

## Abstract

Under the current waste legislation in both European Union and Czech Republic, material recovery is preferred over other types of municipal solid waste treatment. However, waste collection systems have negative environmental impacts. This thesis deals with modeling and optimization of waste collection routes, which should lower their impact.

The model makes use of the ArcGIS software system and operations research to optimize routes. Inputs of the model are the amount of waste produced in the region, locations of the final facilities, and their capacities. The amount of waste produced per district was estimated to be the portion of total waste produced corresponding to the number of inhabitants of given district. Final facilities are the assorting lines. Distances between districts and final facilities were computed by Network Analyst Extension of ArcGIS. The index method assigns the assorting lines to districts in a way that minimizes total distance traveled by waste collection vehicles, while respecting the capacity of the assorting lines.

Outputs are waste collection routes and the distance, per waste type, traveled by the waste collection vehicles. The model allows changing the input data to observe changes in the waste collection system.

The model was applied to the data from the capital of Czech Republic, Prague, where the collection of paper, plastic, glass and liquid packaging board was simulated. The model turned out to be able to optimize municipal waste collection.