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Report on national ICP IM activities in Spain

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Introduction

The Natural Park of Bertiz, a protected forested area by the western end of the Pyrenees and within the region of Navarre, comprises the new ICP IM site (ES02) with which Spain/Spanish participation has rejoined the network after suspension of the activities in site ES01.

This location used to be a lordship since the XIV century. The traditional land uses in it were pastures, chestnut meadows and timberland, conditioned by activities such as shepherding, woodcutting, and charcoal and quicklime production. It was acquired in 1898 for private recreation. From then on, woodcutting and timber extraction were suspended, and the traditional land use drastically reduced; the entrance to this area was strongly restricted as well. In 1948, it was donated to the Government of Navarre by Mr. Ciga, and acquired Natural Park status in 1984. Since then, human intervention in it has been kept to the minimum. In 2000 it was designated as Natura Site and is currently considered as a Special Area of Conservation (EC Habitats Directive).

The experimental basin (137 ha) is representative of the main forest type in the region, a composite Atlantic wood dominated by beech trees. Its elevation ranges from 230 m.a.s.l. to the 649 m.a.s.l. of Meate mountain, with an average inclination of 37%.

The climatic conditions in this site are characterised by moderately warm summers, mild winters and low differences between the average monthly maximum and minimum temperatures, owing to the vicinity of the Cantabric sea, a few kilometres away as the crow flies. The long-term annual mean temperature and precipitation are 14ºC and 1525 mm respectively; the most humid period of the year comprises from October to May. Snow precipitation is not very common.

The establishment of the experimental site began in late 2006 after concession of the required administrative permission. First efforts focused on the characterisation of the site and the equipping of the experimental plots. During 2007, the subprogrammes AM, AC, PC, TF, SF, SW, SC, LF, FC, FD, and VG were initiated. Other complementary activities were carried out as well.

Bedrock material and soils

The bedrock is mainly defined by silicic sandstones and conglomerates of the Bundsanstein - Triasic, Mesozoic in the highest zones, and Paleozoic materials in the slopes and lower areas, where two well defined areas can be distinguished: That in the northernmost areas of the basin, marked by Carboniferous outcrops, and that which comprises the rest of the basin, composed of schist with inserts of Devonian materials; limestone from the same period appears bordering the east limit of the basin.

The development of soils in Bertiz is mainly determined by the strong inclination, the moist and temperate climate, and the lithology. Erosion and deposition, leaching of base cations, soil acidification and, finally, clay and humic illuviation are the main pedogenic processes in this area. In spite of a very important acidification, the organic matter is normally well integrated in the soil: The A horizons are pale, with a relatively low organic C content; only in specific locations, such as the highest areas, there are soils with an *umbric* or even *histic* superficial horizon on *skeletic* soils (systematically[1] Leptic Umbrisol and Leptic Histosol [0.8%]). The soil distribution is mainly conditioned by the topography in most other zones of the basin. The soils developed on steep areas are *Cambic* and *Haplic Leptosols dystric* [66.4%](except over limestones where they are of the eutric group [6.1%]). Those in flat areas or on gentle slopes show greater development and present cambic horizons with a low base saturation that can evolve towards an argic horizon with very low bases saturation and a slight *oxyaquic* patern; systematically they are *Cambisols* and *Luvisols* (*Alisols* are also possible) [26.1%]. Small areas of soils with fluventic features appear near the stream beds (Fluvisols [0.2%]). The rock outcrops occupy 0.3% of surface.

Vegetation

The north-facing slopes are dominated by an acidophilus beech forest whereas a mixed beech-oak acidophilus forest grows in the south-facing ones. In general, the understory is poor in number of species although is structurally heterogeneous. The understory shrub coverage presents higher values there where beech and oaks coexist: Heathers (*Calluna vulgaris, Daboecia cantabrica, Erica vagans*) and other shrubs like *Cytisus scoparius, Euphorbia amygdaloides* and *Hypericum pulcrum* are the dominant species. Shrubs appear in the gapped areas of the north-facing slopes, where *Hypericum androsemum* is the dominant species. A higher presence of herbaceous species owes to a higher diversification of habitats: Species such as *Brachypodium sylvaticum, Deschampsia flexuosa* and *Festuca rubra* present high coverage values in the south-facing slopes. Other herbs like *Cardamine pratensis, Carex remota* and *Chrysosplenium oppositifolium* have higher values in the edges of streams. The open areas are dominated by ferns (*Blechnum spicant, Dryopteris affinis* and *Polysticum settiferum*), rushes (*Juncus conglomeratus* and *J. effuses*) and herbs like *Digitalis purpurea* and *Campanula patula*. Other species such as the fern *Pteridium aquilinum* and the herb *Veronica chamaedrys* are heterogeneously distributed into the basin.

Evidence of environmental changes during the last 150 years

We have studied bryophytes from Bertizarana -Bertiz Valley- collected about 1885, 1926–1935, 1974–1978 and 2006–2007, identifying or compiling 259 species. Fertility and Ellenberg indicator values of light, temperature, substrate pH and nitrogen have been analysed. Results show small variations in Ellenberg indicator values: the tendencies are to decrease for light, and to increase for temperature, substrate pH and nitrogen. Regarding fertility, the number of species with sporophytes or sexual organs has decreased spectacularly. All this suggests that changes in ecological conditions and air quality must have taken place during the studied time span.

Progress on Biodiversity Assessment

During 2007 we have continued developing the protocol for the Edaphic Microarthropod (EM) subprogram. Standardisation has been tested with field samples both at selected, polluted sites and at the newly established IM site at Bertiz. Results prove a much higher extractability for EM from soil cores over traditional methods,

such as Berlesse funnels, thus providing a more accurate and reliable density counts for precise diversity indexes.

Based on the experiments and performance of the initial 60–sample prototype (EVE) presented at Riga in 2006, a compact and fully automated 216-sample machine has been designed and built using industry standards and procedures, and is currently undergoing performance tests.

The system is part of a larger protocol aiming at eventually automating as much as possible the full procedure of biodiversity index determination for certain EM groups, from sampling in the field up to operational taxonomic unit (OUT) determination and count.

References

[1] IUSS Working Group WRB. 2006. World reference base for soil resources 2006. World Soil Resources Reports. No103. FAO, Rome.