Lake Toba, the world's largest crater lake and the largest lake in Southeast Asia, is in an environmental crisis characterized by widespread deforestation, drought, rapid decline of the water level in the lake, water quality degradation, and loss of biological diversity. The political and economic crisis in Indonesia is contributing to the environmental catastrophe occurring with the lake, but political reforms which are now underway offer new hope for restoring the environmental and economic health to the Lake Toba region.

Visit to Lake Toba

The Government of North Sumatra and the Lake Toba Heritage Foundation hosted an 11-person delegation from the Lake Champlain region for a one-week study tour from 26 April to 3 May 1998. The delegation met with leaders of Provincial and Regional (kabupaten) government, the Lake Toba Heritage Foundation, PT Inti Indorayon Utama pulp and rayon mill and local universities while traveling throughout the Lake Toba region. The visit was part of a one-year Sister Lakes Exchange Project funded by the Council of State Governments and
the US-Asia Environmental Partnership through a grant to the Vermont Agency of Natural Resources.

## North Sumatra and Vermont Sign MOU

Raja Inal Siregar, Governor of North Sumatra, with Barbara G. Ripley, Secretary of Vermont Agency of Natural Resources as a witness, signs Memorandum of Understanding to establish sister province/state relationship. (Photo: Lisa Borre)

The Lake Champlain delegation's visit resulted in the signing of an MOU between the Governors of Vermont and North Sumatra. The MOU establishes a cooperative program in the following areas: environmental management, tourism and culture, human resources development, agriculture and forestry, and rural and urban development. "We have a commitment to share our technical expertise at the state level with the global community," stated Barbara Ripley, Secretary of the Vermont Agency of Natural Resources and leader of the delegation. "Many of today’s environmental problems, such as water pollution, loss of biodiversity, forest fire smoke and global warming, do not pay attention to political boundaries. Vermont and New York have had success working cooperatively together to deal with these kinds of problems."

## Observations on the Condition of Lake Toba

During the visit to Lake Toba, the Lake Champlain delegation made general observations about the condition of the environment, economy, culture, people and institutions.
Deforestation

Forestry practices in the watershed have had substantial environmental consequences for the lake. "The clearing of virtually all of the mature rain forests in the region has disrupted the hydrologic cycle in the watershed by decreasing percolation and increasing evaporation and run-off," noted Peter Gale. Anecdotal evidence from local people indicate that the clearing of forests has also had an impact on the micro-climate of the Sumatran Highlands and decreased rainfall.

Drought and Decline of Lake Levels

"The most disturbing observation in the lake Toba basin was the extent of the drought, particularly on Samosir Island. The canal separating Samosir from the western shore, which was at least 3 or 4 feet deep in November 1996, was completely dry, as was virtually every stream we saw anywhere in the basin," observed David Barker. The Asahan River also seemed much diminished from the vantage point of the bridge over it at Porsea. Although the irrigated sawah rice crop appeared to be normal, the vegetation in the basin generally appeared to have suffered from both lack of rainfall and from wildfires. The haze caused by these fires was very evident when the group first arrived in Medan. "Most discouraging was that all 2,500 of the seedlings that were planted by the scouts at the workshop in Paropo in November 1996 had burned," commented Barker.
Water Quality Degradation

The total lack of sewage facilities around the lake, hydrocarbons contained in oil pollution from ferry boats, run-off of sediments, pesticides and nutrients from cleared lands and agricultural areas, and erosion from large construction projects such as the hydroelectric project have resulted in degraded water quality conditions in Lake Toba. The diversion of two rivers carrying high sediment loads into Lake Toba upon completion of the Renun Hydroelectric facility will have unforseen environmental consequences.

While in Prapat, the group visited the Ajibata wastewater treatment plant. Construction was completed in 1996, but the hard part -- getting hotels, stores and households to connect to the sewer system -- hasn't even begun. A campaign to promote connections to the facility is desperately needed. Targeting hotel operators in this tourist town would be a good place to start. As Sandy LeBarron observed, "The environmental issues are still competing against public health and social issues in the region."

Loss of Biological Diversity

Loss of biological diversity in both the terrestrial and aquatic ecosystems in the Lake Toba region was very apparent. On land, this is mainly due to widespread deforestation as described above. In the lake, loss of biodiversity is largely a
result of the introduction of non-native, nuisance species, decline in water quality and degradation of shoreline habitat. Native fisheries of the lake have been all but wiped out by the introduction of exotic species, such as carp. Without a fisheries biologist on the trip, it was difficult to assess the impact of the abundant fish farming activities on lake water quality and biological diversity.

The Foundation's one-year program to control nuisance aquatic plants on the lake appears to have been a success. The populations of water hyacinths observed in 1996 have declined dramatically. According to Ann Bove, an aquatic biologist from Lake Champlain, the populations are not dense enough to warrant mechanical controls, however, a program of continuous hand removal is needed to keep the nuisance weeds from spreading. A lake-wide survey of aquatic plants would also be helpful in establishing baseline information in order to monitor the problem in the future.

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**Economy**

The economic crisis in Indonesia was very apparent. The value of the rupiah had reached record lows and many people appeared to be out of work. One of the important lessons learned on Champlain is that a healthy environment supports a vital economy and vice versa. Transferring the Lake Champlain experience offers Indonesians a model for using a natural resource asset as an engine for economic growth. Protecting Lake Toba will be critical to the future of the people of North Sumatra and Indonesia.

Three main industries operate in the Lake Toba region: a pulp and rayon mill, an aluminum smelter and a hydroelectric facility. One of the objectives of the exchange is to transfer information and environmental technologies in the pulp and paper industry. Another is to strengthen the understanding and political will of stakeholders to increase environmental standards in the Indonesia and the Lake Toba region.

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**Environmental Catastrophe: New Hydro Facility**

While visiting Lake Toba, the delegation made a very brief stop at the construction site for the Renun Hydroelectric Facility. Funded by Japanese investors, the massive project will supply power throughout the Province. Almost nothing has been done to control erosion during construction of the facility. The group observed a large plume of sediment in the Lake emanating from a gravel washing station on the shore. The daily sediment load is having an immediate and direct negative impact on the quality of water in the near shore area. After observing first-hand the extremely poor water quality conditions of the river that
will be diverted into Lake Toba when the project is complete, the group quickly concluded that design standards for the sedimentation basins at the facility were totally inadequate. This project alone has the single greatest potential to negatively and irreversibly impact the water quality in Lake Toba.

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**Tourism**

Government continues to hope that tourists from Medan, Singapore and Europe will bring employment and prosperity to the Lake Toba region. The economic crisis and political instability in Indonesia has caused a dramatic drop in the number of tourists visiting the lake. Very little commercial or recreational activity was evident on the lake during the delegation's visit. Hotels, restaurants and shops were also empty. Plans for tourism development on the lake were discussed during the delegation's visit. The group concluded that tourism development will only be successful and an engine for economic growth--if it retains the scenic beauty of the area and if sustainable development practices that minimize environmental impacts are employed.

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**Religion**

Religion plays an important role in Indonesian culture, and religious leaders are very influential within communities. One attitude from the ancient past that seems pertinent to the environmental management of Lake Toba today is that the Bataks honor the mountains of the North Sumatran Highlands because they are closer to the heavens. This is counter-balanced by a fear of the lake because of its great depths and mystery. As a result, traditional Batak houses and communities turned their backs to the lake and faced the mountains. "Getting
people to treat Lake Toba as their front door rather than their back door will go a long way towards improving motivation and interest in protecting the lake," suggested Buzz Hoerr.

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**Political situation**

The Lake Champlain delegation visited Indonesia at a very volatile time. During the one-week visit, peaceful demonstrations on University campuses escalated into riots in Medan, the capital of North Sumatra. Two weeks later, riots spread to Jakarta resulting in hundreds of deaths, causing U.S. citizens and officials to be evacuated from Jakarta for security reasons. President Suharto resigned on 21 May 1998, ending more than 30 years of his authoritarian regime. The timing of the delegation’s visit and its relevance to current events in Indonesia is best summed up by one of the delegates:

*The Sister Lake initiative could result in recommendations for improvements to lake and watershed management, and stimulate short and long term implementation activities. As Indonesia moves toward post-Suharto democracy, new models of development and decision-making will be sought. A Lake Toba initiative could be such a model -- integrating environmental protection, economic development, and social equity.*

--Peter Clavelle, Mayor of Burlington, VT

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**Institutional Issues**

The delegates from Lake Toba have not yet acted on the main lesson thrust on them during their visit to Lake Champlain in September 1997: developing a long-term institutional mechanism to bring all the stakeholders to the table is the first step toward successful implementation of an environmental management strategy for a major lake. "It seems that lacking are both the institutional capacity and the political will to address these problems," commented Peter Clavelle.

The Provincial Planning Board presented a list of activities for the Lake Toba region which was very helpful. However, the list seemed to have been prepared with a top-down approach without involvement from community leaders and other stakeholders in the region. Sandy LeBarron commented, "A planning process such as the one we did on Lake Champlain could greatly enhance the knowledge and support received for implementation activities to protect the valuable natural resources of Lake Toba."
Local Projects

A few highly localized projects involving traditional authorities, local government, and foreigners, are flourishing. One example is a project initiated by one of the Bupatis in the Karo district. Under Mr. Sinulinnga's leadership, a shoreline clean-up project was initiated in cooperation with the Leuser Development Programme and funded by the European Union. Shacks, outhouses and trash were removed along the shoreline of Lake Lawar, a small lake near Lake Toba, in order to make way for an ecotourism development project on its shores. Approximately 5,000 local tourists visit the small lake on weekends. Virgin rainforests still surround most of the lake with about 30% of the shoreline cleared and converted to agricultural uses, causing extremely high erosion rates. Much is still to be done on Lake Lawar, but the cooperative project with the Bupati shows some promise.
Lake Toba Heritage Foundation

"The efforts of the Lake Toba Heritage Foundation are increasing the awareness of residents, government officials, and international bodies on the condition of the lake," noted Peter Clavelle. The success of this NGO is largely due to the inspiring leadership of one man, Prof. Dr. Midian Sirait. Established in 1995, the Foundation has completed projects in environmental education, teacher training, water hyacinth control and lake monitoring; however, the Foundation's activities came to an abrupt halt in December, 1997 when modest funding ran out for its boat operation on the lake. A successful lake management program will depend on having a stable NGO active in lake initiatives. With modest funding, the Lake Toba Heritage Foundation has proven that it can be successful. Financial support is needed to build the institutional capacity of this organization.

Lake Champlain Delegation
List of Members

Barbara G. Ripley, Secretary, Vermont Agency of Natural Resources and member, Lake Champlain Steering Committee (delegation leader)

Peter Clavelle, Mayor, City of Burlington and member, Lake Champlain Steering Committee

A. Wayne Roberts, President, Lake Champlain Regional Chamber of Commerce

Roland "Buzz" Hoerr, Chair, Lake Champlain Citizens Advisory Committee

Sandra L. LeBarron, Special Assistant to the Commissioner, NYS Dept. of Environmental Conservation

Peter Gale, Stone Environmental Inc.
Ann Bove, Aquatic Biologist, Vermont Dept. of Environmental Conservation

Betsy Rosenbluth, Co-Director, Lake Champlain Basin Science Center

Jenifer Christman, Partnerships Coordinator, International Paper Company

David Read Barker, President, Monitor International (Liaison to the Lake Toba Heritage Foundation and Interpreter)

Lisa Borre, Project Director, Lake Toba-Lake Champlain Sister Lakes Exchange

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Partnerships and Project Partners

Several formal relationships have and are being established related to the management of Lake Toba:

- Lake Champlain Basin Program and the Lake Toba Heritage Foundation have signed an MOU establishing a sister lakes relationship.
- State of Vermont and Province of North Sumatra have signed an MOU establishing a sister state/sister province relationship.
- EPA Region 1 and the Indonesian Environmental Impact Management Agency (Bapedal) Western Region (covering the Island of Sumatra) are in the process of establishing a sister regions relationship.
- St. Michael's College in Vermont is in the process of establishing partnerships with several universities in North Sumatra to cooperate on English as a second language programs and lake research.

Partnerships are an important component of implementing the Sister Lakes Exchange.

Numerous public and private partners participated in this phase of the project from both the US and Indonesia.
U.S. partners:

City of Burlington, Vermont
EPA Region 1, New England
EPA Headquarters
International Paper Company
Lake Champlain Citizens Advisory Committee
Lake Champlain Basin Program
Lake Champlain Basin Science Center
Lake Champlain Regional Chamber of Commerce
Monitor International
New York State Department of Environmental Conservation
State of Vermont, Agency of Natural Resources
Stone Environmental, Inc.
St. Michael's College

Indonesian partners:

Lake Toba Heritage Foundation
Regencies of Tapanuli Utara, Simalungun, Dairi and Karo (Regions around Lake Toba)
Province of North Sumatra
PT Inti Indorayon Utama
Lake Toba Hotel and Restaurant Association
University of North Sumatra, Environmental Studies Center