

## **Project Update: April 2013**

### **Project overview**

Ecosystem services are the benefits that humans get from nature and their provision is regulated by multiple processes that respond differently to biodiversity changes. In this project I propose to characterise and quantify the relationship between plant diversity, ecosystem processes and services in temperate mixed forests of north-west Patagonia under silvo-pastoral management. In these forests, increasing livestock production leads to species loss, changes in forest composition and soil degradation but also increases nutrients inputs and prevents deforestation. As the intensification in one ecosystem service may negatively affect the provision of others, livestock production may be the source of intense trade-offs with regulating and cultural services.

### **Specific objectives**

- 1) Assess biodiversity by quantifying plant species and functional diversity, ecosystem functioning by quantifying decomposition and above-ground live biomass; and the provisioning of ecosystem services by quantifying indicators of forage production, erosion prevention, soil fertility and cultural heritage.
- 2) Identify and quantify the relationships between biodiversity, ecosystem functioning and services.
- 3) Identify trade-offs in ecosystem services under different intensities of silvopastoral production.

**Our goal** is to recommend management practices which reduces biodiversity loss and provides multiple ecosystem services. In this sense, our work will generate information for resource management by integration scientific knowledge on biodiversity and ecosystem functioning, local ranch-owners needs and local people perceptions/valuation of ecosystem services.

### **Activities**

This update reports about the work done during the first three months of the project (March-May 2013).

We went to the field in March 2013 (for 2 weeks) and visited the five preselected ranches, as well as five new ranches. On this occasion we had an informal and informative talk with each ranch-owner in order to learn about the land-use history and the current production activities. We also walked around all the ranches looking for mixed forests under different intensities of silvopastoral management:

- High = pampas – intense grazing pressure and no forest canopy (past deforestation) (photo 1).
- Intermediate = intense grazing pressure under open mixed-forest canopy (past selective logging) (photo 2).

- Low = low grazing pressure under close mixed-forest canopy (no past or current wood extraction) (photo 3).

The region where the project is taking place is divided in three valleys: El Bolsón, El Foyel and El Manso (Rio Negro province, Argentina). Out of all the ranches we visited, we decided to work in sites which best suits two out of the three searched silvo-pastoral intensities, and which were similar between them (land-use history and forest type) to allow comparisons. In these senses, the project is going to be held in ten pairs of sites with intermediate and low silvopastoral intensity, and in five pampas.

We went back to the sites in May 2013 for 18 days in order to start with the decomposition experiment. First, we visited each ranch-owner and gave them a detailed printed version of the project where we explained them the problem of ecosystem services trade-offs under land-use intensification, the objectives, methodology, and, most importantly, the expected results and possible deadlines. We also talked about their perception of the ecosystem services that the forest provides and how they may be affected by different management strategies. This was very useful to deeply involve ranch-owners in the results and implications of this project.

During this field trip we also collected fresh senescent leaves of the dominant plant species at each site. Then we oven-dried the plant material at 65°C for 3 days (until constant dry weight) and prepared the litter bags for the decomposition experiment. This laboratory work was done with the collaboration of colleagues from the National University of Rio Negro (UNRN - Sede Andina) and the National Institute of Agro-Technology (INTA - AER El Bolsón). Finally, we set four litter bags at each site, under similar micro-sites and protected from cows. These litter bags are going to be collected after 6 and 12 months of incubation in the field, in order to assess the loss weight and estimate the decomposition rate of each site.

Next expected activities: The next field trip is going to be held in November 2013 in order to collect half of the litter bags. Also, from December 2013 to February 2014 we are going to sample vegetation (species and functional diversity) in all sites. During both trips we are going to do interviews with ranch-owners and local people. A final field trip is going to be held in May 2014 to collect the rest of the litter bags. We expect to give to the ranch-owners a final report of the project by August 2014.



Low - high intensity.