



POLITECNICO  
DI TORINO

# Honors thesis

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## COURSE OF ARCHITECTURE FOR SUSTAINABLE DESIGN

### *Abstract*

**The renovation of the alpine village of Ferriere in Valle Stura: research and experiments between innovative methods of laser surveying and GIS, traditional building techniques and sustainable design.**

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The purpose of our work is to outline a recovery model for alpine villages, that in our thesis has been applied to the hamlet of Ferriere in Valle Stura. This model is based on a deep knowledge of the architectural heritage peculiarities and of the environment characteristics; it has the purpose of roughing out a recovery program that involves the whole surrounding area and that preserves both the tangible and intangible heritage. In particular the aim, for Ferriere, is to restore the upper part of the hamlet, uninhabited for many years and in a serious state of degrade, and in the same time to reuse and enhance the terracing around the hamlet and to restore the traditional construction techniques that have been lost, such as the thatched roof.

The deep knowledge of the environment and the architecture comes from innovative techniques of survey and analysis. The territorial analysis have been supported by the use of the Geographic Information System (GIS) that allows to study the different features of the environment and to represent it on specific maps. The analysis of the hamlet and its surrounding are based on the results of the survey campaign we took part in September 2015. During this campaign the team has employed UAV systems for photogrammetric survey with drone and terrestrial 3D laser scanners for LiDAR survey. The employment of these systems has allowed to acquire in a short time a lot of detailed information about the buildings and the terracing system to compose a complete survey of the area.

From the photogrammetric survey we could map the abandoned terracing of Ferriere, made up of grassy earth scarps, where traditionally rye was cultivated. We mapped these fields with two different methods that allow to outline the terracing without a direct survey. The first method is based on GIS analysis of the terrain model, defining the edges of the field through a comparison between the profile of the terrain, the slope model and the ortho-image. The second method aims to automate the outline process through a conversion of the slope model from a raster to a vectorial data that shows the areas with low slope, that is the terracing areas.

Afterward, we have combined the photogrammetric survey with the terrestrial laser scanning one to have complete data for drawing and studying the buildings. Every building of the hamlet has been drawn in details; the drawings, with a description of their main features, have been collected on a volume that illustrate the condition of the hamlet as a whole, showing not only the main building but also the ruined ones.

Starting from all these analysis we could draw a project for the recovery of Ferriere including both the buildings and the terracing. The idea is to transform Ferriere into an open air construction site to recover and teach the traditional building techniques that have been lost and where is possible to experiment new building solutions based on local materials. It's essential for achieving this purpose to arrange the terracing to restart the cultivation of rye, that will be used for building traditional thatched roof and new straw-loam walls. Buildings will be restored using these techniques; in relationship with their conditions and the materials availability will be applied different solutions. These directions are written on a *Manual for suitable design* that is specific for the place and gives solutions that are suitable with the architectural heritage and the local resources.

In conclusion, the recovery model we proposed allows to enhance the hamlet and its surrounding in a unitary way and promotes the local production chain. Thanks to the restart of this production is possible to preserve the local identity and to study new ecological solution for building in mountains. These solutions, when used with an architectonic language that is coherent with the milieu, enable to design architectures that are the continuation of the historical heritage and, therefore, are “eco-logical”.

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