

Davis 100 Projects for Peace, Final Report - Summer 2007

Title: Plastic Waste Recycling in Kratovo, Macedonia

School: University of Florida

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The purpose of our project was to execute a pilot study which included local construction of polyethylene-terephthalate (PET) recycling bins, optimal deployment of initial recycling bins, and the commencement of a community and school based environmental education initiative. Since the citizens of Kratovo have lacked any environmental education, the success of this project relies on our ability to assist the Kratovian citizens in realizing the consequences of their environmental ignorance.

Fortunately, with the combined efforts of Stojan Nacevski (head of Sunny Hill, an NGO), Mite Andonovski (Mayor of Kratovo), Limonka (Assistant to the mayor), Cane Przo (employee of the municipality), and our team, we were able to organize the complete infrastructure for the PET recycling program in Kratovo. This included construction, painting, and deployment of the six recycling bins. Moreover, with Stojan's assistance, we distributed pamphlets detailing the importance of a healthy environment, and explaining how composting and recycling can improve the environment.

While in Kratovo, we worked with the NGO office to set up a community clean-up of the local park that was littered with trash. In less than two hours, our volunteers and we collected all the trash, separating the recyclables which equated to approximately 30 kilograms of PET plastic. Each kilo of un-bailed PET plastic is worth 8 denar. If managed carefully PET recycling in this region will be a financially viable endeavor, which means neither Sunny Hills, nor the Municipality of Kratovo will need to stretch their financial resources in order to ensure the longevity of the program.

The final and most imperative aspect of our project, environmental education in the classroom, is still in progress. The lesson plans for students are currently undergoing translation. Thorough translating services require a substantial amount of time, especially since the lesson plans we developed for the two age groups are approximately 200 pages in length. The lesson plans cover identical topics; however, the approach and depth vary. The following three units compose the lesson plans for the elementary-age students: Conserving Natural Resources; Reducing, Reusing, and Recycling Classroom Waste; and Proper Disposal of Waste. The activities in these lesson plans are hands-on and simplistic in detail. The lesson plans for the secondary-school age students involve four units: Managing and Conserving Natural Resources; Reducing, Reusing, and Recycling; Composting; and Proper Disposal of Waste. These include more scientific experiments to engage an older audience. Cumulatively, these community and school based initiatives will help raise awareness of the current environmental issues Kratovo faces.

Our initial objective for the future is to continue to assist Kratovians with any challenges they face, which includes maintaining contact with Stojan to receive feedback and provide advice on the recycling initiative.

On our implementation trip, we also assessed the challenges identified in the two preceding assessment trips, including the insufficient treatment of wastewater and the unsanitary landfill. Accordingly, we gathered data and took updated pictures and videos that will significantly aid our efforts in addressing these environmental issues. We have split the UF - Engineers Without Borders (EWB) Macedonian Team in two groups: the landfill group and the anaerobic digester group, in order to appropriately concentrate our efforts and our specialties.

Within the landfill project, we have one mentor, one student leader, and three team members. The objectives of this team are:

- To reroute the road that runs along the side of the landfill,
- Design a fencing system at both the entrance and exit,
- Research the possibility of stabilizing the slope with a retention wall, and
- Design a leachate collection system.

Since all sewage is discharged directly into the nearest river and over 60% of the waste generated in Kratovo is organic, we have deduced that an anaerobic digester will provide the most sustainable and easily implemented solution to the current wastewater problem. Moreover, it will decrease the stress currently placed on the landfill. On this implementation trip, we determined a prime location for the anaerobic digester. With assistance from officials in Kratovo, we will design a system that will divert the organic portion of the waste to the wastewater stream, whereupon methane will be harnessed from the digestion process.

The objectives of these two projects will be attained through thorough research and close collaboration with the EWB-Macedonia engineers, the Peace Corps Representative in Kratovo, the Municipality of Kratovo, and the mentors on our team.

The implementation trip not only taught us noteworthy business lessons regarding collaboration, delegation, and accountability; but also engineering lessons such as how to design devices and services that will integrate easily into a community and will be reliable (in the case of the recycling bin, will be stable, easily utilized and accessed). In addition, we learned to listen first and act second. We had intentions of arriving and setting explicit dates and times for meetings – as we would here in the states – however, upon arrival, we embraced the culture and intertwined our business with leisure. We set no explicit meetings; we simply dropped by to visit with people, enjoyed coffee and each other's company, and allowed ourselves to release our rigid ideas of business. We even took Wednesday, August 8 off so we could travel into the mountains with a Macedonian family to the culmination of a four day religious celebration. It was a very exciting and unique experience and we were grateful to have been invited to be a part of the event that brings all the neighboring towns together. Sadly, the mountains where the celebration is held will be under water soon due to the construction of a dam.

The bonds we formed with Macedonians help demonstrate the goodwill of the American people and country. Moreover, a country's growth and economic development are intrinsically linked to a functioning system of management for the municipal solid waste. Through this project we are promoting and assisting with the stabilization and vitality of Macedonia.



The first PET Recycling Bin in Kratovo, Macedonia. This bin is located directly in front of the entrance to the school. From left to right, Chris Rokicki (EWB-UF Team Member), Kelly Hodoval (EWB-UF Team Leader), Raghu (Peace Corp Representative in Kratovo), Micky Stojmanovski (one of the Bin Constructors), Paul Indegia (EWB-UF Team Mentor), Cane Stevanoski (Representative from the Municipality).



After approximately 2 hours of effort, we collected 30 kilograms of recyclable PET plastics and over 120 lbs of trash. This is Mite, one of the volunteers, and a "supersack," which is the type of bag that is inside each recycling bin, filled with the 30 kilograms of PET. All profits were donated directly to Sunny Hills, NGO.



All the PET plastic in this picture was extracted from the river that runs directly behind this site from Kratovo.