APPLICATION FOR KATHRYN WASSERMAN DAVIS
100 PROJECTS FOR PEACE

Project: "PLASTIC WASTE RECYCLING IN KRATOVO, MACEDONIA."
Submitted by: Engineers Without Borders at the University of Florida

Prepared by:
Nathan Wangusi (United World College of the Atlantic '03, University of Florida '07)
Lindsey Nolan (University of Florida - Agricultural and Biological Engineering '07)
Scott Keddy (University of Florida - Environmental Engineering, '07)
John Perry (University of Florida - Geomatics, '08)
Branko Kerkez (University of Florida – Civil and Coastal Engineering '08)

Introduction

Kratovo, Macedonia, a city of approximately 10,000 people, has suffered serious economic and environmental problems since the country declared independence from the former Yugoslav Republic in 1991. This ancient city, nestled in the Osogovo Mountains, suffers from unemployment of over half of its citizens and lacks a sustainable system to manage its solid waste. As a result, solid waste is routinely disposed of in the Tavacka River, which runs through the center of the city. Unsanctioned dumps are frequent in neighborhoods and the current landfill is not properly designed or maintained. Serious concerns for the environment and health impacts on the community were expressed in the past by international aid organizations, leading to our involvement.

This proposal is on behalf of the University of Florida chapter of Engineers Without Borders (EWB). EWB is a non-profit humanitarian organization whose purpose is to partner with communities worldwide in order to implement sustainable engineering solutions. One year ago EWB adopted the solid waste management project in Kratovo in collaboration with the EPA, USAID and Peace Corps. Our team consists of eight students from various engineering programs, two faculty advisors, and four professional engineers. We have technical support from members of the professional engineering community in the United States as well as in Macedonia.

Over the last year EWB has made significant strides in developing a successful solid waste management program in Kratovo. The group traveled to Macedonia in May 2006 for initial project analysis, and then again in December to gather data and to make the necessary connections with local community leaders and the public. Through meetings and field work, we have put together a comprehensive picture of the solid waste management needs of Kratovo, including a 500+ respondent community survey and a Geographic Information System (GIS) that catalogues the town's critical features and current waste management resources. A waste stream analysis revealed the majority of waste to be composed of PET plastics and compostable organics. The need for immediate action was addressed by creating a composting program. A significant portion of the town's population grows at least a small garden on their property, which allowed the composting initiative to remediate much of organic substances form the town's waste. Having successfully spurred the interest and cooperation of the community, we directed our efforts at implementing a comprehensive recycling program.

The problem is complicated by a poorly organized overall solid waste management system. The different waste streams, such as organics, plastics, and metals, are not separated. As a result there is no way to isolate any of the waste streams and hence no way to effectively recycle the trash. For recycling to be effective there must be a method of separation and categorization of the different wastes being produced by the town. To successfully manage the plastic waste that fills the streets, plastic bottles and other plastic materials must be isolated at their sources. For this purpose, EWB is getting ready to install recycling bins strategically throughout the town. These bins have already been designed and funded by EWB students and will soon be constructed locally in Kratovo.

Proposed Project

This proposal is phase IV of a four phase initiative. The three phases leading up to this proposal are currently nearing completion. Phase I, focuses on bin placement as well as the optimization of collection routes. Phase II deals with local students and the community; EWB has developed numerous educational materials that will be implemented in May 2007 to raise awareness about the benefits of recycling and to instruct individuals on the use of the newly designed collection containers. Phase III consists of the construction and placement of recycling containers around town.

The last phase, and the justification for this proposal, is the construction of a structure to house the collected bottles. The structure will be used to compact collected plastics, shield them from weather, and will also serve as a drop off point for local citizens. Two employees are expected to work continuously throughout the week inside this structure. Upon being baled and stored, a large truck will pick the bottles up periodically and drive them to a neighboring town to be recycled. The money made from selling these plastics will be enough to cover the expenses of electricity and the workforce required

to collect, bale and store these plastics. The employees will also be responsible for paying any citizens that drop off their plastics at this storage facility (10 MKD ~ $0.15 per kilogram).

A 1000 m^2 site has already been approved by the municipality. The design of the structure is currently being developed by University of Florida students and supervised by Professional Engineers. Upon completion of this design, and the acquisition of the appropriate funds, the plans will be handed to a local firm for construction. The costs associated with this construction are listed in the attached Budget. Labor and materials will be retrieved at minimal cost due to the eager support of the community.

Technical Specifications

Our team will design a processing/storage facility to temporarily house plastic bottles which have been collected in Kratovo, Macedonia. The structure will be able to hold 120 m^3 of plastic bottles, 2 baling apparatuses and 2 scales. The site will have an open 1000 m^2 available for construction and partitions will be created inside the structure to allow for easier sorting. The structure will be resistant to heavy wind, snow and seismic loads. The floor will consist of a reinforced concrete slab and the frame will be constructed out of steel. The roof and walls will be made of corrugated aluminum sheets. Adjacent to the structure will be an office and a restroom. The floor will be graded in order to ensure proper drainage of chemicals leaching from stored plastic bottles. The compound will be fenced off to prevent entry of intruders during non-working hours. The building plans will be signed and sealed by professional Engineers of Record.

Conclusion

The immediate goal during the summer will be to send a team of three to four engineering students and a mentor to Macedonia in order to implement the plastic waste management plan. At the end of the summer it will be expected that we will have a functioning recycling program. EWB will establish collection centers at strategic locations around the city to reduce the plastic waste going into the environment and a buyback point at the proposed structure.

All other project phases are nearing completion, and the funds from this grant will assist in implementing the final phase; the construction of the storage structure. The remainder of our project is supported by private sources and the University of Florida. EWB students have raised enough money for the next implementation trip, with the exception of the roughly $10,000 needed for the construction of the storage facility. We have developed strong relationships with the community and will continue to foster these nascent friendships on subsequent trips. Your gift will not only help to set a precedent for solid waste management practices in Macedonia but will also provide a group of University of Florida students with an invaluable educational experience.

We are confident that this phase of our project is worthy of obtaining funding of the Davis 100 Projects for Peace Gift. Ultimately the goal of this project is to improve the quality of life of the citizens of Kratovo by promoting tourism, which has so far declined due to poor environmental conditions. Promoting the establishment of a recycling industry in Kratovo will provide a source of livelihood for a growing unemployed section of the community.

Contacts

Organization /Individual	**Address**	**Phone number**	**Email**
Nathan Wangusi *(Student Contact: EWB-UF)*	207 NW 17TH ST, APT 501 Gainesville, FL 32603	480-220-3817	natekish@gmail.com
Cathy Leslie *(Director: EWB- USA)*	EWB – USA ,1811 Left-hand Circle, Suite A-1, Longmont, CO 80501	303-772-2723	cathy.leslie@ewb-usa.org
Dr. Timothy Townsend *(Project Leader)*	P.O. Box 116450 Gainesville, FL 32611	352-392-0846	ttown@ufl.edu
Dr. Angela Lindner *(Faculty Advisor)*	P.O. Box 116450 Gainesville, FL 32611	352- 846-3033	alind@eng.ufl.edu
Katrina Finn *(Peace Corps Volunteer)*	Location: Kratovo Macedonia		krfinn@mtu.edu
Limonka Georgieva *(Asst to Mayor: Kratovo)*	Location: Kratovo Macedonia		limonkag@yahoo.com
Oliver Nacevski *(USAID Engineer)*	Location: Skopje, Macedonia		Oliver_Nacevski@dai.com
Biserka Dimiskova *(Professor of Civil Engr., University of Skopje)*	Location: Skopje, Macedonia		biserka@pluto.iziis.ukim.edu.mk