## 1 - An Ant Colony System adaptation to deal with accessibility issues after a disaster

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One of the main problems relief teams face after a natural or man-made disaster is how to plan rural road repair work tasks to take maximum advantage of the limited available financial and human resources. Previous research focused on speeding up repair work or on selecting the location of health centers to minimize transport times for injured citizens. In spite of the good results, this research does not take into account another key factor: survivor accessibility to resources.

In this paper we account for the accessibility issue, that is, we maximize the number of survivors that reach the nearest regional center (cities where economic and social activity is concentrated) in a minimum time by planning which rural roads should be repaired given the available financial and human resources. This is a combinatorial problem since the number of connections between cities and regional centers grows exponentially with the problem size, and exact methods are no good for achieving an optimum solution.

In order to solve the problem we propose using an Ant Colony System adaptation, which is based on ants' foraging behavior. Ants stochastically build minimal paths to regional centers and decide if damaged roads are repaired on the basis of pheromone levels, accessibility heuristic information and the available budget.

The proposed algorithm is illustrated by means of an example regarding the 2010 Haiti earthquake, and its performance is compared with another metaheuristic, GRASP.