

## Policy brief on the project 'BEISA3'

### Executive summary

The results generated during the course of BEISA3 have demonstrated the potential to change the cropping practice to improve yield and thereby diminishing the need to clear land for cultivation by preserving soil fertility and effectively control pests and to develop sustainable agro-forestry systems that can provide rural farmers with both cash crops and fodder for their cattle. Another important outcome is that the capacity building and research activities initiated by BEISA3 has led to a re-orientation of the research activities at the Universidad San Francisco Xavier do Chuquisaca towards agroecology and sustainable farming manifested through the setting-up of an Institute of Agroecology and Food Security. The four MSc students trained through BEISA3 all have either research or teaching responsibility at the new institute proving a high degree of embedding of BEISA3 in the research portfolio of the university.

### Introduction

Bolivia is one of the world's megadiverse countries with a very diverse flora and fauna and protecting biodiversity has high priority in Bolivia. An extensive system of protected areas has been established to achieve this goal. The challenge in the protected areas is, on the one hand, to ensure the livelihood for rural farmers and, on the other hand, to protect biodiversity and the natural resources. Serranía de Iñao represents such an area where deforestation, soil erosion and uncontrolled grazing is a major threat not only to natural resources (see Figure 1) but also to the sustainability of farming and thus the long term prospects for the rural population living in this area. The objective of BEISA3 was to strengthen the research and human capacity at Universidad San Francisco Xavier de Chuquisaca (USFX) in Sucre to support a sustainable development in Serranía de Iñao.

### Background

Farming practice in Serranía de Iñao is slash and burn, i.e. when a farmer needs land for cultivating crops he/she will burn forest and take the land into cultivation. Only a minor part of Serranía de Iñao is flat (typically the areas along the rivers lowland) while the remaining area is characterized by mountains and hills, i.e. steep slopes that are very exposed to soil erosion during the wet season. As no particular measures are taken to reduce soil erosion typically a few years taking land into cultivation soil fertility is very low and yields diminish quickly (see Figure 2) and more forest will be burnt and taken into cultivation. Besides deforestation soil erosion also results in contamination of the rivers running through Serranía de Iñao. In general, no measures are taken by farmers to restore the forest on abandoned land.

The main objectives of BEISA3 were 1) to improve cropping practices in order to preserve soil fertility and increase yields reducing the need for reclaiming land for agricultural purposes and 2) to develop novel agro-forestry systems that could provide farmers with both crops and fodder. The activities were conducted in four municipalities in Serranía de Iñao (see Figure 3). A third activity was to collect seeds of

plant species closely related to the most widely grown crops to contribute to the build-up of a Bolivian gene bank.

## **Results**

Several courses taught by international experts were organized for the staff and students at USFX to update them and to improve their research capacity. Subsequently the staff and students at USFX organized courses for farmers and local advisors in the four municipalities. Importantly a number of demonstration trials were set up in two of the municipalities and 'Farmer's Days' were organized to disseminate the results. The students at USFX were involved in the project at all levels and several demonstration trials were their final thesis work.

In short, the research activities clearly demonstrated that there is ample room for improving cropping practices in terms of preserving soil fertility and prevent soil erosion, e.g. through crop rotation and the use of green cover crops. Also weeds, diseases and pests are causing significant yield losses that could be diminished through a better understanding of crop-weed competition and timing of control practices. Finally, pronounce differences were found between the available cultivars and by proper selection of cultivars there is scope for improvement. Novel agro-forestry systems were established and although it is too early to assess their sustainability the results of the first years are promising. The concept applied was to plant a mix of short-, medium- and long-duration crops to provide farmers with an outcome from year 1 but also to have an effect on soil erosion. Among the crops planted are forest trees and the end-goal is to re-establish the forest (see Figure 4).

## **Conclusions**

Significant progress was made not only in terms of new cropping practices and novel agro-forestry systems but maybe more significantly in the research capacity at USFX and their focus on the role of agroecology to improve the livelihood of rural farmers. One of the important lessons learnt is that the Bolivian partners, including the four municipalities participating in the project, have been very committed and actually contributed more to the project than foreseen. This holds promise for the future. Also the interest from the side of the farmers and their willingness to consider new approaches has been encouraging and suggests that many of them are fully aware of the threats to their livelihood and open to new solutions.

## **Implications**

The main implication of the project is that USFX is in a much better position to continue their own research on agroecology but also in better position to collaborate with international institutions. Recently, USFX was successful with an application together with Ghent University in Belgium focusing on soil fertility and erosion which will allow them to continue follow-up on this part of BEISA3.

## **Recommendations**

Following the decision of the Danish Government to exclude Bolivia as one of the recipients of development aid and therefore no longer included in the FFU research it makes little sense to make recommendations. My experience is that there is a need to support the agricultural development and that the Bolivians are very committed allowing for fast progress so I guess my only recommendation is to include Bolivia in the programme again. It is good value for the money.



Figure 1. Soil erosion due to deforestation and over-grazing is a major problem in Serranía de Iñao



Figure 2. Poor cropping practices means that soil fertility and yields are rapidly declining following cultivation. In the field to the left the organic matter content was 6%. Following some 3-4 years of continuous maize cultivation the organic matter content is down to 0.8% and yields are significantly lower.

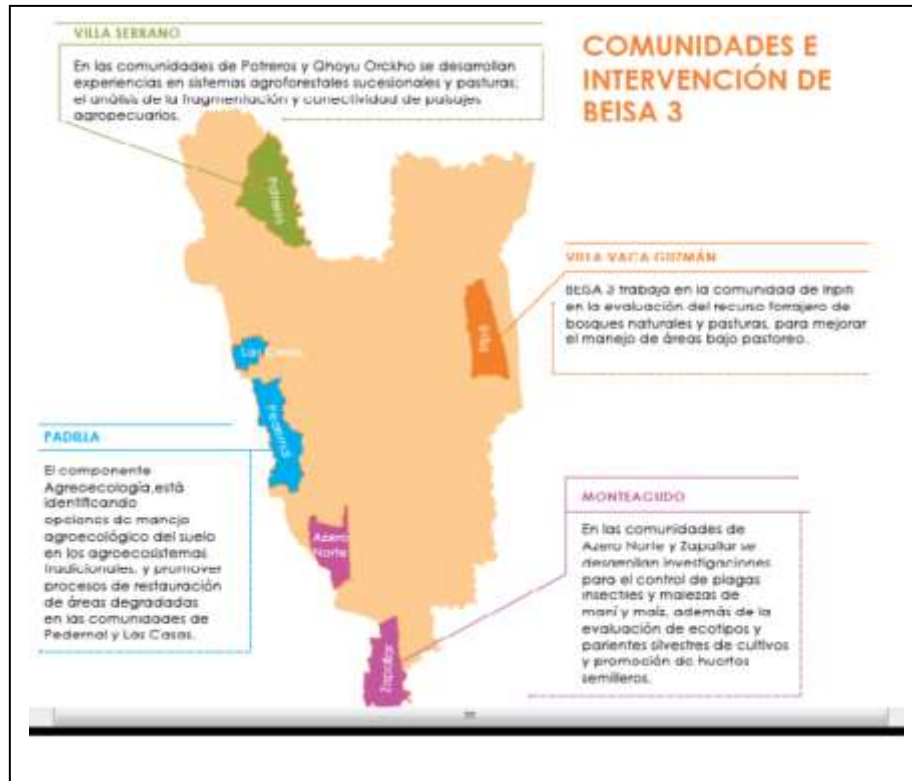


Figure 3. A map showing the location of the 4 municipalities in Serranía de Iñao. The four municipalities are very different in terms of precipitation and soil fertility. Demonstration trials were set-up in Zapallar and Pedernal.

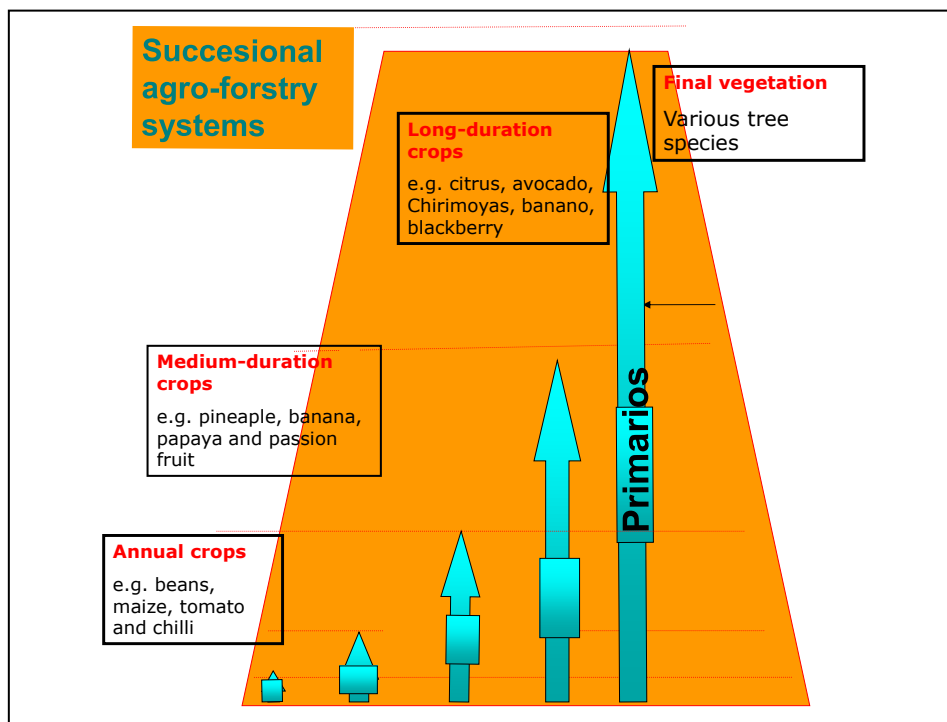


Figure 4. Schematic illustration of the principles of the successional agro-forestry systems establish as part of BEISA3