their feet as soon as possible.



## Protecting a delta and an energy resource in Indonesia

**ONE OF THE WORLD'S LARGEST RIVER DELTAS, WHICH ALSO HAPPENS TO BE THE SITE OF A MAJOR PETROLEUM RESERVOIR, IS ON ITS WAY TO BEING BETTER PROTECTED THANKS TO STUDIES OF AN UNDERGROUND PIPELINE NETWORK AND ITS RELATED OPERATIONAL RISKS.**

The Mahakam River delta, covering 2400 square km (900 square miles) on the Indonesian island of Kalimantan, is dense with mangrove and nipah palms and cut by meandering channels. It also features areas of waist-deep mud, strong currents, crocodiles and swarming ants.

In this extreme environment, Golder's project teams have walked roughly 150 km (93 miles) to inspect the pipeline corridors owned by Total E&P Indonesia, and collected data to help with the study's engineering recommendations. Inspections of the delta also involved several helicopter flyovers and taking thousands of photographs that have been referenced to GPS.

The study sought sound engineering solutions to the challenges of erosion while respecting the existing hydro-geological balance of the delta, which is widely influenced by tides and upstream rainfall.

What has been achieved is a greater understanding of what is needed to protect the regional environment and the livelihoods of local people, while continuing to produce petroleum reserves in the area.





## Balancing local and global impacts of landfill gases

**EVEN “GOOD” ENVIRONMENTAL PROJECTS CAN HAVE THE POTENTIAL FOR THEIR OWN NEGATIVE IMPACTS. A PROJECT IN SOUTHERN ENGLAND IS MEASURING THE IMPACT OF ONE SUCH INITIATIVE, TURNING LANDFILL GASES INTO ENERGY.**

Landfills that contain household waste produce gases including methane. Released into the atmosphere, methane is over 20 times more potent than carbon dioxide as a greenhouse gas, and is a major contributor to global warming. If the landfill gas can be captured and burned, however, it has less of an impact on the environment. It also provides the opportunity to create electrical power, meaning less fossil fuel consumption. It sounds like a win-win solution – so what is not to like?

The issue is that the landfill-gas-to-energy tradeoff is not entirely benign. The gas itself contains small but significant quantities of other compounds. These discarded household chemicals can cause damage to the power plant itself, which in turn can lead to higher than acceptable releases of combustion gases, including nitrogen oxides, carbon monoxide and sulfur dioxide. It is these that have impacts on local air quality.

A study by Golder Associates in Cambridge, UK is examining the impact of a landfill and the equipment that is being used to capture gases and burn them to produce electricity. The study compares the amount of “background” pollution and the effects of the landfill, including the gas-to-energy initiative.

When completed, the study will provide a clearer idea of the total impact of landfill gas utilization, furthering our understanding of this technology, for application all over the world.

## Providing safe, emergency water for people in Guatemala

**PEOPLE IN A REMOTE GUATEMALAN VILLAGE, HARD-HIT BY LANDSLIDES FOLLOWING HURRICANE STAN IN OCTOBER 2005, WERE ABLE TO DRINK CLEAN WATER SOON AFTER THE DISASTER, THANKS TO THE VOLUNTEER EFFORTS OF A MEMBER OF THE GOLDER OFFICE IN MISSISSAUGA, CANADA.**

Shawn Cleary, co-founder of the Life Springs Foundation whose basic operating idea is that access to clean water is a basic human right, saw news reports of the devastation in Guatemala. Granted a leave of absence from his work at Golder, Shawn quickly pulled together a team to travel to Guatemala.

Once on location in Santiago Atitan, Shawn’s team worked with local authorities to set up an emergency water purification system that processed 25,000 liters (6,600 US gallons) of drinkable water a day in a schoolyard in the center of the town.

While Shawn’s team was there only to provide emergency supplies of drinking water so that people would not have to resort to drinking straight from the bacteria and parasite-filled lake, their work was soon followed by other groups who provided longer-term solutions.



Shawn found the work so rewarding that he plans to go back next year. Upon his return he plans to assist local people in building simple but effective biofiltration systems using concrete forms filled with sand. The local people will utilize their own skills to build new filtration systems using locally available materials.

The quick response to the disaster likely saved many lives, as water-borne diseases are a major killer in the area, particularly among children. Longer-term solutions provided by others will continue to help protect people from water-borne diseases while increasing water treatment capacities beyond emergency response levels.

As a result of this experience, Shawn is starting an initiative called “Golder Cares” within the Life Springs Foundation, which will offer the skills of other Golder professionals on a charitable basis.

## Evaluating flood damage in eastern Germany

**WHEN A MAJOR FLOOD STRUCK CENTRAL EUROPE IN 2002, THE WATER IN SOME AREAS CREATED A LAYER OF MUD IMPACTED WITH RESIDUE FROM CHEMICAL PLANTS, LANDFILLS AND MINES. THANKS TO HELP FROM GOLDER, FARMERS IN SOME OF THE AFFECTED PARTS OF SOUTHERN GERMANY, AND THE PEOPLE WHO EAT THEIR PRODUCE, WERE REASSURED ABOUT THE SAFETY OF THE FOOD THAT COULD HAVE POTENTIALLY BEEN CONTAMINATED.**

The flat lands of the Mulde River floodplain, south of Leipzig, have long been a wonderfully productive agricultural area. Potential chemical impacts from the 2002 floods, however, put a pall over the future of the land for farming.

To assess damage, Golder examined about 8,000 ha (20,000 acres) for potential chemical impacts. This involved describing about 1,500 soil profiles, taking 3,000 soil samples and testing for several potentially dangerous heavy metals. A high-resolution digital geographic model was used for hydrodynamic and morphological interpretation, and about 70 contamination maps were prepared.

From all of this came recommendations on future use of the land, which in some cases included restrictions on agricultural uses. Golder's work was also used as a basis for planning, design and re-design of flood protection barriers.

As well as evaluating agriculture-related impacts, Golder also assessed flood damage to 150 buildings (some of which included structural assessments), assessed contamination from oil spills, calculated remediation costs and designed local flood protection systems.

As a result, the area's residents, as well as government bodies, have a more accurate idea of the flood's damage and a greater understanding of how to prepare for similar events that could occur in the future.



## Sharing water resources could lead to improved cooperation in Bosnia-Herzegovina and Croatia

**BOSNIANS, SERBS AND CROATS OF THE FORMER YUGOSLAVIA ARE LEARNING TO MANAGE WATER AND OTHER NATURAL RESOURCES AS WELL AS BUILD VIABLE LOCAL BUSINESSES IN A REGION THAT IS RECOVERING FROM CIVIL WAR. THROUGH THIS PROCESS, THEY MAY BE BUILDING A PLATFORM FROM WHICH TO COOPERATE IN OTHER AREAS AS WELL.**

The region has an abundance of fresh water which has presented an opportunity to facilitate regional cooperation. Golder's involvement has focused on water management and protection – an issue which impacts several independent countries and thus is of significant regional economic interest.

Working with national governments and local community groups under the auspices of a World Bank study, Golder has helped identify social and rural development needs as well as develop a structured approach to resolve water management and environmental protection issues. This has included identifying different interest groups, surveying their perspectives and needs and finding the best ways to manage and protect the Tresbinjica and Neretva river watersheds. Golder's work has involved determining situations where people have felt powerless and remote from the decision-making processes that have affected them. Thus, Golder has also been in a unique position to advise the Global Environment Fund on ways to improve local levels of engagement.

The result has been an increasing awareness of opportunities for collaboration and the enhancement of people's livelihoods to contribute to a prosperous and, potentially, a more peaceful future.

# Understanding the impacts of a mine in Uganda



**WAYS TO PROVIDE A BETTER FUTURE FOR PEOPLE IN PART OF UGANDA, AND TO PROTECT RIVERS AND LAKES THAT FORM THE HEADWATERS OF THE NILE RIVER, ARE BETTER UNDERSTOOD THANKS TO A STUDY OF THE SOCIAL AND ENVIRONMENTAL IMPACTS OF A FORMER MINE AND ASSOCIATED OPERATIONS.**

The Kilembe Mine in western Uganda began operations in 1956 to extract copper and other minerals, and soon formed an important mining complex that employed many local people and also included a smelter to process the ore. After twenty years, Kilembe came to the end of its productive life – the smelter closed in 1978 and the mine closed in 1982. Since then, many former mine workers have continued to live in the area.

However, the mine's environmental impacts have continued, with groundwater seeping into the underground workings. This water is being pumped into the adjacent Nyamwamba River, flowing into Lake George and into the Nile tributary system, by local people who hope to restart the mine someday.

However, the mine water contains significant quantities of heavy metals and dissolved salts, which are harmful to humans, wildlife and the regional environment.

Golder was called in by the Government of Uganda to assess the environmental and social impacts of the mine and associated infrastructure. Our findings will be used to guide future uses of the property and find ways to mitigate long-term environmental impacts. One priority will involve closing the mine appropriately.

Should the recommendations be implemented, the region's people and the environment along the Nile River, and downstream from the former mine, will have an opportunity for a better future.

For more information about the projects featured in this newsletter please contact us at: [solutions@golder.com](mailto:solutions@golder.com). Electronic versions of the newsletter are available at: [www.golder.com](http://www.golder.com). Just follow the links to our "Library" and "Newsletters".

#### LEAD AUTHORS:

##### POWER

Hydro and wind projects. This is especially significant with the overall trend now going towards green power  
Anthony Ciccone,  
Mississauga, Ontario,  
Canada

##### DISASTER

Disaster recovery in the US Gulf Coast region  
Jim Renner, Atlanta,  
Georgia, USA

##### DELTA

Mahakan Delta in Kalimantan (Indonesia)  
Gabriel de Marco,  
Jakarta, Indonesia

##### GUATEMALA

Shawn Cleary's volunteer work providing clean water in Guatemala  
Shawn Cleary, Mississauga,  
Ontario, Canada

##### LANDFILL

Landfill gas research  
Bob Gregory, Nottingham, UK

##### FLOOD

Damage investigations after a flood in the Czech Republic and Southern Germany

Johannes Bruns, Celle,  
Germany

##### RIVERS

Social and rural development assessment on two river basins in Eastern Europe  
Helen Russell, London, UK

##### UGANDA

Understanding the impacts of a mine in Uganda  
Andrew Brown,  
Johannesburg, South Africa

Managing editor:  
GREGORY BECKSTROM

Editorial assistance:  
ERIN JOHNSON

Copy writing:  
GLOBAL REACH  
COMMUNICATIONS

Design:  
LUZ DESIGN +  
COMMUNICATIONS

[www.golder.com](http://www.golder.com) | [solutions@golder.com](mailto:solutions@golder.com)

Africa: + 27 11 254 4800  
Asia: + 852 2562 3658  
Australia and New Zealand: + 61 7 3721 5400  
Europe: + 44 1628 586 213  
North America: + 1 800 275 3281  
South America: + 55 21 3084 3490



Technically Speaking is published for valued clients and employees of Golder Associates. This quarterly newsletter includes articles showcasing innovative and technically challenging projects that Golder professionals have worked on throughout the world. We value your opinions. Please contact Gregory A. Beckstrom, Managing Editor, at + 1 651 697 9737 or [greg\\_beckstrom@golder.com](mailto:greg_beckstrom@golder.com) if you have any questions or comments.

This paper is recycled and recyclable.