# Mapping Ecosystem Services in the Urdaibai Biosphere Reserve

(Northern of the Iberian Peninsula)

Gloria Rodríguez-Loinaz, Ibone Amezaga, Miren Onaindia Department of Plant Biology and Ecology. University of the Basque Country.

## **Objective:**

The aim of this work is to develop a methodology for mapping ecosystem services based in biophysical conditions and to evaluate its application to the Urdaibai Biosphere Reserve.

#### **Methods:**

STUDY AREA: The Urdaibai Biosphere Reserve in located in the north of the Iberian Peninsula. It presents a diverse landscape with villages, traditional farmhouses and urban nuclei, where various natural systems of extraordinary importance are present. Outstanding areas include the estuarine or maritime system, the karstic system that supports extensive Cantabrian evergreen-oak forests (*Quercus ilex* subsp. *Ilex*), and a coastline with beaches and cliffs. In the rest of the area the potential vegetation consists of mixed-oak forests (*Quercus robur*) which, throughout the 20th century, were heavily fragmented being nowadays most of its potential area occupied by forest plantations (*Pinus radiata* and *Eucalyptus* sp.) together with grasslands and crops (Fig. 1).

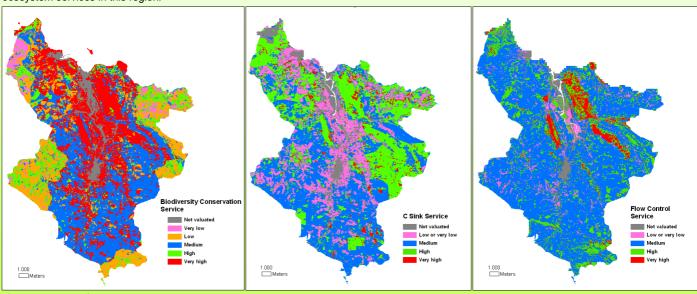
**METHODOLOGY:** This methodology is based in the use of GIS data. For each service the different factors that affect the service were mapped and valuated in a 4 rank scale (4: very high contribution of that factor to the provision of the service; 3: high contribution; 2: medium contribution; and 1: low contribution). This valuation was based on expert knowledge and quantitative data. Once the factors were individually valuated, the map of the total value of the service was obtained by maps algebra.



| Service          | Biodiversity conservation   | C sink   | Water flow control   |
|------------------|---|--|--|
| Valuated factor  | Instead of the total richness of the ecosystems, their contribution to the conservation of important native species was considered        |  | Surface run-off control  |
| Valuation system | contribution of the different ecosystems due to their intrinsic characteristics; and, the protection status of the different areas.       | firstly, the content of C of the soil was valuated; and, secondly, the content of C of the vegetation. | The evaluation was made in two steps: firstly, the contribution of the geophysic conditions (slope, soil permeability and precipitation) was valuated; and, secondly, the contribution of the biotic factor (land uses): |
|                  | B= V+Z  | SC= CS+CV where:   | F= (U+GF)/2  |
|                  |   |  | GF=(SI+Pr+Pc)/3  |
|                  | <b>B</b> = Biodiversity conservation service value  | SC= C sink service value   | where:   |
|                  | V= Value for the intrinsic characteristics of the   | ( 10 , ( 1 ,   |  |
|                  | ecosystem (based on expert knowledge). The  |  | <b>U=</b> Value for the land use (based on expert knowledge)   |
|                  | naturalness of the different ecosystems was   | - 1  | GF= Value for the geophysic conditions   |
|                  | considered being more valuated the natural systems than the artificial ones. In the case of artificial systems the type of management was | To obtain the content of C for the   | <b>SI=</b> Value for the slope: 4: >50%; 3: 50-30%; 2: 30-15; and, 1: <10%.  |
|                  | also taken into account.  | Inventory was used. The final valuation  | Pr= Value for the soil permeability: 4: High; 3: medium; 2:  |
|                  | Z= Value for the protection status of the different   | was: 4 and 3 for the different forests: 2  | low; and, 1: very low or not permeable.  |
|                  | areas. Z=1: If it had any protection status. Z=0: If  | for the shrub systems; and, 1 for the  | Pc= Value for the precipitation.   |
|                  | it had no protection status.  | rest.  |  |
|                  |   |  | Max Pc Min PC  |
|                  |   |  | 4 1  |

### **Results:**

The maps obtained using this methodology reflect well the expected results for the area, thus, this methodology seems to be adequate to map the ecosystem services in this region.



#### ACKNOWLEDGMENTS