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Biodiversity analyses with GRASS

Leonardo Lami, Emilia Venturato, Paolo Cavallini, Riccardo Petrini, Daniele Scarselli

*Faunalia – piazza Garibaldi 5 – 56025 Pontedera PI
www.faunalia.it info@faunalia.it*

Abstract

An Italian Regional administration has collected a large data base (> 25.000 records; from 1960 to 2002) containing locations of all elements (animal and plant species, biocenoses) of biodiversity conservation importance. For each location, relevant biological information (species, year, etc.) have been typed in. The location was described by the coordinates of a point, the type of shape and its width. The origin of the data, and consequently their precision, are quite variable (from a few meters to entire Provinces). Many locations are partly or totally overlapping. The aim of the work was to develop a global map of biodiversity value.

We therefore:

- spatialized the data: using PostgreSQL with PostGIS geographical extension we rebuild the area of each location
- attributed to each location a value inversely proportional to the area, so that the integral of each was equal to unity
- imported data into GRASS, keeping a link to the PostGIS table
- overlaid single elements, and created each overlay area as a distinct vector element
- repeated the same analysis separately for each group of elements (fauna and flora)
- attributed to each vector element a value resulting from the sum of the values of overlapping elements (“weight” value of the area, i.e. the number of locations or their fractions insisting on it); this step has allowed, for each element of interest (birds, mammals, plants etc.) the display of a map of probability of presence
- a further analysis has been conducted, attributing to each vector element the count of different species (an index of species richness in the area)

The resulting map was highly informative, and proved useful for identifying spatial priorities for conservation. Resulting vectors were useful as basis for further analyses, down to the species level (e.g. we could map the distribution of two species of moles as a function of altitude).