

Feasibility Study for the Lake Toba Science and Education Center



Prepared by



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For the



Lake Toba Heritage Foundation
Jakarta, Indonesia

September 2000

This report was prepared with funding from the US Environmental Protection Agency New England Region.

Acknowledgements

Monitor International appreciates the support for this project provided by the US Environmental Protection Agency New England Office. This report could not have been completed without the in-kind support of the Lake Toba Heritage Foundation and the Lake Champlain Basin Science Center. Several individuals contributed to this project by providing advice, assisting with research and helping with in-country logistics: Betsy Rosenbluth, former Co-director of the Lake Champlain Basin Science Center; Haryatiningsih, Monitor International's Indonesia Country Director; and David Barker, President, Monitor International.

Monitor International

Monitor International is a US-based nonprofit organization dedicated to conserving marine and freshwater ecosystems throughout the world. Since 1997, Monitor International has coordinated the Lake Toba-Lake Champlain Sister Lakes Partnership on behalf of project partners in the US and Indonesia. Monitor International also serves as the Secretariat for LakeNet, a global network of people and organizations promoting the conservation and sustainable management of lakes. For more information visit our website at <http://www.monitorinternational.org> or contact us:



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I. Overview

The community leaders of Lake Toba consider environmental education and awareness as their number one priority. A science and education center was at the top of the list of priority actions following the first Lake Toba delegation's visit to the Lake Champlain Basin Science Center (LCBSC) in September 1997, and this was reinforced by the visit of a Lake Champlain delegation and Betsy Rosenbluth, Co-Director of the LCBSC, to Lake Toba in April-May 1998.

In view of this high priority, the US Environmental Protection Agency Region 1 New England awarded a grant to Monitor International to conduct a feasibility study of a Science and Education Center on Lake Toba. Monitor International assembled a small team to visit Lake Toba in February 1999 to collect information and ideas. "We found widespread--virtually universal-- agreement in North Sumatra about the importance of a science and education center," remarked David Read Barker, President of Monitor International and a member of the study team.

The study team's preliminary recommendation is that the Science & Education Center would have four main components:

1. A **discovery & education center** housed in a building or small cluster of buildings on the shores of Lake Toba with exhibits, classrooms, and laboratory facilities;
2. A **boat**, to serve as a floating classroom;
3. A **website** to serve as an "online center" on the Internet's World Wide Web;
4. A **laboratory/training center** with dormitory space for students and researchers.

The study team concluded that a Science & Education Center would be a tremendous asset to the Lake Toba region for several reasons: (1) it could provide a focal point for educational programs about the lake; (2) it could serve as a clearinghouse of information about the lake both within the region and outside the region at a national and international level; and (3) it could support the tourism industry by serving as a site for tourists to visit and learn about the lake and the region; and (4) it could help the local economy by serving as an demonstration of responsible shoreline development practices and as an example of a community development project compatible with conservation of the lake environment.

The Science & Education Center is considered most feasible if the different components are phased-in over time. This is especially the case from the standpoint of institutional development, but also because it will allow the institution to implement pilot projects and demonstrate success as a way of attracting funding and support from the local, regional, national and international communities. The study team envisions that the establishment of the Center will take place at the grassroots level first, and over the long-term, has the potential to become a center of excellence for Asian and/or tropical lakes. Establishing a baseline of scientific information about the lake is considered essential for the Center.

Phase 1 of the project is estimated to cost between \$100,000 and \$200,000.

II. Statement of Need for the Project

Improving environmental awareness in the Lake Toba region has been identified as a priority for achieving sustainable development objectives by the Lake Toba Heritage Foundation as well as the partners of the Lake Toba-Lake Champlain Sister Lakes Exchange program. Declining environmental quality, including water quality degradation due to untreated wastewater entering the lake, is evident in the region. A better informed and more involved citizenry and improved cooperation among the numerous public and private stakeholders in the region are key to successful implementation of conservation and sustainable development initiatives. Creating a center which can serve as a clearinghouse of information and a place for learning about Lake Toba will be an important step toward addressing these needs for the region.

III. Methods

a. Source of funding for feasibility study

The US Environmental Protection Agency Region 1 New England awarded a grant to Monitor International, a nonprofit organization based in the United States, to explore the feasibility of developing and education and science center on Lake Toba in partnership with the Lake Toba Heritage Foundation. The study was carried out in the context of a larger sister lakes partnership between Lake Toba and Lake Champlain in the United States. In addition to those mentioned above, the main sponsors of this partnership include the Council of State Governments, US-Asia Environmental Partnership, US Agency for International Development, the Vermont Agency of Natural Resources, and the Lake Toba Heritage Foundation.

b. Exchange program identifies a center as a priority

Delegations from Indonesia and the US have conducted study tours of both lakes as part of the Lake Toba-Lake Champlain Sister Lakes Exchange. As a result of these initial exchanges, project partners identified priorities for follow-up activities. Establishment of an education and science center for Lake Toba emerged as one of three top priorities.

Prof. Ir. Bungaran Saragih, an economist at Bogor Agricultural University and board member of the Lake Toba Heritage Foundation, participated in a one-week technical exchange during September 98 to learn about science and education centers on Lake Champlain, including the Lake Champlain Basin Science Center (LCBSC). Dr. Saragih was very impressed with the concept of an education and science center and the approach to education and public involvement on Lake Champlain. In May 1999, he presented a paper and participated in a workshop on managing the great lakes of the world at the Lake 99 meeting in Copenhagen. At that meeting, he established additional contacts with representatives from other Asian lakes, tropical lakes and crater lakes around the world. Dr. Saragih has served as one of the main points of contact for this project in Indonesia.

c. Study methods

Information for the study was gathered through phone interviews and meetings with appropriate contact people in the US and Indonesia, and included a one-week visit to Indonesia during 12-19 February 1999. Study team members met with the Board of Directors of the Lake Toba Heritage Foundation, representatives of the Hotel and Restaurant Association in Prapat, provincial and local agency officials and other business leaders and educators in the Lake Toba region. The study team also visited the proposed site of the center.

d. Topics addressed in the feasibility study

This study is intended to be an initial step in the development of the Lake Toba Science and Education Center. This report is not intended to take the place of a more detailed plan for the facility and its programs in the future. The feasibility study addressed the following topics:

1. Lessons learned from other science and education centers
2. Existing museums, historic sites and natural attractions in the Lake Toba region
3. Vision and mission of the Center
4. Program concepts
5. Proposed facilities
6. Location and site assessment
7. Potential project partners
8. Institutional capabilities
9. Operational considerations
10. Sustainability of funding

IV. Lessons Learned from Other Science & Education Centers

Although there are many good examples of science and education centers throughout the world, four in particular stand-out as being particularly relevant models for the Lake Toba Center because of their mission, size and the fact that they are situated on lakes that are already engaged in a partnership with Lake Toba through LakeNet. Another example, the Lake Biwa Museum, may also be a very relevant model, especially from the standpoint of its location in Asia and the potential of forming a close partnership with the Lake Toba Center. However, the study team was not able to conduct a site visit or evaluate it within the scope of this project.

Recommendation: A study visit to Lake Biwa by a small delegation from Lake Toba is recommended as a future phase of the project and as plans for the Center progress further. Other sites should be visited as time and funding allows.

A. Lake Champlain Basin Science Center (LCBSC)

1. Mission and status

The mission of the Lake Champlain Basin Science Center is to educate visitors about Lake Champlain basin ecology, history and culture in a dynamic hands-on environment. The center's mission is embodied in a 40,000 square foot facility with educational exhibits. The center demonstrates unique partnerships with the University of Vermont's Rubenstein Ecosystem Science Laboratory and other lake-related institutions such as the Lake Champlain Maritime Museum. The underlying theme of the center's exhibits and programs is humankind's relationship with, and impact on, nature. The Lake Champlain watershed provides the geographic focus for this story and the basis for a rich, interdisciplinary perspective on the region.

2. Interactivity and integration of science is important

The LCBSC is a good example of museum-type center where a high priority is placed on educating visitors about a specific place (in this case Lake Champlain). The interactivity of the exhibits, educational programming, and connections to scientific research all build upon this theme. The center plans to achieve a high level of integration between the educational and scientific research aspects of the center.

3. Planned expansion

While construction is underway for the laboratory facility, the LCBSC is in the midst of a capital campaign to raise money for the construction of a new building to house educational exhibits and programs. The existing building is not suitable for the planned expansion of the center and will be replaced by a new building. A conceptual plan for the LCBSC has been developed and is included along with several photos in Appendix A.

"One of the important lessons we have learned is to develop your programs first and then let the programs drive the design of facility," commented Betsy Rosenbluth, Co-Director of the Lake Champlain Basin Science Center. "If you design the building first, it is much more difficult to fit the programs into it."

4. Visitation statistics and revenue

Since opening its doors four years ago, 110,000 people have visited the LCBSC, more than 26,000 per year on average. Approximately 6,000 schoolchildren are involved in educational programs at the center which operated on a \$232,000 budget in fiscal year 1999. Three full-time staff and

6 part-time employees operate the facility and run the educational programs along with consultants and 30 volunteers. The center also employs 14 teenage students during the summer as junior explainers.

A small shop near the entrance gives visitors an opportunity to purchase a souvenir, but is not considered a major source of revenue, generating less than \$5,000 a year. The cost of admission to the center is very low: \$2 for adults and \$1 for students. The center also provides free admissions through subsidized school programs, field trips and camps, totaling about 1500 students in FY 98. Of the visitors to the center, 70 percent are from within the basin and 30 percent are tourists. One of the center's fundraising programs is the Sturgeon Club for donors of \$1,000 or more. So far 52 donors have contributed under this program, including the Lake Toba Heritage Foundation.

5. Partnerships are important

LCBSC is an active partner in *LakeNet* and has participated in numerous environmental exchange programs with other lakes, including Lake Toba in Indonesia, Lake Ohrid in Macedonia and Albania, and Lake Baikal in Russia. They also have plans to develop a "sister lake" exhibit as part of their expansion plans. An opportunity exists to develop a companion traveling exhibit. The LCBSC also has numerous partners in operation and programs of the center (see brochure). One important partner, the Lake Champlain Maritime Museum, has had significant input in the design of exhibits and running of programs related to cultural heritage resources. They represent an important kind of partner, because the LCMM operates its own outstanding facility approximately 45 minutes south of the LCBSC. One mission of the LCBSC is to serve as a gateway to other sites and facilities in the Lake Champlain basin which is a good model for the Lake Toba center and the Arjuna Culture Museum.

Additional information about the LCBSC can be found on-line at: <http://www.uvm.edu/~lcbssc/index.html>. *Contact:* Betsy Rosenbluth, Co-Director, 802-864-1848.

B. Lake Baikal Ecology and Science Centers

Lake Baikal is home to two ecology and science centers worth noting in this report. The first is an Ecology Museum located in Listvyanka, Irkutsk Oblast that Lisa Borre visited in June 1999. While the interpretive signage and exhibits were not very interactive, the collections, maps, scientific information, specimen collections and data were very impressive.

1. Bi-lingual signage is important

Most of the signs and exhibits were in Russian which poses a problem for many tourists, but the museum was staffed by a guide/interpreter on the day of her visit who was very knowledgeable and gave a tour of the facility in English. The presentation was loaded with facts and information about the lake. A small exhibit about sister lakes showed images of Lake Baikal and Lake Tanganyika, the second deepest lake in the world, superimposed on each other.

2. Visitation statistics and fees

The museum had a small, but nice collection of books and maps for sale, one of which was a map of the region in Russian and English languages. The 60 year-old museum was closed to everyone but special delegations until five years ago. Now, more than 150,000 people visit the museum every year which is staffed with four interpreters. A small aquarium with two nerpa seals is located off-site on the shore of the lake and plans are underway to expand the aquarium. Admission is US\$3 for tourists and US\$1 for residents. Information about the operating budget of the facility was not available. *Contact:* Moreva Natalie, Interpreter/Guide

On the other side of Lake Baikal, in the town of Baikalsk, is a Scientific-Ecological Center with exhibits and collection about Lake Baikal. The Center also runs a number of educational programs for local school children. While not as sophisticated as the museum in Listvyanka, the Center is staffed by knowledgeable and experienced scientists and researchers, including specialists in birds, fish and plants of the region. Several exhibits explain the sister lake relationship with Lake Tahoe and the Tahoe-Baikal Institute. Admission is free and visitation statistics were not available, but the center caters mostly to the local community and plays a very important role in that regard. *Contact:* Dr. Alexei A. Gulin, Director

More information and photos of both museums on Lake Baikal are provided in Appendix B.

C. Lessons Learned from Other Centers

Several important lessons can be learned from these facilities that are important considerations for a Lake Toba Center.

1. Sharing and communication scientific information about the lake should be central to the mission of the center

The amount of research data and scientific information about both Lake Baikal and Lake Champlain is immense. Very little data and information is available about Lake Toba, but certainly enough to get started with educational programs. Having well-integrated scientific and educational programs will be very important. Sharing and communicating this information to students and the publics should be central to the mission of the center.

2. The Science Center should serve as a gateway to other facilities

The facility should serve as a gateway to other facilities and sites of interest through cooperative promotion efforts, joint educational programming and co-sponsoring events and festivals. The Lake Toba Education and Science Center should not duplicate the efforts of other nearby facilities, but instead should promote and enhance the offerings at these facilities, especially sites and facilities which have been developed around important cultural heritage or natural areas.

3. Information and signage should be multi-lingual

It is important that the science center captures the ethnic pride of the region and is sensitive to the local culture and customs by providing information and signage in the native language of the region. At the same time, it must cater to tourists and visitors by providing signage in other languages, especially English. Although the Lake Baikal Ecology Museum's signage was written in only Russian, they made up with this by having bi-lingual interpreters and guides, but much of the information was not available to foreign visitors, simply because of the language barrier. For the Lake Toba Center, it will be important to target foreign visitors, and at a minimum, signage should be made in Indonesian, Batak and English languages.

D. Association of Science and Technology Centers

The Association of Science and Technology Centers (ASTC), located in Washington, DC, has several helpful information resources and guides. One is a book, *A New Place for Learning and Science, Starting and Running a Science Center*. In this book, the authors provide sample operating budgets for very small and small science centers which were determined to be most relevant for the Lake Toba center at this stage of development. The organizational charts and sample budgets were used as a reference in developing the budget for the proposed Lake Toba facility, with a correction for the exchange rate and salary structures in Indonesia. Examples of the budgets for very small and small science centers are provided in an Appendix C.

V. A Gateway to Existing Museums, Historic Sites and Natural Attractions in the Lake Toba Region

Like the experience on Lake Champlain, where the LCBSC serves as a "gateway" to other museums, historic sites, visitor centers, and other areas of interest in the region, there are several key museums and sites to consider connecting together in the Lake Toba region:

1. Arjuna Batak Culture Museum, Balige
2. Simalungun Palace, between Brastagi and Prapat
3. Chief Sidabutar Tomb, Tomok
4. Volcanoes, Brastagi

5. Sipiso-piso Waterfall
6. Hot springs, Tele
7. Monkey forest, Prapat
8. Batu Gantung Cliffs
9. Gunung Leuser National Park and Orangutan Rehabilitation Center, Bukit Lawang

Recommendation: The concept of serving as a gateway should be factored into the location, design and programs at the Center. Partnerships should be established with other museums and sites of interest as well as with the tourism industry and cooperative marketing and promotional materials should be developed that promote the entire regions of Lake Toba.

VI. Vision and Mission for the Center : Promote stewardship of the Lake Toba region

The vision for the Lake Toba Science and Education Center is to create a place where residents and visitors can learn about the environment, culture and economy of the Lake Toba region and participate in programs to protect the lake for present and future generations. The proposed Center may take shape in a variety of ways, including in an actual building or complex of buildings near the shore of the lake, aboard a boat that travels around the lake, and in cyberspace through a website.

The specific mission of the center should adopt a mission. Proposed elements might include:

- *Educating* residents and visitors about the Lake Toba region through interactive exhibits and programs;
- *Inspiring* people to take action to protect Lake Toba's environment, culture and economy;
- *Supporting and stimulating* cooperation in the Lake Toba region and internationally;
- *Training* students and scientists to study and monitor the health of the lake; and
- *Serving* as a place for study and a clearinghouse of information about the lake region.

Recommendation: The key to successful establishment of the Center is to design the facilities in a way that supports the types of programs which will accomplish the vision and mission. A mission statement should be adopted to guide the development of the Center.

VII. Program Concepts

A. Themes

The Lake Toba region is a fascinating place from the standpoint of its natural and human history, and it is these two areas which offer the greatest potential for the themes of the center's programs and exhibits. The study team identified a number of potential themes and/or stories that could be told at the center:

1. **Ring of Fire**--Indonesia and the Island of Sumatra are located in an area known as the "Ring of Fire" where great geologic forces are at work both here and north toward. Volcanoes, plate tectonics and geology are part of Lake Toba's geologic history. Stories that relate to this theme include: the volcanic eruption that created Lake Toba some 75,000 years ago; subsequent volcanic activity that created Samosir Island; comparisons to other craters in Indonesia and crater lakes of the world; interesting natural phenomena related to geologic history (e.g. hot springs and waterfalls); and rocks, fossils, tuff deposits, and minerals of the region.
2. **Batak People**--The Lake Toba region is home to one of three major branches of austronesian people known as the Bataks. Along with the Dyaks of Borneo and the Toraja of Sulawesi, the Bataks of North Sumatra occupy the central highlands of one of the large islands of Indonesia. All three cultures are distantly related to each other, as evidenced by the similarity in their traditional homes, carvings and burial ceremonies, but at the same time they are isolated from each other geographically. The story of the Batak people and the cultural history of the Lake Toba region is linked to the history of Indonesia, but is also unique in many ways. Certainly the major branches of the Bataks--Karo, Dairi, Toba and Simalungun--provide an entrée into understanding the unique culture and customs of these people as well as their views toward the lake.
3. **Exploitation of Natural Resources**--The health and condition of Lake Toba today has been influenced greatly by the fact that the region's natural resources--its forests, water and soils--have been exploited. Most of this exploitation is fairly recent, and contrary to the basic principles of sustainable development, the local residents have not benefited from this nor have they been participants in decision-making which resulted in major industrial developments in the region. Instead, the use and management of the region's resources has been driven largely by the goals of a highly centralized government based in Jakarta and by foreign investments. Major projects include: Inalum Hydroelectric facility, PT Inti Indorayon Pulp and Paper Mill, and Renun Hydroelectric facility. These projects have resulted in major changes to the landscape, environmental quality and water supply. Unfortunately, the lack of basic information about Lake Toba prevents a more thorough understanding of the nature and extent of these changes.

Recommendation: Suggested themes should be developed further as plans

progress because they provide a useful context for some of the possible programs and activities at the center.

B. Target Audiences: A place for families, visitors and researchers

Future planning for the facility should focus on defining target audiences and potential markets through specific surveys, studies and visitation statistics. In the absence of more detailed information, the study team has identified an initial list of target audiences for the Center:

- Residents (focus on families and children)
- Tourists
- Teachers and students
- Researchers

C. Educational Programs, Activities, Exhibits and Field Trips

During the information gathering stage of this study, many ideas were suggested as potential educational activities, field trips/outings and exhibits at the Center:

Educational Activities

- adopting and cleaning-up a river, shoreline or street area
- painting festival for kids in all 4 districts with cash prize for 1st, 2nd and 3rd place (pilot project being conducted in 1999)
- interactive educational programs about life within the lake (batak fish as mascot)
- tank of trouble exercise (like the one at the LCBSC)
- training on how to make batak handicrafts
- training on how to use the toilet and dispose of trash properly
- planting seedlings
- contributing to the Center through a coin machine (like at LCBSC)

Field Trips/Outings

- sampling and site visits on boat to learn about life on the lake
- fishing and hiking with school children
- visit to Samosir Island by boat
- tours of Inalum, Indorayon and Renun facilities
- boat excursion to Batu Gantung Rock Cliffs
- camping trips
- tour of the Monkey forest in Prapat
- cross country hike to Simarbalatak Mountain on peninsula near center
- bicycle trips around Samosir Island
- travel by bus to Arjuna Batak Culture Museum

Exhibits (interactive, informative, constructed by local craftspeople)

- lake levels over time

- three-dimensional model of lake and watershed
- hydropower turbines/ model of Inalum
- aquarium with fish from Lake Toba
- sister lake visiting exhibit
- geology and natural history visit about volcanoes, caldera formation and fossils
- music, culture, dialect, traditional dance
- water, forestry/agriculture, municipal waste

Recommendation: The Center should continue to evaluate and define target audiences and develop a more detailed plan for programs, activities, field trips and exhibits.

D. Research and Monitoring Program

To date, a research program has not been established on Lake Toba and no systematic monitoring program is being conducted. Several research studies have documented some of the basic characteristics of the lake and watershed, but these have been exclusively reconnaissance surveys. Along with the development of educational programs for the Center, a plan should be developed for a research and monitoring program that would be conducted at the center and through partner institutions. The plan should identify priority research needs as well as potential funding sources and laboratory and equipment needs for the program. Identification of these needs is outside the scope of this feasibility study and should be considered as part of a separate study. However, the establishment of a solid research and monitoring program for Lake Toba should be considered a high priority and an essential component of the Science and Education Center. Without this, the information which can be shown and displayed to the public will be very limited and the credibility of the center will be jeopardized.

Recommendation: A study should be commissioned to develop a plan for a research and monitoring program at the Center. This program should be given a high priority within the development of the Center and be considered essential to the credibility of information provided at the Center.

VIII. Proposed Facilities

Since the programs should be the main factor influencing the design of facilities at the Center, a detailed concept plan cannot be developed until a specific program plan is developed. In consultations with project partners during the course of this feasibility study, many ideas were suggested regarding the facilities. A general concept plan which incorporates some of these ideas for facilities which would also be compatible with the site are described below. The LCBSC developed a concept plan and drawings for their new facility which could be used as a model for the Center (see Appendix A).

A. Lake Toba Discovery and Education Center

- Building 1: Main building and discovery center

"open air" classroom on a covered porch or veranda
exhibit space
office space
walkway and dock on shoreline
restrooms with composting or alternative wastewater system (annex to building)

- Building 2: Science and Education Center
laboratory
teaching laboratory/classroom indoors

B. Training Center

- dormitory for visiting students and researchers at the center
- kitchen and dining room
- restrooms for residential building with composting or alternative wastewater system (separate)

C. Building design considerations

- programs to drive the design of buildings
- in the style of batak house
- demonstration of low-cost, alternative wastewater system
- demonstration of alternative energy (e.g. solar)
- nearby river and lakeshore to serve as outdoor "classrooms"
- phase in three building complexes over time

D. Boat

During 1996 and 1997, the Lake Toba Heritage Foundation operated a boat on Lake Toba to serve as a platform for education programs (see details in Appendix H).

E. Website

1. Lake Toba Online as a Model

Monitor International teamed up with Sustainable Development International to publish a website and free electronic newsletter called Lake Toba Online with the intention that this would serve as a model and basis for an internet presence for the Lake Toba Science and Education Center. As described by Charles Green, Editor, Sustainable Development International, "This special resource examines many of the pertinent issues concerning sustainable development including water and waste water management, knowledge transfer, consumption and production, environmental issues and community empowerment based on sister projects in the USA and Indonesia."

2. Accessible to Indonesians and the International Community

The goal is to make the website available in English and Bahasa Indonesia, to use it as a way to publish both existing and new information about Lake Toba, and to provide a

mechanism for communicating news updates and current events about the lake -- all to create a community of people who are more aware of the issues facing the Lake Toba region. The current partners also hope that the Lake Toba Heritage Foundation will become an active partner in the website and contribute updates, articles and other content.

3. The website should pay for itself

Another goal is to make the site pay for itself through sponsorship agreements with public and private entities. The first edition was published by ICG Publishing in London, England in association with Monitor International and sponsored by Indorayon. This, in itself is proof that business and industry in the Lake Toba region, have an interest in supporting education and science programs in the region. In order to pay for itself, the website must be managed in a way that is content driven and attracts the maximum number of visitors. Again, the partnership with ICG Publishing allows the site to be hosted on the SDI Website where traffic can be directed to the page about Lake Toba. ICG Publishing is already impressed with the visitation statistics after only a few days. While the site is currently targeted to an international audience, the next step will be to make necessary revisions/additions to target the Indonesian audience as well. Additional sponsors are currently being sought.

Recommendation: The Center should develop a more specific concept plan for the facilities to more clearly define and promote the project as funding is available. The LCBSC drawings and plans should be used as a model for this plan.

IX. Location and Site Assessment

A. Site identified in Ajibata

Prof. Dr. Midian Sirait, Chairman of the Lake Toba Heritage Foundation, has identified land in the kabupaten (town) of Ajibata for the location of the Center (Appendix D). Located on the shores of Lake Toba, the site has a beautiful view to the volcanoes near Brastagi to the northwest and of the steep-sided caldera walls of the lake basin. The site is located on the same road as and about 1km from the ferry landing which operates between the mainland and Samosir Island. The site has access to the water along a sandy beach and relatively flat land with a bluff that gently slopes toward the waters edge. The view, access to the lake, close proximity to the ferry landing and main roads, and local support for the project are critical features in favor of this site (Appendix E).

B. An incubator for compatible economic development

Unlike the neighboring town of Prapat, Ajibata is not as attractive for tourists due mainly to the lack of facilities and other tourism-related amenities. Waterfront development is devoted to small commercial ferry boat operations and fish farming. However, siting the

Center in this small village would contribute to its attractiveness as a destination and help spur spin-off ecotourism related businesses and activities which in turn would help economic development activities in this lakeshore community.

C. Uses of the site

Three uses would be allocated on the site: 1) 5,000 square meters for buildings associated with the education center, including classrooms, exhibits and a teaching laboratory, 2) an adjacent 5,000 square meters for a training center with dormitory and living space for students and visiting researchers, and 3) a dock for the boat and access to the lake. A site visit was conducted with the Bupati (mayor) of Ajibata in February 1999. The Camat was very supportive of the conceptual proposal to use the government land to accommodate these uses.

D. Site preparations needed

Significant preparatory actions were taken shortly before the study team's visit to Prapat, Ajibata and Medan on 12-18 February. Most important, the Bupati of Tapanuli Utara, Mr. Sinaga, identified 10 hectares of land which is owned by the Kabupaten Dati II Taput in Ajibata on the shore of Lake Toba. During a site visit, the study team observed that local people have recently posted claims to most of this piece of kabupaten land, based on traditional ownership rules and the involuntary and unfair manner in which some of the land was acquired during the 1950s. In the cases we observed, people posted a sign stating that they were the traditional owner and/or planted a crop--typically maize-- on the land that they claimed.

E. Need to secure enough land

One particular piece of land along the shore was identified as ideal for a science center except that, at about 12 meters wide, it would need to be expanded onto an adjoining new claimant's land, almost certainly before construction could begin. The land that was identified is located in Ajibata, on the shore of Lake Toba between two streams which are themselves located between the new land purchased by Prof. Dr. Midian Sirait and the small office building of the Lurah of Parsaoran. This parcel begins at the water's edge and rises approximately one meter over a distance of 21 meters. At a bluff, the land rises for another 10 meters in distance, to a height of 5 five meters above the lake. From there, moving inland again, the land gains another meter in height when it reaches the road which is about 100 meters from the water's edge. Drs. M.H. Sinaga, the Camat of Ajibata, visited the site and agreed that it is close to being ideal.

Recommendation: The Lake Toba Heritage Foundation should take all necessary actions and work with local authorities to secure the property in Ajibata for use for the Center.

X. Potential Project Partners

Partnerships will be key to the success of a Science & Education Center on Lake Toba. Throughout the feasibility study, numerous potential partners have been identified from education, tourism, business & industry, government and nongovernmental organizations.

A. Education

- Teachers and students from schools in: Ajibata/Prapat; nearby communities such as Samosir, Porsea and Balige; and from other communities around the lake.

B. Tourism

- Prapat/Ajibata Hotel Association
- Local ferry boat operators and tour operators

C. Business/Industry

- PT Inti Indorayon Utama in Porsea (currently closed)
- Inalum Hydroelectric Station on the Asahan River
- Renun Hydroelectric Station on the Renun River

D. Government

- Governor of North Sumatra (Provincial)
- Four Bupatis (Regional Government Heads)
- Camat of Prapat and Ajibata (Town Administrators)

E. Nongovernmental organizations and associations

- Local and community-based NGOs in the Lake Toba region (e.g. LTHF)
- National and International NGOs with an interest in Lake Toba (e.g. Monitor International)
- Through LakeNet, partnerships with similar institutions and organizations in other parts of the world (e.g. LCBSC, Lake Biwa Museum, Lake Baikal Ecology-Science Center, Lake Ohrid Hyrdobiological Institute).
- Association of Science and Technology Centers, particularly their Asian network of centers.

Recommendation: Effective partnerships will be key to successful establishment of the institution, development of the Center and implementation of science and education programs.

XI. Institutional Capabilities

A. Lake Toba Heritage Foundation

1. An established NGO in Indonesia

The Lake Toba Heritage Foundation was established in 1995 to counter the rapid decline of environmental quality and biological diversity in the Lake Toba basin and to conserve and promote the unique cultural and social heritage of the Batak people. The foundation has been at the forefront of promoting environmental quality through workshops, seminars, and technical training for stakeholders in the region ranging from ferry boat operators to religious leaders. It has forged working partnerships among local businesses and governments as well as international partnerships with Denmark, Germany and the United States.

2. Demonstrated success with a boat-based operation on the lake

Through a grant from the USAID-sponsored Municipal Finance Project, the foundation initiated in 1996 a public environmental awareness campaign and lay monitoring program for six of the largest towns along the shores of the lake. The program involved the operation of a boat for education programs as well as the hand-removal of nuisance water hyacinth plants. Although very successful and cost-effective over an 18-month period, the boat-based operations ceased during 1998 due to lack of funding.

3. Sister lake exchanges and international partners

Since 1997, the foundation has been actively engaged in a sister lakes relationship with Lake Champlain in the United States. With funding from USAID through a grant from the Council of State Governments and US-Asia Environmental Partnership, the main objective of the Lake Toba-Lake Champlain Sister Lakes Exchange is to exchange environmental experience, practices and technologies related to the management of a large lake watershed. Study tours by delegations from the US and Indonesia have recommended the establishment of a Lake Toba Science and Education Center. The sister lakes exchange program has been recognized as a sustainable development success story by the United Nations Commission on Sustainable Development.

4. Good working relations with government agencies

The Lake Toba Heritage Foundation (LTHF) has matured into an effective organization since its founding four years ago. It is now able to function at a number of levels, including the ability to influence the government at a high political level with the changing administrations in both the central government and provincial governments. For example, the foundation submitted a detailed report to former President B.J. Habibie regarding the condition of Lake Toba. Unfortunately, one of the intended outcomes of this activity, to create a new authority to manage the Lake Toba region was not acted on before Habibie left office. However, the ministers of several agencies were

added to a board of the LTHF. Another outcome of this activity, to have an independent audit of the PT Inti Indorayon Utama facility in North Sumatra, has lead the LTHF to take more of an advocacy role. The Foundation has been quite vocal in its opposition of the Indorayon facility which was supported by the previous administration, but at the same time, it does not leave them in a neutral role within the region. By no means is the study team making a judgement regarding the actions of the foundation in regards to its advocacy work, but it is important that the Science and Education Center be an independent organization that is not involved in political or advocacy activities.

5. Grassroots support and technical expertise continually improving

Although the LTHF continues to increase grassroots support and to gain scientific and technical expertise, they should look to build upon their successes and help to incubate a new, independent organization to develop and manage the Center. For example, in 1999, the foundation sponsored a poster contest among schoolchildren to raise awareness about the lake. Several members of the board have participated in technical exchanges on a range of issues, and Andaru Satnyoto, the primary staff person of the foundation, spent a semester in the US studying English and interning with Lake Champlain organizations. The foundation is recruiting a younger generation of leaders and has appointed a new secretary general on the board of directors with extensive experience in communications and public relations. The foundation has also demonstrated its success in managing and implementing grants from public and private donors, including bi-lateral and multi-lateral donors. They now need to transfer this capability to help form a new organization to run the Science and Education Center.

Recommendation: The Lake Toba Heritage Foundation should be the lead organization in the establishment of a science and education center. This leadership role should include the formation of necessary partnerships with other organizations as well as serving as the primary grant recipient and manager of the facility during Phase 1.

Recommendation: During Phase 1, the LTHF should serve as an incubator for a new, independent organization that would be created to manage the center. This should be done in a way that provides a smooth transition from the interim management of the LTHF and does not impede progress toward on-the-ground activities.

B. BAPEDAL and Bapedalda

1. Decentralization underway

During 1994-1997, the Badan Pengendalian Dampak Lingkungan, Bapedal, the Environmental Impact Management Agency, moved to decentralize its operations through the establishment of three regional offices covering all of Indonesia. The Eastern Region office was to be located in Ujung Pandang, South Sulawesi Province; the Central Region office was to be located in Den Pasar, Bali Province; and the Western Region office was to

be located in Pekanbaru, Riau Province. In 1997 it was decided to intensify the decentralization of Bapedal by establishing a local office, Bapedalda, in each province. This was achieved in North Sumatra Province at the end of 1998 with the creation of a completely new agency in the provincial capital of Medan, located in a refurbished building at Jalan Teuku Daud No. 5.

2. Agency in transition

The Head of North Sumatra's new Environmental Impact Management Agency is Mr. Soangkupon Siregar, a well-trained agriculturalist who happens to be the nephew of the Minister of the Environment, Dr. Panangian Siregar. Mr. Siregar received an MA degree in agricultural industry at the University of Wisconsin in 1979 and subsequently served in the North Sumatra Department of Agriculture. When the study team met Mr. Siregar in his new office, on 18 February, he had assembled a staff of some 50-60 people and basic office furniture, but the operation was still so new that there were no telephones, no office equipment, and not even any basic office supplies.

3. An effort to improve technical capacity at the provincial level

Indonesia's new provincial-level Environmental Impact Management Agency offices represent a major national effort to improve technical capacity for environmental management. They replace and supersede provincial-level offices known as the Environment Bureau, the Biro Lingkungan Hidup (Biro LH). The Environment Bureaus were operated by the Ministry of Home Affairs under the supervision of the Provincial Secretary (SEKDA), who in turn reported to the provincial Governor and to the Minister of Home Affairs. The Environment Bureaus were chronically weak, in large part because the Ministry of Home Affairs had very limited technical capacity in environmental management and had no career path to attract or promote competent environmentalists. Limited largely to formulating general programs and compiling reports, even the largest provincial Environment Bureaus had staffs of only 10-15 people, all of whom typically were administrative generalists.

4. Staff increased

The new provincial Bapedaldas will differ in two important respects from their predecessor Environment Bureaus. First, they will be under the direct supervision of the Governor and of the Head of BAPEDAL, who is also the Minister of Environment. This will link the new provincial offices with the major source of technical expertise in environmental management in Indonesia. Second, the Bapedaldas will average some three or four times more staff than the old Environment Bureaus.

5. The need for technical training and assistance

During our meeting with him, Mr. Soangkupon Siregar was enthusiastic and optimistic about his office's potential impact over the course of the next few years, but he also

articulated a wide range of immediate needs. Most important, he said, was that the new staff lacked real expertise in environmental matters; most of them, including himself, were drawn from other fields of government service, including agriculture, forestry, fisheries, and tourism. He very much wanted the whole staff to receive basic training in environmental impact management and also in English language. The other major need that he articulated is general management, to develop a program and a budget, and to monitor and evaluate the office's work. Above all else, he said, "We need a consultant to teach us."

Recommendation: As the key environmental management agency in the province, Bapedalda should become an active partner and supporter of the Lake Toba Science and Education Center.

Recommendation: A training needs assessment should be conducted of the new provincial Bapedalda in Sumatra, as the first step toward fulfilling the human resources development and training that will be required to bring it to full operational efficiency.

Recommendation: The Memorandum of Understanding between US EPA and BAPEDAL should be executed and implemented in order to provide some of the necessary training in this region.

C. Province of North Sumatra

1. The province is an active supporter

North Sumatra is one of eight provinces on the Indonesian island of Sumatra. Its population of approximately 4.5 million includes the homeland of the Batak people who live in the Lake Toba region which is located in the center of the province. The Governor of North Sumatra is the honorary chairman of the Lake Toba Heritage Foundation. Both the present and former governors have been active and supportive participants in the sister lakes partnership. Raja Inal Siregar, Governor of North Sumatra for ten years and who retired in 1998 at the end of his term, signed a Memorandum of Understanding to create a sister province-sister state partnership with the State of Vermont. His successor, Rizal Nordin, fully endorses the partnership and is committed to sustaining it into the future.

Recommendation: The Province of North Sumatra should become an active partner with the Lake Toba Heritage Foundation in the establishment of the Center by providing funding, technical expertise, monitoring information and results of environmental surveys and scientific studies.

D. Kabupatens (regencies) of Tapanuli Utara, Simalungan, Dairi, Karo and Toba

1. Increasing local government role

In the Indonesian administrative system, kabupatens (regencies) are the units of

government just below the provincial level. The approximately 306 regencies in the country have an average population of 650,000. With the creation of a new kabupaten in 1999, there are now five separate regencies in the Lake Toba region, each with a distinct history and culture, but sharing a common ethnic heritage of the Batak people. The regent heads (bupatis) are key local political leaders, and with the political changes underway in Indonesia related to *reformasi*, their roles are becoming increasingly more important in the more democratic system of government. As a group, the bupatis in the Lake Toba region have been very supportive of the creation of a science and education center. In particular, the Bupatis of Simalungun and North Tapanuli strongly support the proposed location of a center in the neighboring communities of Prapat and Ajibata as ideal for serving some of the larger communities on the lake.

2. The boat provides a link among the communities

A boat-based operation that can easily travel to lakeshore communities is proposed as one way to give all of the kabupatens a sense of ownership over the science and education center. Even though the main location of the center is proposed for the community of Ajibata, a boat can provide the most effective linkage to communities in the other kabupatens.

Recommendation: The bupatis (regent heads) of the 5 kabupatens (regencies) in the Lake Toba region should become active supporters and advocates for the science and education center and help to organize campaigns to raise public awareness and needed funding.

E. Indonesia-based Organizations

Indonesia has a variety of institutions that are potentially important partners in the Lake Toba Science and Education Center project, including: Prokasih Program (Clean Rivers Program); Indonesia National Science Foundation (LIPPI); and Indonesian Biodiversity Foundation (KEHATI). These agencies are conducting relevant programs in Indonesia, and in the case of Prokasih, within the Lake Toba region. The Lake Toba Heritage Foundation should coordinate with and consult with the leaders of these institutions early in the planning phase regarding their interest in the project, especially financial and technical assistance to programs offered at the center.

Recommendation: An outreach campaign should be conducted with leaders of Indonesian-based organizations to explore their interest in the project and to identify potential sources of financial and technical assistance.

F. Indonesian and North Sumatran Universities

Several universities have been active with research and education programs in the Lake Toba region, including: Bogor Institute of Agriculture, University of North Sumatra, Simalungan University, and Nomensen University. Each of these should be considered important partners in the Lake Toba Science and Education Center, and in the case of

Bogor Institute of Agriculture, should be asked to take the lead in developing a research and monitoring program for Lake Toba which would be conducted at the proposed Center.

Recommendation: Cooperative agreements should be secured with colleges and universities in Indonesia and North Sumatra that are interested in supporting research, monitoring and education activities at the center.

Recommendation: A separate feasibility study should be commissioned to design a research and monitoring program for the Lake Toba region.

XII. Operational Considerations

In the book, *A New Place for Learning Science, Starting & Running a Science Center*, the author Sheila Grinnell prepared profiles of staffing and operational budgets of typical science centers for very small, small and large facilities. Based on the information provided in this publication, as well as information provided by the Lake Champlain Basin Science Center and consultations with the Lake Toba Heritage Foundation, a preliminary proposal for an organizational structure, staffing levels and operating budget was prepared.

A. Organizational Structure

This study concludes that the organizational model which is most feasible for the Center is to have a new, independent organization established. Recognizing that this may take some time, the Lake Toba Heritage Foundation, a well-established organization, should take the lead in initiating the project and implementing Phase 1. On both an interim and long-term basis, the Center should be operated by working in close partnership with others, including government agencies, academic institutions, other NGOs and private businesses and industry. A proposed organizational structure is described below and an organizational chart is provided in Appendix F.

Operation of the Center should be overseen by a Board of Directors. At least initially, this would be a Management Committee reporting to the LTHF Board. Because of the importance of this project and the significant level of effort that will be needed to bring to concept to fruition, three special committees should be established that have specific responsibilities related to the development and operation of the Center and its programs: 1) Science and Education Center Management Committee/Board of Directors; 2) Citizens Advisory Committee; and 3) International, Scientific and Technical Advisory Committee. The latter two committees would report to the Management Committee/Board of Directors. Specific responsibilities of these committees are described below:

1. Management Committee/Board of Directors – This Committee will be responsible for oversight and management of the Science and Education Center Project, including fundraising activities. Once a Director is hired for the Center, this

committee will oversee his/her work until a separate organization can be created and a Board of Directors established. At such time, the Board of Directors would take over.

2. Citizens Advisory Committee – This committee will serve in an advisory role to the Management Committee and will consist of local people from the Lake Toba region, including private citizens, business people, tourism officials, NGOs and industry representatives.
3. International, Scientific and Technical Advisory Committee – This committee will serve in an advisory role to the Management Committee on matters related to scientific and technical aspects of the Center’s programs and activities, and to facilitate cooperation with international experts and institutions. Membership should consist of researchers who have studied the lake or who are interested in conducting research on the lake, representatives of partner academic institutions, international experts and representatives of international organizations.

These committees should be established immediately with support from the LTHF Board. As the project gains support and a new organization is formed in the future, a new Board of Directors can be established in place of the Management Committee.

Recommendation: The LTHF should establish three committees to oversee the development and management of the Center and its programs: 1) Science and Education Center Management Committee; 2) Citizens Advisory Committee; and 3) International, Scientific and Technical Advisory Committee.

B. Staffing Levels

As soon as funds can be secured, hiring staff to assist in the design and development of a Center will be important. Appointing a director and an administrative assistant are the highest priority, even if these positions are considered interim appointments until permanent staff can be hired. Other proposed positions are outlined below based on models from other centers. All positions are contingent upon securing adequate funding for capital construction and operating costs:

- Director
- Secretary/administrative assistant
- Education director
- Staff educators (2 - 4)
- Volunteers (10 – 20)
- Development/marketing director (located in Medan or Jakarta)
- Operations/maintenance supervisor
- Security staff (1 – 2)
- Boat captain and crew (2 – 3)
- Building and grounds staff (1)
- Exhibits staff (1 - 2)

The total number of staff needed to operate the facility and its programs will depend on the status of program development and funding levels. Initially, the number of staff might be quite small with just three to five people, but eventually may be as much as twenty full and part-time people and equally as many volunteers.

Recommendation: As soon as initial project development funds can be secured, staff should be hired to assist in the development of the Center and its programs. A Director should be appointed as soon as possible, even if it is on an interim basis.

C. Operating Budget

A sample operating budget was developed based on the proposed organizational structure and staffing levels described above. During the early phases of this project, the annual operations cost is estimated at approximately USD 50,000 to 100,000 per year. Initial capital costs are estimated to range from USD 50,000 to 100,000 for the first phase. Based on these estimates, approximately USD 200,000 is an appropriate fundraising goal to initiate and complete Phase 1 of the project. Approximately USD 100,000 would be the minimum needed to properly initiate the project. Please refer to Appendix G for budget details for Phase 1. The capital costs for full implementation of all phases could cost an additional USD \$200,000 to \$400,000 and even more depending on the design and sophistication of facilities developed, including the laboratory and necessary equipment.

Recommendation: As an initial step, the LTHF should try to secure USD \$100,000 to \$200,000 for the first phase of developing the Center.

XIII. Sustainability of Funding

Securing and then sustaining funding will be the key to success of the Center. To enhance the feasibility, a phased approach is recommended, in part to demonstrate the need for the Center as well as to demonstrate success and attract funding. An initial grant for as little as USD 50,000 for capital and operating would go a long way towards implementation of Phase 1 and the establishment of the Center and educational programs. It is anticipated that revenue for the Center would come from three main sources: 1) grants; 2) corporate sponsorship; and 3) admission and program fees.

A. Grants

For initial development and operation of the Center, securing grants from the following sources are considered most feasible: 1) private, philanthropic foundations, 2) international organizations such as UNESCO; 3) bilateral funding agencies such as USAID, JICA and Danida; and 4) multi-lateral funding agencies such as The World Bank and Asian Development Bank. Each of these potential funding agencies should be approached regarding funding opportunities and application procedures. As

appropriate, applications should be submitted to implement capital construction of facilities and operation the Center and its programs.

B. Corporate Sponsorship

Since the Lake Toba region is a major tourist destination within Indonesia and Southeast Asia and is also the site of several major industrial activities, corporate sponsorship should be considered an important priority for fundraising and development activities. The Chamber of Commerce (KADIN) as well as its individual members should be targeted as potential partners and corporate sponsors.

C. Admission and Program Fees

Like the other lake science and education centers around the world, the Lake Toba Center should keep admission and program fees affordable for residents and visitors. However, admission and program fees should not be overlooked as one of several important sources of revenue for the operation of the center.

During the early phases of the Lake Toba Center, a nominal fee should be considered, perhaps after a period of free admission on a promotional basis for 3 to 6 months. The following admission fees are suggested initially: Rp 100 kids; Rp 500 adults; and Rp 1000 Family. A program fee should be charged and/or be off-set by grant funding to cover the costs of offering educational programs. The admission and program fees can be increased as the offerings at the center grow and expand and further market studies are completed. The goal should be to keep the Center accessible, affordable and sustainable from a financial standpoint.

D. Membership

The Lake Toba Center should consider establishing a membership program once a new organization has been created to manage the facility. The membership program should be specifically designed to allow residents and foreigners the opportunity to support the Center and receive special benefits as a member.

XIV. Conclusions and Recommendations

The study team concluded that a Science & Education Center would be a tremendous asset to the Lake Toba region for several reasons:

- (1) provides a focal point for educational programs about the lake;
- (2) can serve as a clearinghouse of information about the lake both within the region and outside the region at a national and international level; and
- (3) will support the tourism industry by serving as a site for tourists to visit and learn about the lake and the region; and
- (4) will help the local economy by serving as an demonstration of responsible shoreline development practices and as an example of a community development project

compatible with conservation of the lake environment.

The Science & Education Center is considered very feasible, especially if the different components are phased-in over time. A phased approach is considered most feasible from the standpoint of institutional development, but also because it will allow the institution to implement pilot projects and demonstrate success as a way of attracting funding and support from the local, regional, national and international communities. The study team envisions that the establishment of the Center will take place at the grassroots level first, and over the long-term, will become a center of excellence for Asian lakes. More baseline research of the lake and its surrounding watershed is considered essential for supporting the Center and establishing credible information for education programs.