

## Project Update: December 2019

### Activities performed

The project was approved in March 2019. Since then, we have conducted the following activities:

- Analysis of satellite images and field exploration in order to select sites and trails to be assessed.
- Intensive vegetation surveys in the selected trails, across the entire elevation gradient (Fig. 1).
- Taxonomic identification in the herbarium of the species collected in the field.
- Selection of plant species to be analysed in their functional strategies.
- Sample collection and measure of plant traits relevant to the analysis of functional strategies.
- Preliminary data analysis and communication.
- Elaboration of structured questionnaires to assess knowledge and attitudes of different stakeholders including recreationists, managers and local communities that actively use mountain natural areas.
- Preliminary surveys using the questionnaire, in order to test its performance and feasibility.

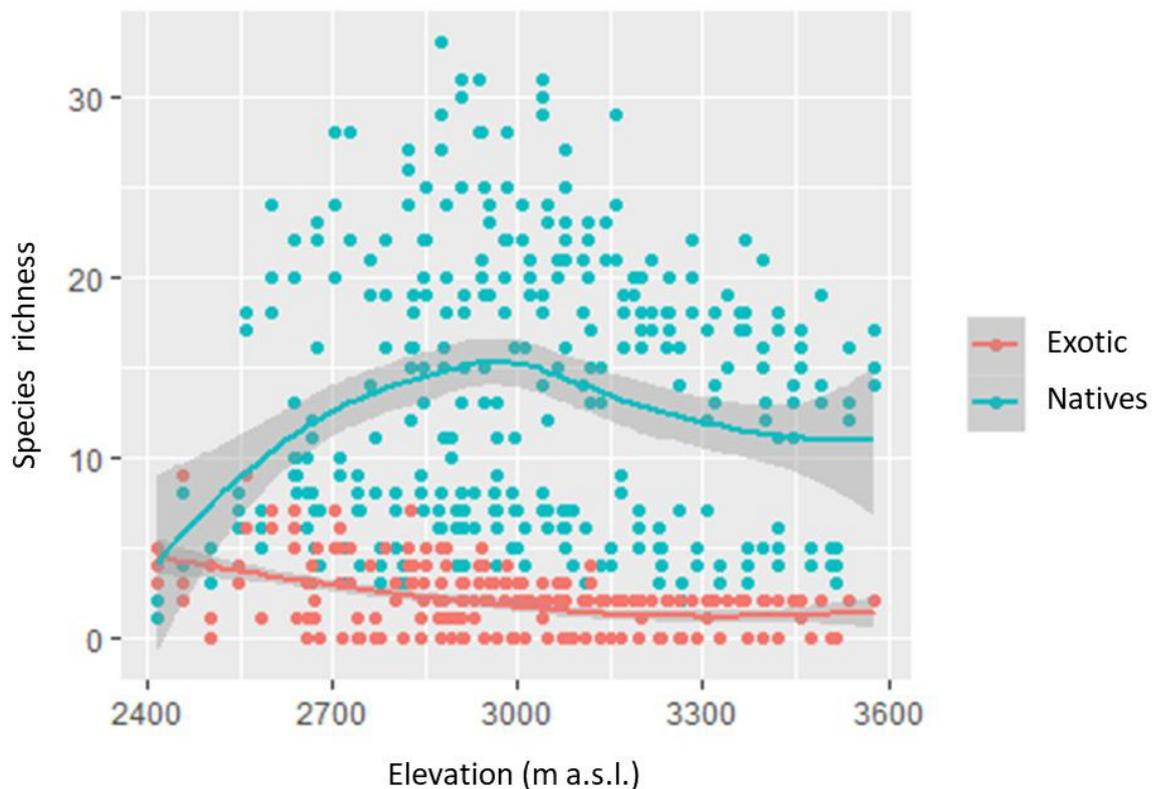


**Fig. 1.** Intensive vegetation sampling in the study area.

### Preliminary outcomes of the project

We selected six trails in three protected areas, located in central Andes of Mendoza: Aconcagua, Cordón del Plata, and Tupungato. The vegetation surveys allowed us to identify 199 native and 39 exotic plant species, which represent 16% of the total plant diversity. It is important to mention that in these surveys we were able to detect six exotic species not previously recorded in the area. This information constitutes a fundamental database for the protected areas and complements existing information for the zone.

Our preliminary analysis show that exotic richness is highest at lower elevations, while native richness reaches the highest values at middle elevations (Fig. 2). On the other hand, preliminary statistical models indicate that the distance to the trails and the presence of herbivores could influence the presence of exotic plant species in the study area. The main exotic species related to trails in the study area are: *Taraxacum officinale*, *Cerastium arvense*, *Convolvulus arvensis*, *Trifolium repens* and *Rumex acetosella*; of these species, both *T. officinale* and *C. arvense* are present along the entire elevational gradient, ranging from 2400 to 3600 m asl.



**Fig. 2.** Species richness vs. elevation gradient in the study area.

We selected the most abundant and frequent exotic and native species to analyse and compare their functional strategies. We collected samples and recorded the following plant traits in 22 native and 14 exotic species: plant height, leaf area, specific leaf area, and leaf dry matter content. After preliminary analysis we found that exotic species have more acquisitive strategies of the resources, like rapid uptake of water and higher growth rates, while natives are more conservative, being able to grow in more stressful conditions. When we analyzed the intraspecific

variation of each of the exotic species, we found that although they are present in a wide altitudinal range, they do not show plasticity in their traits.



**Fig. 3.** Visitors of mountain natural areas completing the questionnaires.

We have conducted more than 60 questionnaires to users of natural mountain areas (Fig.3). The questionnaire worked properly, and the people showed interest and actively participate in answering the questions, so we are able to continue with this topic. In addition, we showed our preliminary results in the National Congress of Botany, in Argentina (XXVII Jornadas Argentinas de Botánica, Tucumán, Argentina) and in the international MIREN Meeting, in Switzerland (Fig. 4).

### **Next steps**

In the next months we plan to do the following activities:

- Data analysis in order to assess the effect of trail disturbance on exotic and native plants.
- Collect additional samples to obtain functional traits data on more species, to analyse functional changes related to the invasion of exotic plants and trail disturbance at a community level.
- Stakeholders' surveys including tourists and other mountain areas users.



**Fig. 4.** María Alisa Álvarez, one of the team members, showing our preliminary results in the National Botany Congress, Argentina