Waste Water Management in Lake Toba

Social Marketing of the Existing Wastewater Treatment Plant and Community Based Sewer System

Water quality in Lake Toba in North Sumatra, Indonesia is negatively impacted by the discharge of untreated sewage from virtually every household in the basin. The social understanding and acceptance of wastewater treatment in the Lake Toba has not been addressed in previous construction improvement projects. This has resulted in infrastructure improvements that have not been accepted and utilized by the community. Two projects have been identified to bridge the gap between the science of wastewater treatment and the social acceptance and implementation of the technology; 1) social marketing of utilization of a new wastewater treatment plant; and 2) building community consensus by constructing a low cost community-based sewer system demonstration.

The first project is a Waste Water Treatment Plant (WWTP) constructed in 1996 to serve the town of Parapat, one of the largest settlements on the lake. The first phases of construction of the collection and treatment facilities have been completed. However, very few connections have been made to this facility. Developed through discussions with relevant governmental parties, a program of social marketing of this facility directly to the households, hotels, and other businesses is proposed. This program includes the hiring and training of local Environmental NGO (Non-Governmental Organizations) staff members to implement the program.

The NGO’s will organize and conduct workshops at the provincial, kabupaten (neighborhood), and community level. These workshops are aimed at building community understanding and consensus, and at identifying community members willing to serve as environmental cadres to conduct door-to-door visits. The environmental cadres will receive training on environmental conservation related to sanitation and household waste, the technical aspects and management of the WWTP, how to market it to the community with materials to support their contacts. This project will be pivotal in the success of the WWTP utilization, which ultimately leads to improved health and water quality in Lake Toba.

The second project focuses on community awareness leading to community participation in dealing with pollution from untreated wastewater. Learning from past failures of projects aimed at changing people’s habits through external public awareness campaigns, this project is geared towards utilizing experiences learned within another community in Indonesia. This neighborhood, motivated by illnesses and deaths related to poor sanitation, installed a simple inexpensive collection and treatment system. This direct approach of motivating and working with the community succeeded where more advanced technologies have failed.

Using this community as an example, this project proposes to identify and work with one of the five settlement areas on Samosir Island in Lake Toba and develop a locally acceptable solution to waste disposal. The project includes establishment of a core team; a tour of the example project; and community consensus and participation in all aspects of decision-making, design, construction and management of the infrastructure and facilities. Successful completion of this project will allow it to serve as a model for future similar projects in the Lake Toba area and throughout Indonesia.

Company Profile & Capabilities

Stone Environmental, Inc. (SEI) is an environmental science and geographic information systems consulting firm, with U.S. offices in Montpelier, Vermont, Raleigh, North Carolina and a Pacific office in Dunedin, New Zealand. We service local, national and international clients.
Stone Environmental, Inc. delivers professional, timely, and cost-efficient services. We conduct successful projects of all sizes, thanks to:

- committed, reliable management
- strict Quality Assurance standards in all services
- comprehensive, multi-disciplinary staff knowledge
- our ability to staff and manage multiple project assignments
- advanced project communications and reporting systems.

Geographic Information System Services

A Geographic Information System (GIS) is an organizing concept used by managers, planners, engineers and scientists to display and analyze spatial information. This highly flexible, graphic representation of data allows these elements to be viewed individually (to examine specific details) or together (to show their positions relative to each other). A visual database, GIS has evolved into a sophisticated information management system that communicates complex data at a glance.

Stone Environmental, Inc. provides state-of-the-art GIS services and products. Extensive planning and analytical skills compliment our strong GIS skills. Nationally and internationally recognized for GIS development and implementation, members of our team have had experience providing GIS services to municipal, state and regional government bodies, private organizations domestically and internationally. We have developed GIS standards for data development, documentation, quality assurance, map coordinate systems, and land cover/use coding.

Watershed Analysis & Management

Understanding watershed processes requires knowledge of complex inter-relationships between human activities, natural processes and the physical environment. Using an interdisciplinary approach and a variety of tools, including GIS and watershed models, many of these relationships can be better understood so that improved management techniques can be developed.

Watershed management involves engineering, planning, legal, and economic components. This approach enables SEI to conduct scientifically-based analyses and develop targeted strategies for improved watershed management. Addressing pollution before it becomes a problem has highly desirable environmental benefits.

Water Quality Impacts

Two types of pollution sources in a watershed affect water quality:

- Point sources (discharges that originate from a single location) including wastewater discharge outlets, storm culverts, and drainage outlets.
- Nonpoint sources (areal) including surface runoff containing pesticides, nutrients, and sediments.

SEI characterizes watershed processes by combining the latest advances in hydrologic and water quality modeling with geographic information systems (GIS) and statistical analysis of components of interest. We use ARC/INFO and ArcView GIS software to model processes within watersheds and their subbasins. Incorporating appropriate information for the delineated watershed, we then use a combination of GIS and water quality models to determine sources and
quantities of point and nonpoint source pollutants. In some circumstances it is necessary to collect field data for specific analyses that may be required to fully understand a watershed.

**Wastewater Treatment & Disposal**

Developments in research and technology have led to many innovative solutions for effective wastewater treatment and disposal. We provide sound, viable answers to your needs.

We base our approach on finding appropriate solutions to wastewater management:

- Soil-Based Dispersal
- Enhanced Treatment
- Site Selection
- Long-Term Acceptance Rate
- Hydrogeologic Capacity
- Sensitivity of Receptors
- Surface Water Discharge
- Assimilative Capacity
- Treatment Component Selection
- Nutrient Removal Systems
- Ecological Impacts

Stone Environmental analyzes overall solutions and their components. Where should your waste go for treatment? Where should the treated effluent go? Stone Environmental Inc. (SEI) conducts specialized evaluations and predicts the ability of the natural systems to receive wastewater. We have substantial experience with physical conditions and wastewater treatment needs throughout the United States and around the world. Appropriate disposal of domestic or industrial wastewater may require evaluation of the capacity of the receiving media — soil, groundwater, or surface water.

**LakeNet**

Established in 1978, LakeNet (formerly Monitor International) is a nonprofit, tax-exempt 501(c)(3) organization based in the United States. David Barker, President and Lisa Borre, Vice President lead the organization in all its efforts. Its mission is to conserve biological diversity and cultural heritage and to promote environmentally sustainable development of marine and freshwater ecosystems throughout the world. LakeNet promotes ecosystem-based approaches as the key to sustaining environmental and economic health and implements conservation activities in three main program areas: (1) coastal/marine, (2) freshwater, and (3) climate. LakeNet also serves as the secretariat for two global networks: (1) the Global Environment Facility NGO Network, and (2) LAKENET.

On behalf of the US and Indonesian partners, LakeNet coordinates the Lake Toba-Lake Champlain Sister Lakes Partnership which began in 1996 with a visit to Indonesia by the coordinator of the Lake Champlain Basin Program. Lake Champlain had just completed a comprehensive watershed plan using a participatory process that involved stakeholders, including government at all levels, business and industry, NGOs, academic institutions and citizens. Indonesian partners were very interested in learning more about this successful experience on Lake Champlain in order to better protect and manage Lake Toba, the largest lake in Indonesia.

The State of Vermont Agency of Natural Resources was awarded an $89,000 grant from the Council of State Governments and US-Asia Environmental Partnership, with funding from USAID.
in August 1997. Delegations from Indonesia and the US conducted study tours of both lakes as part of the technical exchange program which resulted in long-term, sustainable partnerships between the State of Vermont and the Province of North Sumatra as well as the Lake Champlain Basin Program and Lake Toba Heritage Foundation. The partnership was awarded additional funding in 1999 for a pilot project to demonstrate implementation of a community-based watershed action plan in the Lake Toba region.

Stone Environmental Inc. is one of the private partners involved in the Lake Toba-Lake Champlain Sister Lakes Partnership. In cooperation with Ir. Haryatiningsih, LakeNet’s Country Director in Indonesia, SEI developed a strategy for social marketing of the existing wastewater treatment facility and to promote community-based sewer systems in the Lake Toba region.

LakeNet’s work is supported by contributions from individuals and organizations, by grants from private and corporate foundations, and by grants, cooperative agreements and contracts from governments and international organizations.

Lake Toba Heritage Foundation

The mission of the Lake Toba Heritage Foundation is to increase the awareness of residents, government officials, and international bodies on the condition of the lake. The success of this NGO is largely due to the inspiring leadership of one man, Dr. Midian Sirait. Established in 1995, the Foundation has completed projects in environmental education, teacher training, water hyacinth control and lake monitoring. With modest funding, the Lake Toba Heritage Foundation has proven that it can be successful.

Project Support: This project was supported in part with a grant from NASDA Grant Number 187. The National Association of State Development Agencies (NASDA) provided matching funds to Stone Environmental, Inc. (SEI) that were critical to the initiation and eventual success of this project. These funds were dedicated to the transfer of environmentally responsible technologies to Indonesia in order to improve the quality of life and environment for Indonesians. An additional objective of this funding is to help stimulate demand for U.S. technologies that result in job growth for Americans.

Stone Environmental, Inc.

58 East State Street
Montpelier VT 05602
Telephone: +1 (802) 229-4541
Fax: +1 (802) 229-5417
http://www.stone-env.com

LakeNet

300 State Street
Annapolis, Maryland 21403 USA
Telephone: +1 (410) 268-5155
Fax: +1 (410) 268-8788
http://www.worldlakes.org