

R.WALK: SULLE TRACCIE DI ... SVILUPPO DI METODOLOGIE GIS PER LA DETERMINAZIONE DELL'ACCESSIBILITA' TERRITORIALE DI MATTEO FRANCHI

This project's objective is to develop R.Walk, a software that outputs a raster map layer showing the lowest cumulative cost of movement between each cell and the user-specified starting points. It uses as input an elevation raster map whose cell category values represent elevation, combined with a second input raster map whose cell values represent friction costs.

R.Walk uses the following formula to estimate the cost of each slope interval:

$$T = (a * \Delta S) + (b * \Delta H_{Uphill}) + (c * \Delta H_{ModerateDownhill}) + (d * \Delta H_{SteepDownhill})$$

(where T is time of movement in seconds, Delta S is the distance covered in meters, Delta H is the altitude difference in meter)

The a, b, c, d parameters that are used in the formula take into account movement speed in the different conditions and are linked to:

- a: underfoot condition (a=1/walking_speed)
- b: underfoot condition and cost associated with uphill movement
- c: underfoot condition and cost associated with moderate downhill movement
- d: underfoot condition and cost associated with steep downhill movement

These parameters can be changed by the researcher, as they are different for each specie.

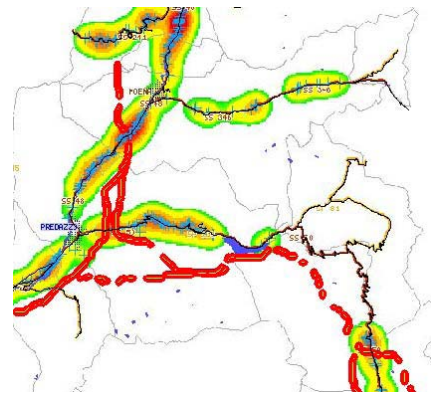
The software, as stated before, considers not only the slope of the path but also the type of ground covered. This is represented by what I called "friction". The total time-energy used to cover the distance is given by the following formula:

(where f is the time-energy used for the ground and the lambda is a variable the user has to set in order to have a linear equation).

$$Total\ cost = T + lambda * f$$

RESULT

I used r.walk to consider the paths that roe-deer to travel between the more populated areas. By combining this map and another one showing the frequency of roe-deer crashes with cars I've noticed that there was more than one intersection between the two, just like in the picture on the right.



CONCLUSIONS

This GIS software opens up some applicable opportunities to study and plan the animal migrations on our land. R.walk can be used for every specie but the researcher must set the correct movement parameters, a, b, c, d, to have a good result. These parameters could only be found by studying the interested specie or by comparing them with the ones of another similar specie.