

Sustainable Development of Sister Lakes: Lake Toba, Indonesia, and Lake Champlain, United States

LISA BORRE, *Monitor International, Annapolis, MD, USA*

MIDIAN SIRAIT, *Lake Toba Heritage Foundation, Jakarta, Indonesia*

ABSTRACT

During 1996-98, the Lake Toba Heritage Foundation and the Lake Champlain Basin Program formed a Sister Lakes partnership. An exchange programme for community leaders, scientists and government officials and a formal memorandum of cooperation between the governments of the province of North Sumatra, Indonesia, and the State of Vermont, USA, has highlighted both shared environmental problems and important institutional challenges. Increasing levels of industrial and municipal pollution and deforestation are devastating the Lake Toba watershed, but the region has not yet developed adequate institutional mechanisms to initiate, pay for or enforce the necessary environmental protection. In contrast, the exchange partners in the Lake Champlain region have established effective institutional mechanisms for watershed management and recently completed a strategic plan which now represents a model of sustainable development.

Two aspects of the exchange programme, pulp and paper pollution control and community waste water treatment, are used to compare the experiences on both lakes as decision-makers work to integrate environmental and economic development priorities. Chapters 8 and 18 of Agenda 21 offer both a useful analytic framework and a prescription for approaching these issues. Sister lake partnerships provide an effective mechanism for exchanging the experiences, technologies and practices for achieving sustainable development of these important freshwater ecosystems.

Figure 1
View of Lake Toba, the largest lake in Indonesia
(photo: Lisa Borre)

INTRODUCTION

Lake Toba, located in the central highlands of Indonesia's province of North Sumatra, is the world's largest crater lake and the largest lake in Indonesia (Figure 1). Created in an immense volcanic eruption some 75 000 years ago, the lake today is the core of the homeland of the four million Batak people (Figure 2). Lake Toba 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 (Figure 3). The political and economic crisis in Indonesia is contributing to the environmental catastrophe occurring with the lake. Political reforms which are now underway offer new hope for restoring the environmental and economic health to the Lake Toba region.

Lake Champlain, straddling the borders of the US states of Vermont and New York and the Canadian province of Quebec, is the sixth largest natural lake in North America (Figure 4). Created by glaciers some 10 000 years ago, Lake Champlain is now the centre of a diverse economy based on tourism, agriculture and manufacturing. Its watershed is home to more than 640 000 people and draws millions of visitors every year.





Figure 2
Lake Toba is the homeland of the four million Batak people. This traditional Batak house near Lake Toba is a popular tourist attraction (photo: Lisa Borre)

Although one lake is situated just north of the equator, and the other is on the other side of the globe at 40° N, they face similar management challenges. But there is one important difference: the people around Lake Champlain have won worldwide recognition for their success in developing a comprehensive watershed strategy and lake management plan. The centerpiece of this initiative is an aggressive programme to reduce the phosphorus pollution that was destroying the lake and threatening the tourist industry on which much of their economy depended.

This article summarizes the unique and successful partnership between these two lakes and two important aspects of the technical exchange programme: pulp and paper pollution control and community wastewater

treatment. Both technical issues are common management challenges on lakes throughout the world. Chapter 8 of Agenda 21 offers both a useful analytical framework and prescription for approaching these issues.

SISTER LAKES EXCHANGE

The Lake Toba-Lake Champlain Sister Lakes Exchange began when Professor Dr. Midian Sirait, the Chairman of the Lake Toba Heritage Foundation, became frustrated with the difficulties of getting the national, provincial and local governments to respond to increasing environmental problems in and around Indonesia's largest lake. As a small NGO organized by local leaders, the Lake Toba Heritage Foundation could not begin to tackle all of these problems. In 1995 they began to seek a "sister lake" and selected Lake Champlain, in the northern United States.

In 1996, a sister lakes relationship was initiated between Lake Toba and Lake Champlain, and in 1997, the Vermont Agency of Natural Resources launched a technical exchange programme with a grant from the Council of State Governments and the US-Asia Environmental Partnership with funding from US Agency for International Development. Numerous public and private partners from the US and Indonesia are involved. Monitor International, a nonprofit 501(c)(3) organization, coordinates the exchange programme on behalf of the project partners.

Objectives of the technical exchange programme include: (1) exchange of experience on managing a large lake watershed based on an American model of management used by the Lake Champlain Basin Program; (2) transfer of low-cost, alternative technologies for managing wastewater in small communities; (3) transfer of industrial environmental technology and experience between pulp and paper mills on both lakes; (4) strengthening of voluntary business standards for the environment in the Lake Toba region; and (5) transfer of technologies for controlling water hyacinth.

Delegations from both lakes have studied and learned from each other. The delegations have included junior and senior government officials, business and NGO leaders, scientists, educators, environmentalists and technicians. A series of increasingly important bilateral



Figure 3
The Lake Toba region is in an environmental crisis characterized by scenes like this burned hillside which is the result of widespread deforestation and drought (photo: Jennifer Christman)

Memoranda of Understanding have emerged from the exchanges, including one between the State of Vermont and the Province of North Sumatra (Figure 5). The Lake Toba-Lake Champlain Sister Lakes Exchange was recognized in 1998 by the UN Commission on Sustainable Development as one of its “Sustainable Development Success Stories.”

WASTEWATER TREATMENT

Water quality in Lake Toba is adversely affected by the discharge of untreated sewage from every household and business in the watershed. The problem is especially severe along the shoreline in Prapat and Ajibata, two adjoining towns that are the largest settlements on the lake, but it is also significant in smaller communities.

In 1996, the Directorate General for Human Settlements, Department of Public Works prepared a medium-term programme for human settlements infrastructure in six towns along the shores of Lake Toba. Consistent with this project, a wastewater treatment plant was constructed with Japanese foreign aid for the towns of Prapat and Ajibata and essentially completed by April 1998 (Figure 6). But the hard part, getting hotels, stores and households to connect to the sewer, has not even begun. This project typifies the problems related to infrastructure development in Indonesia, and is therefore useful as a case study.

Construction of the facility dragged on for several years because of inter-jurisdictional issues among the central, provincial, and the two regency (kabupaten) governments. A recent summary document, “Wastewater Treatment in the Tourist Area of Prapat-Ajibata, Lake Toba, North Sumatra Province”, sketches the institutional and regulatory development steps necessary to bring the facility into operation. In accordance with a letter from the Governor dated 29 January 1997, the Tirtanadi Drinking Water Local Enterprise (PDAM Tirtanadi) will be the responsible institution.

Because rice paddies close to the lake shore were too expensive to purchase for the wastewater treatment facility, the location is more than one kilometre from the lake and several dozens of metres above the lake level. The location therefore requires a fairly elaborate pumping system and increases the operation and maintenance costs considerably.

To date, the project has included no incentives to involve the community or motivate new behaviours. The biggest challenge will be persuading hotel owners and households to connect to the new sewer system because the costs of these connections will fall almost entirely on the shoulders of the local residents and business owners, almost none of whom has ever paid attention to, or money for, sewage treatment.

In contrast, the City of Burlington, the largest city on the shores of Lake Champlain, experienced a long period of changing public perceptions, due in large part to the emphasis placed on community involvement and public awareness campaigns. Combined with strict laws and regulations, this has resulted in significant public investment in waterfront development and the recent construction of a US \$53 million wastewater treatment upgrade. Participants in the exchange programme from Lake Toba learned from their counterparts that the public willingness to pay did not happen overnight, but instead, evolved over many years (Figure 7).

In comparing the situations, delegations from both Lake Toba and Lake Champlain concluded that community involvement and awareness is an essential element of successful watershed management, especially waste-



Figure 4
View from Burlington, Vermont, of Lake Champlain, the sixth largest natural lake in North America. Lake Champlain has received worldwide recognition for its watershed management approach and serves as a model of sustainable development for lakes throughout the world (photo: Lisa Borre)



Figure 5
The sister lakes exchange has resulted in a series of bilateral agreements, including a Memorandum of Understanding between the State of Vermont and Province of North Sumatra to promote cooperation on the environmental management of Lake Champlain and Lake Toba. Barbara G. Ripley, Secretary of Vermont Agency of Natural Resources, witnesses the signing of the MOU by Raja Inal Siregar, Governor of North Sumatra (photo: Lisa Borre)



Figure 6
A delegation from Lake Champlain visits the site of the wastewater treatment plant for the towns of Ajibata and Prapat on Lake Toba. Construction is nearly complete, but households and businesses have not connected to the sewer system yet because the project has included no incentives to involve the community or motivate new behaviours (photo: Lisa Borre)

Figure 7
A delegation from Lake Toba visits the Burlington, Vermont, Wastewater Treatment Facility and learns about a recent investment of \$53 million dollars to upgrade the facility, located on the shores of Lake Champlain (photo: Lisa Borre)



water treatment investments. Public understanding and a willingness to pay for services are key to the optimal effectiveness of these investments.

PULP AND PAPER POLLUTION PREVENTION AND CONTROL TECHNOLOGIES

The exchange of industrial environmental technology between pulp and paper mills has been a key aspect of the exchange programme between the two lakes. Both lakes are the site of major pulp and paper mills. The International Paper Company operates a mill on the shores of Lake Champlain in Ticonderoga, NY, and PT Inti Indorayon Utama, operates a pulp and rayon mill on the shores of the Asahan River which flows out of Lake Toba in Porsea, North Sumatra. Commonly known as "Indorayon", the mill is owned by Asia Pacific Resources International, Ltd (APRIL Group) based in Singapore, a firm listed on the New York and Jakarta stock exchanges. It produces 500 tons per day of pulp and 150 tons per day of rayon at the mill in Porsea.

Local people have complained for years about the odour from the Indorayon mill and deforestation due to excessive logging practices on forest concession lands in the Lake Toba region. Delegations from Lake Toba visited the International Paper Company's Ticonderoga mill in September 1997 and September 1998. They were particularly impressed with air pollution technologies which greatly reduced the odour from the mill's production and with forest management practices employed on land owned by the company. The Ticonderoga mill considers itself to be a world leader in the area of sustainable forestry and pollution prevention and control technologies. As was the case with the previous example about wastewater treatment, the Indonesian delegation learned that implementation of environmental measures took many years. Change came about largely as a result of stringent regulations and effective rule of law, but also because it made good sense from an economic standpoint: many pollution prevention technologies and practices are more cost-effective.

They learned that after lengthy and costly environmental lawsuits filed against the company during the 1970s, International Paper worked hard to become a good corporate citizen and placed a high priority on environmental matters. More recently, the company participated as an industry representative in a 5-year long strategic planning effort to protect and restore the Lake Champlain basin which resulted in a watershed management plan and an institutional mechanism which strives to integrate environmental and economic goals for the region.

In April 1998, a delegation from Lake Champlain visited Lake Toba and the Indorayon mill. The delegation observed a modern facility that employs a variety of pollution control techniques. Since that time, protests by local residents have escalated into violence and have forced the closure of the Indorayon mill in Porsea, leaving approximately 5000 people out of work. Reasons for the protests stem from concerns about air pollution, water pollution, deforestation and bumpy roads caused by heavy logging trucks. Although the Indorayon mill claims to comply with all regulations, there is a great deal of public scepticism due to the lack of public reporting and allegations of a regulatory system mired in corruption. In addition, citizens complain that taxes paid by the company to the central government do not return to the community in the form of public services.

Participants in the exchange programme observed that Indorayon's problems are not fundamentally technological, but instead are symptomatic of the political and economic crisis in Indonesia at this time. As a competitor in global markets, the company has access to state-of-the-art technologies for pollution prevention and control. However, because Indonesia has been reluctant to impose tough environmental regulations for fear of increasing the cost of export products and hurting their competitive advantage, Indorayon is not compelled to make any changes. While the company was able to operate effectively under a highly authoritarian regime, it is suddenly having to deal with an entirely different political and social



Figure 8
The view from the Sipiso-piso waterfall in the Lake Toba watershed is featured on the 1,000 Rupie note in Indonesia and serves as a symbol for the holistic watershed approach to managing freshwater ecosystems

landscape, one where citizens feel much more free to express their concerns about the environmental impacts of the mill operation.

On the issue of industrial operations such as pulp and paper mills, perhaps the most relevant lessons learned from Lake Champlain include: the importance of an effective legal and regulatory framework; the need for public accountability; the role of market forces in achieving the implementation of pollution prevention and control measures; and the importance of finding institutional mechanisms to integrate environmental and economic goals in lake regions.

CONCLUSION: THE AGENDA 21 FRAMEWORK AND PRESCRIPTION

Although Lake Champlain is further along the path of achieving sustainable development than Lake Toba, Chapters 8 and 18 of Agenda 21 offer a useful analytical framework and prescription for both lakes in moving towards a sustainable future. The case studies described in this article point to the need for the four programme areas described in Chapter 8: integrating environment and development at the policy, planning and management levels; providing an effective legal and regulatory framework; making effective use of economic instruments and market and other incentives; and establishing systems for integrated environmental and economic accounting.

Chapter 18 of Agenda 21 calls for a holistic, watershed-based approach to managing freshwater systems that is based on a balanced consideration of people and the environment and emphasizes the importance for public awareness and education in curbing environmental destruction. Indonesia is in the midst of a vast and painful democracy movement which is empowering commu-

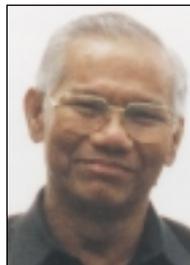
nities to take collective action in their own long-term self interest. If this movement is successful in the end, it offers new opportunities for restoring environmental and economic health to the Lake Toba region (Figure 8). The watershed approach used in the Lake Champlain region serves as a useful and practical model for other lakes around the world. Sister lake exchange programmes such as this are an effective mechanism for exchanging the entire range of experience, technologies and practices related to environmentally sustainable development.



ABOUT THE AUTHORS

Lisa Borre is Vice President of Monitor International, a US-based nonprofit organization working to conserve marine and freshwater ecosystems throughout the world. She was Coordinator of the Lake Champlain Basin Program for seven

years and recently founded LakeNet, a global network of people and organizations promoting the conservation and sustainable development of lakes. Ms. Borre is Project Director for the Lake Toba-Lake Champlain Sister Lake Exchange, a project typical of the kind promoted by LakeNet.



Professor Dr. Midian Sirait is co-founder and Executive Chairman of Yayasan Perhimpunan Pencinta Danau Toba, the Lake Toba Heritage Foundation. Born in the town of Porsea on the shore of Lake Toba, Professor Sirait was a guerilla leader during Indonesia's struggle for independence in the 1940s and was among

the first Indonesians to receive a Ph.D. degree in Germany, in Pharmacology. He served as Vice Rector of the Institute of Technology, Bandung (ITB) and was Director General for Food and Drugs in the Indonesian Department of Health.

IF YOU HAVE ANY ENQUIRIES REGARDING THE CONTENT OF THIS ARTICLE, PLEASE CONTACT:

Lisa Borre

Monitor International
154 Quiet Waters Place
Annapolis, MD 21403
USA

Tel: +1 (410) 268-5155

Fax: +1 (410) 268-8788

E-mail: lborre@monitorinternational.org

Web site: www.monitorinternational.org