

# CABINS

A harmless urbanization model: *Cerdanya case*

<https://klopezregueira.wixsite.com/portfoli>

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*Trabajo Final de Grado Febrero 2020*

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Daniel Garcia Escudero

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Universidad Politécnica de Cataluña

**Declaració d'autoria del Treball de fi de Grau**  
Grau en Estudis d'Arquitectura

Kevin López Regueira

.....  
*Nom i cognoms*

amb DNI/NIE número 40563785L ..... **DECLARO** que la memòria lliurada

correspon al Treball de fi de Grau de la meva autoria que presentaré a la convocatòria

ordinària /  extraordinària del  primer /  segon semestre del curs acadèmic

2019.-2020. davant el Tribunal presidit per ROS BALLESTEROS, JORDI .....

i que ha estat tutoritzat per ARRANZ SAN VICENTE, LUIS FÉLIX .....

I perquè així consti signo el present document,



Barcelona, 03 de Febrero ..... de 2020 .....

## Portfolio



Redrawn



Reinterpretation of existent projects.



Architecture



Projects from the degree based on architecture.



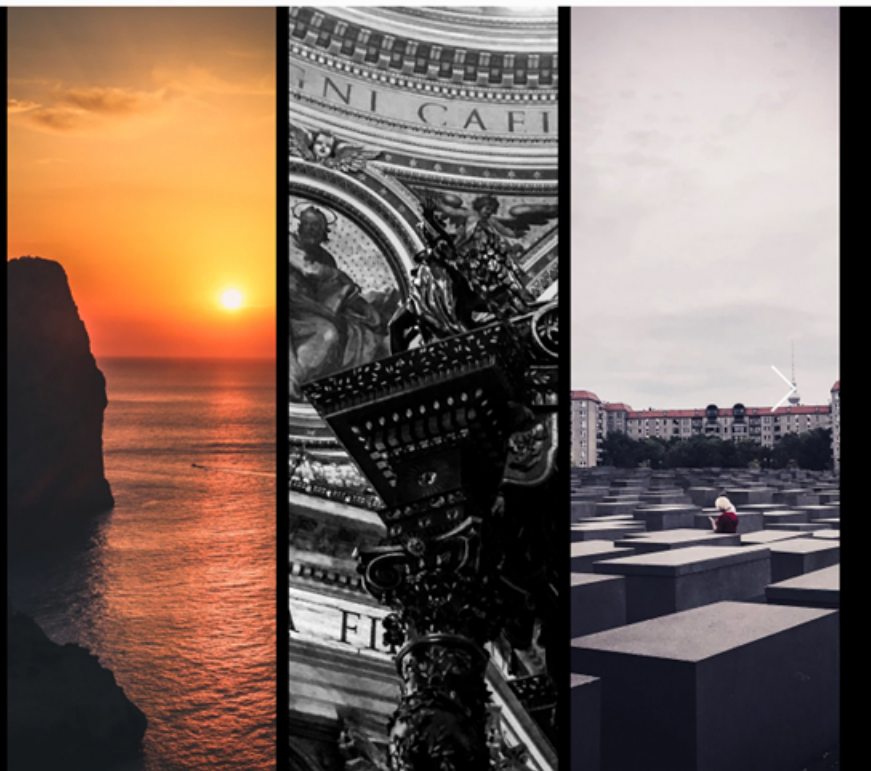
Urbanism



Urbanistic study and projection in diferent scales.

## Hidden CV

From my point of view, architecture is much more than the profession taught in the university lessons, it is a profession that gets richer as you improve your experiences. Learning comes when you open to new experiences and to meet new people or places. Sport has taught me how to work as a team, either in work groups or in terms of coordination with my colleagues in the office. Travelling has thrown me to new cultures and experiences opening my views to expand and improve my values. Finally, working outside this sector has made me understand the importance of ways of doing and priorities when taking decisions in the project thinking more about the user and less about the design itself and the ego.



## TRANSVERSALITY



## TRANSVERSALITY

### Final Degree Work

My relation with the environment and nature comes to me since I was little. I grew up in the Cerdanya and breathing sports and nature. Now a days, I am struck by my concerns about the balance between conservation and exploitation of the nature. From here I am considering an alternative socio-economic model to take a step forward in the conservation of the environment without losing sight of the economic activity of the region.



ENGLISH



CASTELLANO

## Curriculum Vitae



### EDUCATION

Escola del Treball Barcelona

September 2009 - Junio 2013

Master Degree in Architectural Conservation



## EDUCATION

Escola del Treball Barcelona

September 2009 - Junio 2013

Higher Degree in topographic operations.  
Higher Degree in urban development projects

Escuela Técnica Superior de Arquitectura de Barcelona (UPC)

September 2009 - Present (Last degree year TFG)

University degree of Architecture

## EXPERIENCE

Secundino S.L.

Summers: 2009 - 2018; Puigcerdá

Construction worker

Diferents construction and renovation works:  
Structural, roofing, enclosures, stone cladding and urbanization

ARC BCN (Ingenieros Consultores)

September 2012 - March 2013; Barcelona

Intern

Works in delineation of facilities, project reports and various deliveries.

Antonio Cortines (Arquitecto)

November 2016 - May 2017; Barcelona

Freelance

Delineation and projection work on basic projects

Pineraq S.L.P. (Arquitecto)

October 2018 - Present; Barcelona

Collaborator

Participation in complex equipment competitions for health sciences.

## SKILLS

AutoCAD  
REVIT  
Photoshop  
ArchiCAD  
Artlantis  
Illustrator  
InDesign  
Sketchup  
Rhinoceros  
Excel  
Word

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# Kevin López Regueira

EN

### Redrawn



Reinterpretation of existent projects.

### Architecture



Projects from the degree based on architecture.

### Urbanism



Urbanistic study and projection in different scales.

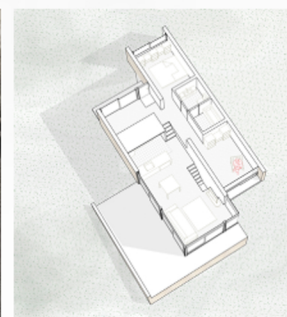
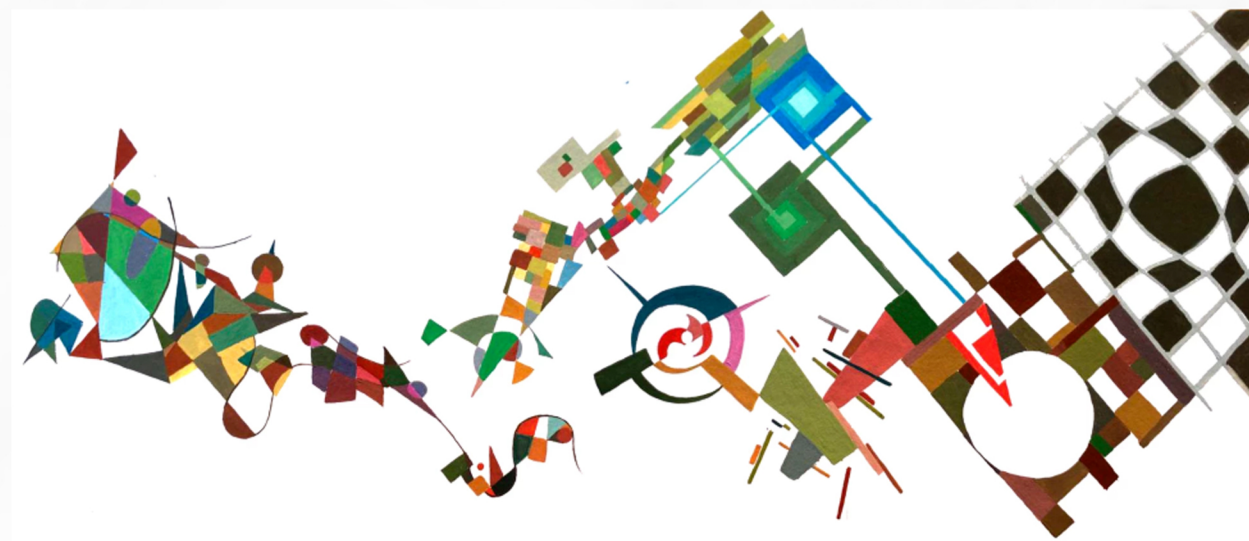
## REDRAWNS

### Abstract Gouache paintings

Starting with the first approach with this type of material, with a blank canvas to experience textures and colours. The goal of the course was to create a timeline with reinterpretations of some of the greatest masters of abstract movement such as Kandinsky, Pollock, Mondrian or Delaunay among others.



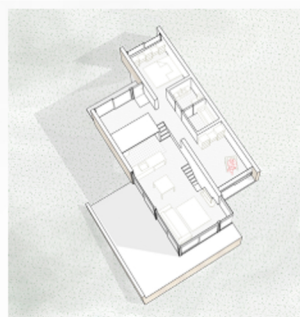
Representación arquitectónica I



### Ibara house, Okayama, Japón

Basic documents were redrawn to be able to understand Ibara house, by Kazunori Fujimoto. There is an axonometric plan sectioned by the main floor and three exterior views. Two day views made with different methodologies and the third one a night vision. The original project has two volumes. The main one a three level house where, the first is the entrance and the night area, the second is the day area and the terrace and the last one there is the basement, below the land level.

Representación arquitectónica II



Ibara house, Okayama, Japón

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Representación arquitectónica II



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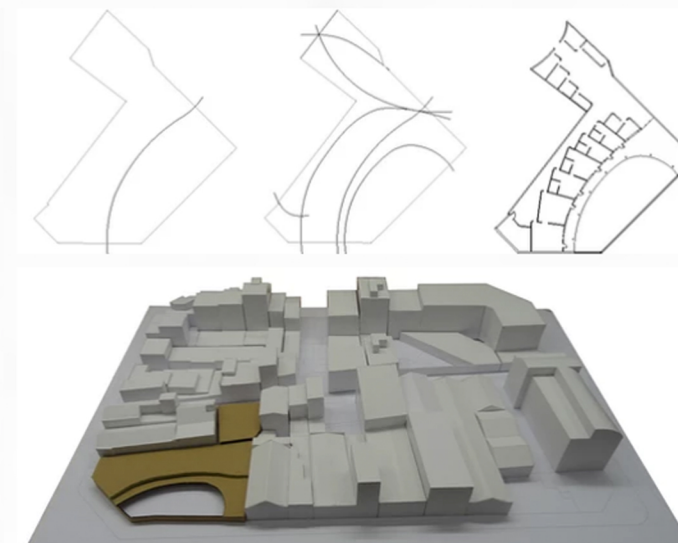
Urbanistic study and projection in different scales.

# ARQUITECTURA

Nursery Poblenou, Barcelona, España

Within the urban plan of Poblenou where the industry and residence come together, it is proposed to solve the growing number of families with children, making a nursery solving a "chanfran" in the neighbourhood. The nursery is designed to have the access from the quiet secondary street and that way the playground acts as a filter between the noise of the city and the classes. The entrance is a large open space, as a multi-purpose space, producing a visual throughout the building from the alley to the playground.

Proyectos I



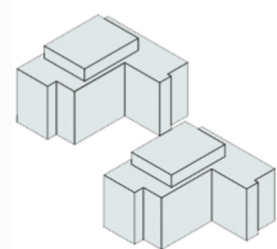
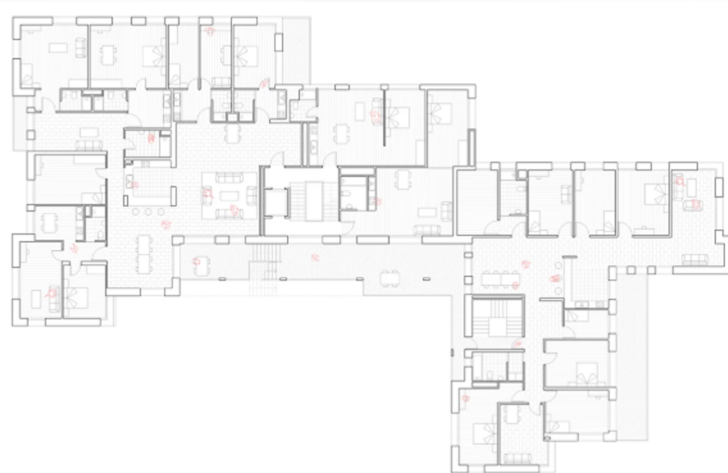
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Housing Kraftwek 2

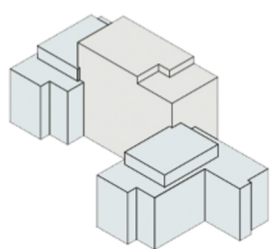
Zurich, Switzerland

A study of the collective housing designed by architect Adian Streich. The project consists of the rehabilitation of two multi-family blocks to generate a single collective residence block. Projecting a third block and a walkway linking the three blocks. This path is the main element of the project being the space for the entire building community. On each floor, there are two separate houses and a room for the community to use for any use.

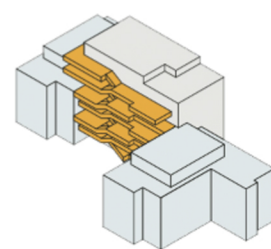
Espacio: unidad y privacidad



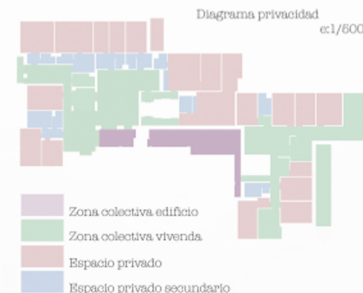
Edificios preexistentes



Conectar con volumen central



Terraza comunitaria



MediaLab Poblenou Barcelona, España

This project can be understood as a crack to connects the two streets. The centre of the project is a double middle space that connects the two heights of the program with the visuals. A third important point is added with the auditorium giving it a clear section. The material of the facade is made of bricks to blend in with the surroundings, industrial buildings that are gradually being renovated and turned into new uses. The two floors each have outdoor spaces. The facade has a large curtain wall to bring a lot of light into the entire interior.

Proyectos II

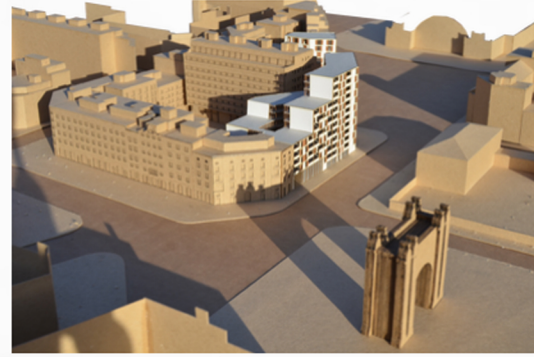


## Housing in Arc de Triomf

Barcelona, España

Opposite Arc de Triomf's train and metro station, there is an empty piece of land surrounded of magnificent residential blocks and near one of the greatest open spaces of the city. A residential block is proposed with the intention of being a scale exchanger and a continuity for the cornices of the near blocks, closing the block. There are two ways to interpreted the plans. The first when the building is lower, with an inner courtyard and folding the houses around it. And then the taller bit there is only a single row of houses that stand out from the rest, becoming practically a tower. In all the building three types of houses, simple and duplex, are alternated, apart from the special piece of the joint.

Proyectos III

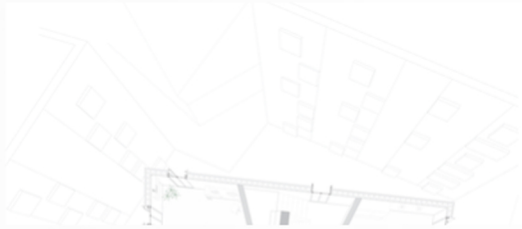


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## Housing in Borne, Barcelona, España

Located on the border of the Born district, a set of isolated residential buildings are planned near the Arc de Triomf. The project consists of four towers of a proportional scale to its surroundings joined by a common ground floor to give a human scale to the pedestrian. The four towers have a different interior distribution, depending on their connections with the exterior, but all have the same philosophy. The stairs have a central position and the houses surrounding it and making the most of the facade. Creating dynamic interior spaces with crossed visuals at all times, giving a feeling of spaciousness even in the most restricted cases. On the ground floor is projected a small library for the neighbourhood with a glazed interior courtyard and an exterior privacy. This project also highlights the definition of the details of the carpentry making the window part of the furniture to live the facade.

Proyectos IV



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## Tesla offices, Bell-lloc, España

This project is located in a natural environment, near Cardedeu. The project consists on setting up a Tesla headquarters in Catalunya. A part from the office space itself, a car showroom and an auditorium will be projected. Relating to this natural location, it is decided to project with a sustainability philosophy and energy self-sufficiency. Projecting a four-level building, which adapts to the slop with its shape and optimizes its length to make minimal modifications to the topography. The building has two entrances, one for the clients with breathtaking views of the valley from the highest level. A second entrance from the lower level to the



[Load More](#)

## Multifunctional equipment, Barcelona, España

Within Barcelona's urban plan, next to Molina square, there is currently a petrol station next to a place with multitude of needs and in the future gasoline vehicles will disappear, the project wants to adapt this space to the future new demands.

The project has many uses organized in the different floors. In the basements a car park will be projected and in the lower floor a petrol station-workshop for electric cars. On the ground floor, the most complex, with a passage and public space, a new access to the FFCC stop, a nursery; the access and administration of a day centre for the elderly. The day centre will also be on the first floor with common areas and on the second floor with external services. The access to the CAP will be in the first and second floors giving a facade to Balmes street with horizontal wooden verdigris. Finally, an access to emergency housing rising above the CAP on the third, fourth and fifth floors in two separate volumes.

Proyectos VI



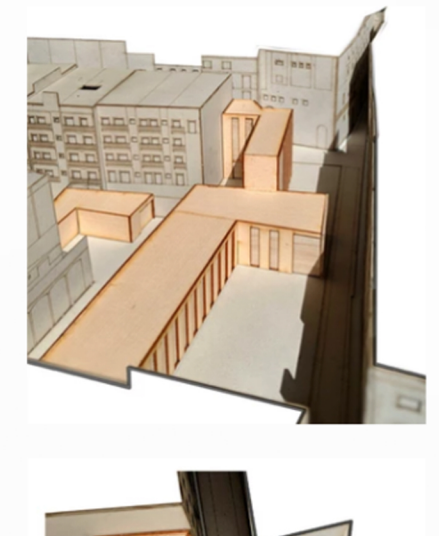
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## Music school, Barcelona, España

A project of a new school of music and residence (for students and teachers) in the dense fabric of the Raval, with the intention of spongering the centre of Barcelona. With its shape, it puts a strain and then frees up the space to generate two exterior squares, without losing the continuity of the pedestrian paths. Combined with its height and its formal finish, provides two different characters to the spaces. On the other side, it releases two interior courtyards that lets the building breath and enhance the natural light.

The project is composed of a single volume with two different heights, where they meet is where the access is to the building. The administration with a quiet and illuminated space. The classrooms can be opened out to organize some kind of event in the inner courtyard where the auditorium is also located. In the centre of the second floor is the dining room and the kitchen while at the sides appear the rooms. The student residence gains height to accommodate up to nine rooms.

Taller II



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## Redrawn



Reinterpretation of existent projects.

## Architecture



Projects from the degree based on architecture.

## Urbanism



Urbanistic study and projection in different scales.

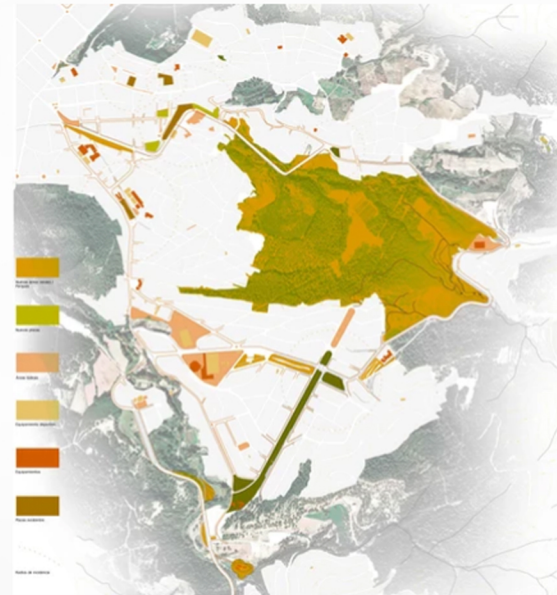
## URBANISMO

### Green ring, Barcelona, España

The objective of this exercise is to connect the towns of Martorelles, San Fost de Campsentelles and Santa María de Martorelles through a green ring. For the formalization of this green axis, pre-existing roads have been used adapted to those planned, such as green spaces and areas of plaza or walks.

To complete the project, a new central street has been projected, resolving the difference in heights between two areas of the town, which ends in front of the town hall in a new square. The objective of the square is to solve the strong topography of the place with three platforms, connected to each other. The spaces have different characters giving functionality to the area, with the aim of making it a new meeting point for the population.

Urbanismo III



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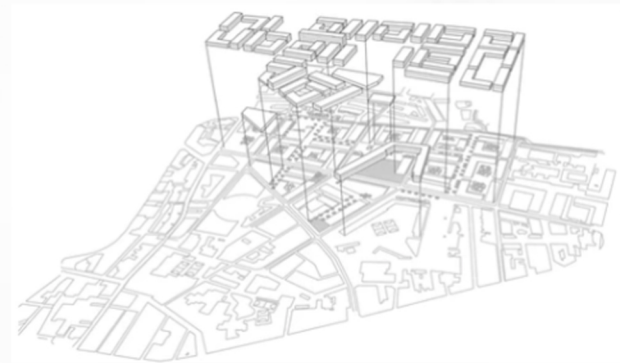
### Residential neighborhood, Fiegueres, España

Fiegueres, España

In the city of Figueras there is a set of empty plots in a building land, for a possible future expansion. The project proposes to occupy this space giving continuity to the existing roads, so that this new urbanization is integrated into the urban fabric. This new neighborhood is composed of six blocks, limited by three pre-existing horizontal roads and three new verticals.

The proposal is composed of three types of buildings and five public facilities that make up the complex. The main idea is to form a super pedestrian blocks with different intensities of privacy relating to each other through visuals.

Urbanismo IV



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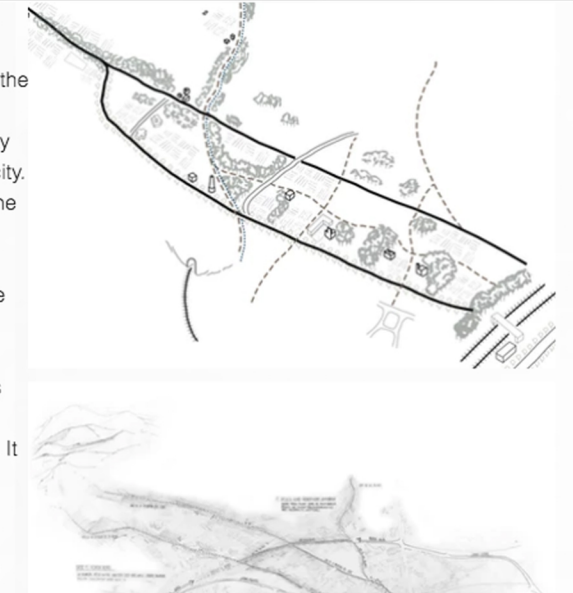
### Integración barrio Gaudí Reus, España

The Gaudí neighborhood, in the city of Reus, is isolated from the rest of the city by rail infrastructure. The neighborhood only has a few connection points by car and even less pedestrian. This fact also implies that the city is turning its back on the agricultural and rural fabric of the north of the city. To solve this problem, the area has been analyzed, in order to improve the connection with the rest of the city and its future expansions.

Once the conflict points and connection points have been detected, a reintegration of the area is proposed through the promotion of agriculture and crafts through sales workshops or relocating the university of agriculture in that area. From the road point, the main action is the culmination of a perimeter highway, projecting a road as less invasive as possible.

A residential expansion zone is also projected at the end of the highway. It is planned to rehabilitate the train station, converting it in an overpass, connecting the agricultural green axis directly with the city center.

Urbanismo VI



Load More

### España square, Barcelona, España

One of the accesses of the city of Barcelona is the Gran Via de les Corts Catalanes, which, when passing through the España Square, the density of vehicles obstruct traffic. This fact implies that the España Square only has one passing through use, giving it the connotation of a car roundabout.

To solve this problem, a road remodeling is proposed, pedestrianizing Maria Cristina avenue and turning it into a core activity.

The project consists of dividing the pedestrian level in two and projecting commercial galleries at the level minus one, with a direct connection with the subway. The idea is to generate a green area conceptually dragging the vegetation of Montjuic to the España Square, giving it a more friendly and less hard character, with the aim of promoting its use as a public space.

Taller I



Load More



# CABINS

A harmless urbanization model: *Cerdanya case*

Kevin López Regueira

*Final Degree Work February 2020*

*Tutor:* Félix Arranz San Vicente

*Director:* Jordi Ros Ballesteros

*Court:* Alba Arboix Alió

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Universidad Politécnica de Cataluña

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## 1. INTRODUCCION

### 1.1. Choice of the theme

I grew up in Puigcerdà, a place surrounded by nature and urbanization. However, in the recent years, I have realized that the current model is unbalanced, consuming more resources than are regenerated. Therefore, a new model should be considered.

The idea arises from the concept "more with less" in order to propose a socio-economic system, where the central premise is sustainability through a small element harmless to the environment.

### 1.2. Objective

The objective of this work is to propose a new theoretical, socio-economic model of sustainable rural tourism in Cerdanya. This alternative model will focus on providing environmental and social benefits to the region. In order to achieve this, a network of ecocabins arranged on the undeveloped land is planned, which will host sporadic tourists. After this approach, a series of questions will be that have arisen will be answered throughout the elaboration of this work.

Firstly, the general context will be determined, talking about the history and climate of Cerdanya.

Then, more technical aspects will be defined, which will serve as a basis for the further development of the urbanization model.

Once the basic concepts have been defined, the characteristics and operation of this alternative model will be presented.

Finally, although it is not a conclusive work, the conclusions or answers that have been obtained at the end of the work will be presented. This is only the draft of some ideas, and its intention is not to give a definitive answer to these questions, but to find points of union through architecture between public administration, private economics and environmental care.

### 1.3. Main sources

A variety of bibliographic sources have been used. Mostly of the are electronic and web resources, but also books, specialized journals or academic articles have been consulted for the work research.

## 2. GENERAL CONTEXT

### 2.1. The Cerdanya

The Cerdanya is a natural territory located in the Pyrenees. The Cerdanya is divided into two regions: the Upper Cerdanya that depends on the French region of Languedoc-Roussillon, and the Low Cerdanya, in the Catalan area, which is divided between the provinces of Girona and Lleida.

The region of the Catalan Cerdanya is formed by the high valley of the Segre river, where the largest plain of the Pyrenees and the mountain range of the Sierra del Cadí and Moixeró mountains, and other massifs.



Illustration A, historical Cerdanya

Among its mountains, there are centuries of history that begin with cave paintings and dolmens throughout the region. In the 1<sup>st</sup> century BC, the Romans formed the settlement of Lilia Lybica, in present day Llúvia, as the capital of the region. The occupation brought technological advances such as communication channels (the Strata Ceretana) or rural agricultural reorganization. Nevertheless, the disappearance of the empire left the region in the hands of the native population.

At the end of the 8<sup>th</sup> century, Charlemagne's troops liberated a great part of Catalonia from the Arab occupation, including Cerdanya. In the 12<sup>th</sup> century, King Alfonso II of Aragon founded the town of Puigcerdà, which quickly centralized much of the area's economy.

The Treaty of the Pyrenees (year 1659), ratified by the monarchs of France and Spain ends the Thirty Years' War, with the loss of the County of Roussillon and half Cerdanya, for the Spanish crown. To this, it must be added the territorial division of Spain in the provinces of 1833, which meant that Catalan Cerdanya was divided between Lleida and Girona, although this did not involve sensible changes in local economic and social practices. Border controls serve to stimulate smuggling, understood as a local source complementary to family income arising from agricultural activity.

At the end of the 1880 all the municipalities of Upper Cerdanya have their school with an indoctrinating objective of French nationalism. Vernacular languages were considered a symptom of rurality and backwardness, while French is considered the language of progress and intellectuality.

At the end of the XIX century the Renaissance enters in Catalonia, with the purpose of opening the rural and mountain world to the observation of the illustrated bourgeoisie of urban origin. In this context, families from the upper class of Barcelona appear in the town of Puigcerdà, building their mansions around the village's pond and sponsoring urban and cultural projects.

At the beginning of the 20<sup>th</sup> century, despite the business derived from the vacationing elites, the economy of the Cerdanya remained fundamentally agricultural throughout the



Illustration B, La Molina train station 1943

region (high and low Cerdanya) without the international division being a major obstacle. The improvement of the road system and, above all, the inauguration of railway lines opens the territory and consolidates mountain tourism. One of the engines of this growth was La Molina, the first Spanish ski resort, located near Puigcerdà. The sports activity begins in 1925 and the first ski lift opens in 1942.

Cerdanya saw its cross-border activity limited by the constant war conflicts until the period of time between 1944 and 1948 the Franco regime closed the borders along the southern the Pyrenees. At this stage, the smuggling across the border was intensified, even the “passers” who were dedicated to help to cross the border to fugitives from the conflict appeared. With the reopening of the border the social differences, derived from the social moments of each country, were accentuated.

In 1961, Spain and France signed an intra-border work agreement, which resulted in the emigration to the Cerdanya came from different areas of Spain. In the late 70s and early 80s, the census data reflected that in Puigcerdá approximately half of the census population came from immigration. Many of them were settled in the lower Cerdanya, despite they worked in the French Cerdanya, where salaries were higher.

The end of Franco was the opening of the border to greater mobility and the entry in 1986 of Spain in the EU facilitated that Spanish citizens move to reside in France, seeking the social advantages derived from a much more protectionist state.

In 1984, the Cadí Tunnel was inaugurated, in order to consider the Cerdanya as a satellite residential neighborhood of Barcelona, as it united the two localities with a journey of approximately two hours. This fact triggered a more intensified traffic between Barcelona and Cerdanya. At the end of 20<sup>th</sup> century the real-estate sector increased considerably, helping Spanish companies to gain presence on French regions, as there was a fiscal difference between the two countries.



Illustration C, aerial view of the Cadí tunnel

The territory, turned into landscape, constitutes one of the great patrimonial assets of the region. But with an obvious problem in the balance between tourism, a volatile activity with known ecological risks, and environmental conservation.

Finally, it is worth mentioning the creation of the Cross-border Hospital, led from Puigcerdà and Barcelona, with the participation of the French State and the financing and the European legal framework.



Illustration D, cross-border hospital of La Cerdanya

## 2.2. Mountain weather

We understand by mountain, a natural geographical elevation of great height. It is a prominence on the earth's surface and its terminology varies according to its height and climatic conditions. Geographical accidents that do not reach 700 meters of elevation are generally and guideways considered hills. It exists a classification depending on the main features of the mountain:

- **Low mountain or sub-alpine** (generally between 1000 and 1500 meters): in this type of mountainous environment small population centers can be found as there are access through good roads.
- **Half mountain or alpine** (usually between 1500 and 2500 meters): it is found a type of mountainous environment where snow normally appears from November to May. A small rural nucleus can be found. The annual average temperatures are around 6°C. The presence of forests is maintained along the mountain, however, as the height increases, smaller shrubs or grasslands appear.
- **High mountain** (generally heights above 2500 meters): Normally, in this type of mountains glaciers and perpetual snows can be found, increasing the difficulty of ascents. There is usually less vegetation and animal life. There are no inhabited nuclei, except for the possible existence of mountain shelters or places for bivouac.

The mountain climate is related to a decrease in temperature and an increase in pressure in proportion to the altitude. It also tends to make a difference in the dynamics of rainfall. Studies claimed that the temperature decreases approximately between 0.6 °C and 1 °C per 100 meters of slope, but may vary depending on the characteristics of the territory, what can lead to an increase in frost and the change of plant species. At higher altitude it could be a bigger thermal oscillation, due to the lowering of atmospheric pressure and the increase of insolation and radiation.

This climate is quite complex, for instance, despite the fact that two areas are at the same altitude, there are factors that can vary climatic conditions, such as the orientation of the slope with respect to the sun or the wind. When a slope is oriented to the north it is called *shady*, since throughout the day the shadow of the mountain itself predominates. It is known as *suntrap* on the opposite side. Besides, it is important to know the typical winds

of the area in order to understand that the face of the mountain that receives those usual winds is called *windward* and the opposite is called *leeward*.

The negative thermal gradient in relation to the increase in altitude also means a decrease in the relative humidity of the air. The presence of orographic rains (may be in the form of snowfall) in the *windward* area, which is usually the wettest, is known as the *Föhn effect*. This effect occurs when the air rises up the mountain (*windward*) condensing and releasing its wetness in the form of precipitation. In the same way, it will begin its descent on the other side (*leeward*) being a dry air.

### 2.3. Cerdanya weather

It could be said that the climate of Cerdanya is Pyrenean mountain climate. The weather in this mountainous system may vary depending on its location, it may be affected by the Atlantic climate on its northwest side or by the Mediterranean climate in the southeast.

This is translated into a decrease in rainfalls in the south-east area. The Catalan Pyrenees and the pre-Pyrenean valleys are the driest region of the Pyrenees. On the contrary, the Pyrenean areas of the Basque Country, Aragon and Navarre, near the Cantabric sea, tend to have a colder environment and usually with more rainfalls.

In Cerdanya more than one climate can be found due to its diverse orography. Even so, it can be considered that the predominant climate is the Mediterranean Pyrenean mountain and might vary its characteristics according to the altitude or the position regarding to the sun (*shady* or *suntrap*). For example, in the area of *La Molina* rainfalls are copious, especially in winter, while in Bolvir the climate is much drier and with greater thermal oscillation. In addition, two factors have to be considered: thermal inversion, which makes many winter days warmer at high mountain levels than on the plain and the air corridors, areas where the same frequent winds predominate.



Illustration E, mountain range of Cadí

The region enjoys a Mediterranean mountain climate: cold winters with snowfalls and quite hot summers with abundant storms. Autumn is usually very rainy while spring is normally dry and late. A great thermal oscillation prevails between day and night, but also between the seasons.

The Cerdanya has many hours of insolation. This is because the valley is oriented from East to West (like the sun's path), something not very common in the Pyrenees. This defines the climatic difference according to the slope orientation

### 2.4. The flora of the Cerdanya

Regarding the flora, it is also necessary to differentiate between plain and mountain, because the plain is very humanized by agriculture and pastures, which have replaced the original vegetation.

The mountain also presents differences in the flora between the shady and suntrap slopes. In general, we can say that large red pine forests are characteristic up to 1600 meters, and up to 2400 meters they are replaced by black pine. Spots of mixed fir trees in the wettest places can be found up to 2200 meters.

It exists a classification of the flora depending on its location in the mountain:

**Mowing fields:** The area of occupation of mowing fields in the region of the Cerdanya is quite extensive, occupying approximately 6144 ha. It is a cultural landscape resulting from many centuries of permanent work. These mowing fields are dominated by plants such as *fromental*, *Trifolium pratense* or white clover.

- **Red Pine:** It is found in areas that are not too humid at altitudes between 1200 and 1300 meters and 1600 and 1700 meters. In some parts of the region the forests due to the effects of logging and pastures, begin to decrease.
- **Black pine:** It appears in the 1600 and 1800 meters and is the dominant between 2200 and 2400 meters, although other deciduous trees such as the *Bedroll* and the *Moixera de guilla* may also appear.
- **Alpine meadows:** They are located from the height of approximately 2200 meters. These areas are present in all the top of the mountains of the *Cadí*.
- **Riverside forest:** It is of vital importance in the rivers and has a diverse and fundamental functions, such as to stop the water in case of flood and to fix the land of the banks. It is mainly in the area of the *Segre* river; however, they can also be found in various torrents.

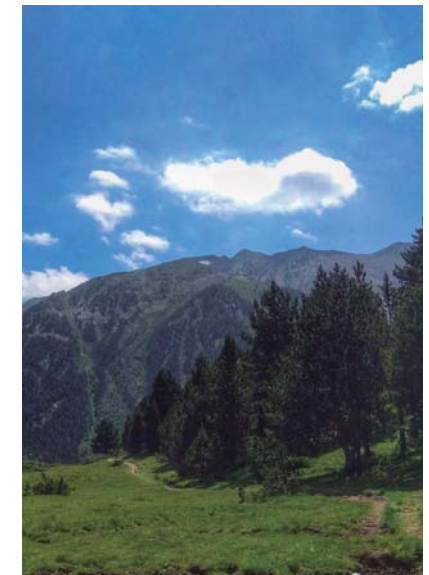


Illustration F, View of the Cerdanya forest

### 3. PREVIOUS ANALYSIS

#### 3.1. Rural and sustainable tourism

The rural fabric fulfills vital functions for society as a whole. It is common to confuse rural space with agricultural land, but it is much more than that. It is a complex system that must be in balance between the socio-economic activity of the place and the biodiversity reserves of its surroundings, fulfilling important functions for the whole society:

- Ecosystems' reserves of the territory.
- Natural resources production.
- Territorial balance against the centralization of the current cities.

The development of rural areas according to the European Economic Community (EEC), must be based on economic and social cohesion between the economic demands of the market and the conservation of natural, cultural and environmental heritage.

A strong restructuring of the primary sector has been detected, which is manifested in the decrease in agricultural land in some areas and overproduction in others. All of this entails a restructuring of rural systems, which is translated into a decrease in the importance of traditional agriculture and an increase of external investments, ceasing to revalue its endogenous potential.

On the other hand, the development of tertiary activities has been concentrated in a few urban centers over the time. In the future, these urban centers must be capable of acting as an intermediate regional development centers, which may imply a whole new configuration of the traditional population model.

The main problem of depressed mountain regions is their lack and aging population. In spite of living with these climatic conditions and with a few public services and infrastructures, people have a good quality of life.

On this territory exist three hierarchical levels of urban centers. The first is formed by the county capital (Puigcerdà), followed by three or four second-order villages with a strategic situation (Bellver de la Cerdanya, Alp and Llívia) and a last level with small residential villages.

The EEC affirms that a system of nuclei that provides accessibility to the exploitable resources in these areas has to be found. It must also be considered the guarantee of an economy in the provision of services and infrastructures that allows an increase of production by diversifying productive activities. Therefore, some objectives are considered:

- Revaluation of cultural spaces, conservation and improvement of valuable ecosystems.
- Application of the concept "Ecologically sensitive area" adopted since 1985 by the EEC to protect both wildlife and classical agricultural procedures and rural landscapes.

- Creation of wild-shepherding systems through afforestation compatible with livestock use on degraded soils.
- Recovery of environmentally degraded points, in order to improve natural resources.
- Improvement of the quality of the urban environment of the villages, often with little architectural interest.
- Recovery, revegetation and conditioning of livestock routes for recreation and leisure.

Build on the analysis of rural areas, an alternative activity for the recovery and conservation of these areas is sustainable rural tourism, a rising concept in our society. The concept of "inhabitant - space - product" is supported from the EU, so that if any element is unbalanced and it results in tourist overexploitation, it will have an irreversible economic-social counterproductive effect. The discovery and conservation of the natural environment should be based on the local development, taking advantage of the existing historical, artistic and popular architecture elements and promoting the natural recreational areas, where conservation must be considered as the revitalizing element of the environment.

The International Union for the Conservation of Nature (IUCN) gives the following concept of sustainable development: "Sustainable development is a process that allows development to occur without deteriorating and depleting the resources that make it possible. This objective is generally achieved by managing resources so that they can be renewed at the same rate they are being used, or from a resource that is slowly regenerated to another that has a faster rate of regeneration. In this way, resources can continue to maintain present and future generations"<sup>1</sup>.

Sustainable tourism is defined as a form of economic development designed to improve the quality of life of the host community, providing the visitor with a high-quality experience and a maintenance of the environment quality. It is like a closed circle where the three elements of "inhabitant - space - product" must benefit each other. The sustainability of the environment must be the highest priority, if not, the exploitation of the environment will be the main reason for the decline of its competitiveness in addition to the loss of biodiversity.

The balance between environmental protection and being competitive in the market is essential for the sustainable development of a tourist destination. Historically, the overexploitation of rural areas has led to the depletion of the natural resources of the place and tensions with local society. The impacts on soil and water, the building of large edifications, as well as the actions that do not prioritize environmental values, will affect the landscape by reducing the natural qualities of the environment.

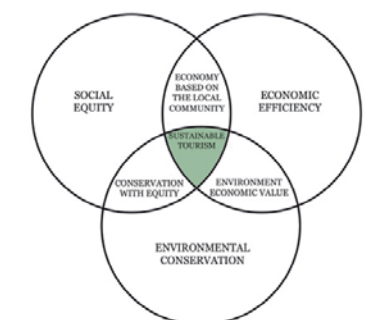


Illustration G, sustainable tourism model

The tourism sector has been one of the great engines of our economy, generating employment, improving infrastructures, safeguarding customs and culture. Nonetheless, the uncontrolled growth of the supply, has led to endless negative impacts, such as the economy, the destruction of heritage and an enormous ecological damage. The main cause of these impacts is related to human or traffic congestion, that leads to pollution, to the generation of poorly treated residues, and mainly, to the uncontrolled use of natural resources. Many companies put forward their own economic interests before the idea of protecting the natural value of the environment.

*“Therefore, tourism policy from the environmental perspective has to be raised around the maintenance of the dynamic equilibrium that allows the satisfaction of the needs imposed by the tourism development process, and at the same time guarantees the environment and favors a sustainable use of resources”<sup>2</sup>.*

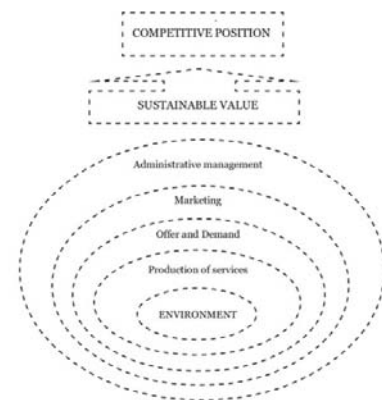


Illustration H, management model

The main question of the sustainable tourism may include how to orient the organizational structures. These structures are only designed to increase their own economic efficiency, therefore a reconsideration to favor to the local resident and the tourist must be considered. This must require qualified management that can understand the balance between economic, social and environmental agents as central elements. Moreover, elements such as the place, the local community and the visitor could be incorporated.

Tourism must be considered with medium-long-term planning, otherwise the system is not viable. Environmental resources must be optimized by maintaining ecological processes and conserving natural resources and biological diversity. The respect and inclusion of the host community, which is the link between the visitor and the territory, fulfills the function of balancing the conservation of the territory and the socioeconomic profitability.

A whole range of economic, social and environmental issues must be considered when addressing the strategy of creating value of a mountain tourist destination to be sustainable.

In landscape architecture it is obliged to work on the territorial, local and detail scales if a project is wanted to be integrated in the place. If the territorial scale is known, a good communicated intervention will be done, benefiting more people and contributing to the cohesion of the territory. The local scale allows to achieve a proximity of the neighbors and those who visit the place daily, to know their customs, to adapt the project and to create a place where they can interact. Finally, the scale of detail can introduce the ergonomics, aesthetics and close feelings to the project.

### 3.2. Sustainability and bioclimatic architecture

The construction sector generates a great impact on the environment in its different phases or processes. The production or obtainment of raw materials contribute to a generation of pollution both for the emissions of waste emitted, and for the non-responsible consumption of natural resources.

During the useful life of buildings, energy consumption is the main problem, since currently most of its production comes from non-renewable energy sources. It is necessary to have into consideration that nowadays 80% of people reside in urban areas, which have a negative influence in other sectors. Finally, at the end of its useful life the building is demolished and this process, together with the storage or non-reuse of waste derived from it, is a sustainability problem.

Given these facts, how can we act to make the exercise of the profession more responsible? Sustainable construction must be a reality in the immediate future. It will then be a continuous and cyclical process: from the beginning of its idea, its physical preposition during the work, the course of its useful life being used by the users, until the moment when the building loses its usefulness or becomes obsolete. All of this without neglecting aesthetic, functional or any other type of requirements to be considered in any architectural creation.

When talking about bioclimatic architecture, a specific type of architecture is not meant, as it is not required a specific design and an identifiable aesthetic. It is a philosophy applicable to the whole concept of architecture. Firstly, before taking any step, a good preliminary study of the architectural elements is necessary. These elements must be made physically and climatically adapted to its surroundings. It also has to prioritize the use of local materials to reduce resources from further regions. Indeed, an energy saving must be considered during the construction's useful life and combined with an energy production system so that the balance of the final consumption of the building is zero.

Another important aspect is the generation of constructive waste. The fact of having a large built-up housing stock has to be considered, however, many of these do not fulfil some of the necessary sustainability requirements. In the cases which is possible, a study of total or partial demolition of the construction must be done.

*“There is data that claimed a 70% of energy savings of bioclimatic projects compared to traditional construction procedures, whose environmental behavior is not taken into account.”<sup>3</sup>*

### 3.3. What is considered as a cabin

The term cabin has different meanings and uses, according to the context or region where it is used. The main and most universal meaning of the word cabin represents the name given to a type of dwelling. Normally, materials from the region surroundings are used for their construction. In Spanish it could be translated as "cabaña" and the etymological

origin of this term comes from the Latin «capanna». In English there are many similar translations such as hut (choza), cottage (casa de campo), cabana (jacal) or hovel (casa muy pequeña).

According to the RAE, the first definition of cabin is “small and rough rustic construction, of poor materials, usually sticks interwoven with reeds, and covered with branches, destined for shelter or housing for shepherds, fishermen and humble people”. In other areas it is also understood as “a set of cattle from a farm, region, country, etc.”<sup>4</sup>

This type of housing has been a good way to connect with the environment, as they tend to be located in natural environments. At present, cabins are widely used by the tourism sector, serving as a type of “lodging”. This is due to the contrast of nature with large cities and the connectivity that characterizes our society. In this scenario, the decision to spend time in an environment of nature, looking for simplicity and disconnection is increasingly demanded. Unlike the original meaning, in this case, the concept does not refer to a precarious construction, quite the contrary, often it is luxurious cabins with a wide variety of amenities and services.



Illustration I, A-frame cabin

### 3.4. Alternative model

The cabins are usually found in non-urban areas, surrounded by nature and sometimes with small dimensions. It can be confused with mountain shelters. Surely, people find in a cabin a place to take refuge from the daily routine, tranquility, disconnection from the social world and connect with nature. In fact, the mountain shelters have a more communal character, whose purpose is the protection of the meteorological conditions that prevent mountaineers, hikers or walkers from continuing their journeys.



Illustration J, Pradells shelter.

There are shelters of all kinds, from minimal spaces to shelter from the weather, to more complex constructions with some employees in charge, where basic accommodation services can be offered. All kinds of services can be found, as the most complete constructions can have even the smallest detail.

Services are not connected to a supply network, so they must be self-sufficient according to their needs. Therefore, the cabin has a private ownership and is more focused on a longer stay in comparison with the shelters. The dimensions of them can be similar, as their energy self-sufficiency. The impact on the territory may also be similar, but the construction process of the cottage gives an ephemeral nature, a difference of the mountain shelters which has to resist the passage of decades.

## 4. UNURBANISM

### 4.1. The concept

The word urbanism comes from the Latin word "urbus" which means city. Urban planning is specialized in the study and planning of cities. The complexity of a city translates into the complexity of urban planning; therefore, it must take into account the shape and the proper regulation of the city. Apart from this, it has to be related to the economy, environment and the social activities that take place in that urban area.

From my point of view, unurbanism is a way of making a city without the limitations of the current demands. Starting from the base that we are in a natural land, the unurbanism would consist of the analysis and the dispositions of constructions outside the established sector, always as a compliment of the uses and activities already in that area.

Unurbanism refers to the opposite values of urbanization, with a planning and urban management character. In this way, the concept is not to “de-urbanize” or “a-urbanize”, but it would have the same intentions, however, with an opposite direction.

### 4.2. The system

As I have previously said, the Cerdanya is having a seasonal overexploitation, which is consuming the main resources of the region’s ecosystem, not adapting to the local life in the area. The question is how to implement a type of tourism based on the basic concepts of ecotourism and that also benefits both the local population and the environment.

In this study is proposed a socio-economic model of a responsible tourism, therefore it is tried to solve the main obstacles that the current model has. Starting from the “unurbanization” where the goal is not to urbanize more territory, to increase the “built park” or to project big constructions, but all the opposite. Therefore, what it is proposed is a system of small cabins harmless to the environment, which in addition of the tourism accommodation purpose, provides a social, environmental and economic benefit to the local population.

The strategy would be to implement it in the undeveloped land near urban centers. Projecting the small cabins integrated into the natural environment. It would be an “acupuncture” operation, where the first basis must be the non-modification of the pre-existing surroundings for its construction.

The suggested plan attempts to respond to the three basics of sustainable tourism, explained earlier in “Illustration F”. Then, the development of these three principles will be performed, adding some architectural strategies as an example of good practices of constructions and how could it be managed.

This tourism plan is aimed to spread tourism throughout the region, to avoid the overcrowding and the massive use of resources. Through the granting of licenses, for a

period of 5 years, which may be renewed up to a maximum of 3 consecutive times. Each of these permissions allows the construction of an ecocabin and of its sporadic touristic exploitation, with a maximum stay of 15 nights. This plan aims to benefit the owner and the guests, but mainly the region, focusing in the improvement of the economic, social and environmental issues.

### 4.3. The benefits

This is an alternative socio-economic model, where the goal is to try and promote other types of tourism. A tourism where the respect and care for the environment is the base of the whole idea. A project in which people participate and bring benefits to the whole society and it does not forget that we live in a society with needs and limitations. Therefore, the businessperson has also been taken into account, which is the person who will have all the profits and competitive advantages in the market.

The passage of time and the constant changes in society have caused a fatigue in the flora and the fauna of Cerdanya. The main problem of the region is the second residence "Table A" and the overuse of natural resources, so it is necessary to promote some measures that contribute and help recover such a valuable resource.

Table A, 1st / 2nd residence, own elaborationratio.

Family Housing	
Principals	7665
Secundaris	27042
TOTAL	34707

With this goal, a network of isolated cabins is proposed, with a sustainable and environmentally friendly design, capable of producing energy through a renewable, non-invasive method for the environment.

An interesting factor in the proposal is the compensation that must be paid to acquire a license. With this philosophy, a land transfer model is proposed by the municipality, together with a tourist exploitation license with it. In exchange for this right of usufruct, the benefactor will have to pay a fee. Scaping from the current economic model, this compensation will not be money, but the owner will have to be in charge of reforestation in a pre-established area. This investment will change depending on the type of the ecocabin. The constructed area is related to the number of tourists who can spend the night in it. From the table a value in euros is obtained, which will correspond to the approximate investment that will have to be paid for the reforestation. This amount of money will be used for the planting of the new area and the conservation of the repopulated area. With this money a team of gardeners, with a philosophy of social inclusion for people with intellectual diversity or in some cases for people with social exclusion risk.

These cabins will be placed on an undeveloped land, within the areas classified as preventive protection land, classification 20b. This means that they are in an undeveloped area, but close to urban centers. This way, the only connection to the general supply system will be the power grid. This connection is necessary since each cabin will have to generate a renewable energy production system, which will be specified within the necessary documentation for the public contest.

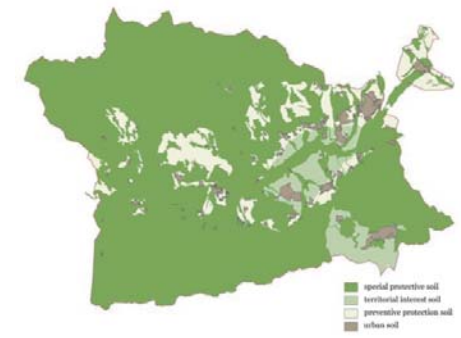


Illustration K, non-developable soil types according to POUM.

This production system can be used in two ways, directly consuming the energy produced, or accumulating it for a later use. In the second case, currently, it is necessary to use batteries (lithium or lead) which are both very contaminant with the way of obtaining the raw material, as in its recycling. That is why it is proposed the connection to the general electricity grid, using it as a large battery. The operation would be to give the energy produced and in return consume the same amount when needed.

Another alternative suggestion of the plan is that although the cabins are private, the energy produced will be from the municipality and will serve to lower the electricity bill of the public facilities and services in the same town. But it cannot be forgotten that this system has to promote this initiative, therefore, the use of the cabins will be included in the municipality's electricity bill. Always controlling the ratio of energy generated/energy consumed.

It is a system to decentralize tourism and that the entire region benefits from its profits. A system focused on rural tourism, contact with nature, not a unilateral consumerist tourism, which only reduces the resources of the place. Dissolving the tourism is a way of redistributing the economy, benefiting small villages that currently are not making any profit. In addition, it is a way of spreading the local culture and making the visitor part of the local life.

The current economy works with the principle of supply and demand. In this case, the offer is already consolidated, and what has to be achieved is that its repercussions are positive. Currently, the system works seasonally, and as a general rule the demand is covered by the current supply. In a healthy and abundant economy, the it is important to have a competitive advantage, adding value to the business. In this case, ecocabins have two main complaints for tourists. They are focused on sustainable rural tourism, which is rising in our current model. It is also a different model of knowing the locality and it allows to easily move around Cerdanya due to the connections between the different towns, while you are living within the nature.

#### 4.4. Administrative management

From the public administration it is suggested the promotion of a private ecotourism system that has benefits for all parties involved. In this process are involved some public authorities. In the Cerdanya there is a peculiar situation, since it is the only region that is part of two different provinces. This fact complicates the bureaucratic concern, which is why it is proposed that the Regional Council acts as a mediator with the two entities. It would have to perform the role of administrator of this tourism plan, assigning the responsibilities, but having in mind that the last word is still for the tourist offices of Girona and Lleida. The Ministry would control and manage the licenses of the ecocabins of the municipality. It will also be in charge of establishing the bases for the adjudication of the cabins and, in the future, will have to make an evaluation of the system and do the changes to adjust and solve the problems that are detected. In short, it is proposed an extension of the "Regional Strategic Plan" (also known as the "Territorial Plan of Cerdanya") expanding the responsibilities and including this project.

##### 4.4.1. What quantity licenses are awarded?

The Regional Council (or the equivalent public authority) will determine the total ecocabins licenses. The final number of licenses will be the sum of all those awarded to each municipality.

To define that number, the first thing that must be taken into account is the ecocabin/resident ratio that is estimated for the entire municipality. In this specific case, according to IDESCAT in 2019, about 18192 people lived in Cerdanya. If we set a ratio of 1 cabin per 100 inhabitants, it would leave us with 182 licenses that have to be spread throughout the region. This value will be called "initial cabins" ( $C_i$ ). But in this amount, none of the sustainability parameters presented above have been taken into account. Following the same logic, towns with more population would have more licenses. Therefore, two correction coefficients will be necessary to adjust this value to the specific reality of each municipality.

Table B, coefficient "P", own elaboration.

Municipality	Población	Cabins "C <sub>i</sub> "	Coef. "P"	Cabins "C <sub>p</sub> "
Meranges	104	1	2,0	2
Riu de Cerdanya	93	1	2,0	2
Das	253	3	1,5	5
Isòvol	281	3	1,5	5
Lles de Cerdanya	253	3	1,5	5
Prats i Sansor	219	2	1,5	3
Prullans	231	2	1,5	3
Urús	189	2	1,5	3
Bolvir	369	4	1,0	4
Fontanals de Cerdanya	444	4	1,0	4
Ger	448	4	1,0	4
Guils de Cerdanya	537	5	1,0	5
Montellà i Martinet	579	6	1,0	6
Alp	1580	16	0,5	8
Bellver de Cerdanya	1937	19	0,5	10
Llívia	1417	14	0,5	7
Puigcerdà	9258	93	0	0
Cerdanya	18192	182		76

The first correction coefficient, it will be called "P", which seeks to promote this tourism in the small towns, restricting the arrangement of this licenses according to the population number of each town "Table B". Once we have obtained this coefficient we can multiply it with each " $C_i$ ", obtaining the value " $C_p$ " "Table B". If this value is compared to the initial " $C_i$ ", a quantification of the differences

among the different population volumes can be done. In this way, municipalities such as Puigcerdà, which in comparison to the rest of the region have a larger population, would be left without any license, while Riu de Cerdanya would double theirs. After applying the first correction a reduction of the number of licenses from the initial 182 to 76, which is 106 fewer licenses. Obviously, this decrease is made at the expense of populations with greater number of inhabitants.

Continuing with the corrections, the density of the towns must be taken into account "Table C". We are looking for a rural and alternative tourism, therefore, areas with a lower density must be promoted. Llívia and Puigcerdà are by far the two towns with the highest density, since they exceed the established limit. In this way, it would be considered that they are not suitable for this type of tourist model.

Table C, density classification, own elaboration.

Inhabitants	Coefficient "P"
50 - 100	2
100 - 500	1,5
500 - 1000	1
1000 - 2000	0,5
2000 - 3000	0,3
> 3000	0

Table D, 1st / 2nd residence ratio, own elaboration.

Municipality	First	Second	Ratio
Puigcerdà	3.296	2.662	1,24
Montellà i Martinet	304	347	0,88
Meranges	40	48	0,83
Bellver de Cerdanya	1.047	1.553	0,67
Riu de Cerdanya	57	97	0,59
Ger	209	372	0,56
Prullans	96	177	0,54
Isòvol	148	279	0,53
Lles de Cerdanya	123	235	0,52
Guils de Cerdanya	223	555	0,40
Llívia	700	1.898	0,37
Das	92	305	0,30
Urús	71	241	0,29
Bolvir	166	606	0,27
Alp	768	2.840	0,27
Fontanals de Cerdanya	236	891	0,26
Prats i Sansor	88	415	0,21
Cerdanya	7.665	13.521	

On one hand, in order to benefit the local people, the ratio between the first-residence housing in relation to the second-residence housing must be considered (figure 6.3). It will be obtained a value less than one when the second-residence housing predominates and has a greater value than one in the opposite case. The goal is to penalize the predominance of these second residences and in that way benefit local communities "Table D". On the other hand, the only municipality where there is more first-residence housing is in Puigcerdà, when the maximum population limit is exceeded then it is excluded from the plan.

The second correction coefficient, which will be called "R", will be obtained from the following table "Table E", in which the population density is combined with the ratio between first and second-residence housing. Following the above criteria, municipalities that have a proper balance between the predominance of the first-residence housing and the population density in relation to their natural environment will be benefited.

Table E, obtaining coefficient R, own elaboration.

	> 1,2	1,2 - 1	1 - 0,8	0,8 - 0,6	0,6 - 0,4	<0,3
< 10	2	1,8	1,6	1,4	1,2	1
10 - 20	1,8	1,6	1,4	1,2	1	0,8
20 - 30	1,6	1,4	1,2	1	0,8	0,6
30 - 40	1,4	1,2	1	0,8	0,6	0,4
40 - 50	1,2	1	0,8	0,6	0,4	0,2



To understand how the predominance of the second-residence housing in the territory affects, we will obtain the “C<sub>r</sub>” value by multiplying each “C<sub>i</sub>” by its own “R” (Table F). If this new indicator is compared with the initial number of licenses, it is seen that the town of “Montellà i Martinet” is the most benefited, although “Maranges” has a better “R”. Alp loses most of its licenses in spite of not having the lowest “R” (which is Bolvir).

Table F, coefficient “R” and “C<sub>r</sub>”, own elaboration.

Municipality	Cabins "C <sub>i</sub> "	Coef. "R"	Cabins "C <sub>r</sub> "
Meranges	1	1,6	2
Montellà i Martinet	6	1,4	8
Riu de Cerdanya	1	1,4	1
Lles de Cerdanya	3	1,2	4
Prullans	2	1,2	2
Ger	4	1,2	5
Bellver de Cerdanya	19	1,0	19
Das	3	0,8	2
Isòvol	3	0,8	2
Urrús	2	0,8	2
Guils de Cerdanya	5	0,8	4
Fontanals de Cerdanya	4	0,8	3
Prats i Sansor	2	0,6	1
Alp	16	0,6	10
Bolvir	4	0,4	2
Llívia	14	0,0	0
Puigcerdà	93	0,0	0
Cerdanya	182		67

Finally, in order to obtain the definitive number of ecocabins that belong to each town, “C”, it is necessary to apply the formula (C<sub>i</sub> \* P \* R = C) as we can see below (Table G). Comparing these final “C” with the initial “C<sub>i</sub>” it is seen that the correction coefficients have not benefited any specific municipality. Puigcerdà and Llívia have been left out of the market meanwhile a strong correction has been applied to the towns of Alp and Bellver. Despite the fact that after the corrections Bellver de Cerdanya has lost nine licenses, it is the municipality that would have more ecocabins. This particular case is curious because despite having a very low “P”, it compensates with the second highest “C<sub>i</sub>” in the region and a balanced “R”.

Table G, final number of cabins and comparison with the initial value, own elaboration

Municipality	Cabins "C <sub>i</sub> "	Coef. "P"	Coef. "R"	Cabins "C"	"C" - "C <sub>i</sub> "
Montellà i Martinet	6	1,0	1,4	8	2
Lles de Cerdanya	3	1,5	1,2	5	2
Prullans	2	1,5	1,2	4	2
Meranges	1	2,0	1,6	3	2
Riu de Cerdanya	1	2,0	1,4	3	2
Ger	4	1,0	1,2	5	1
Das	3	1,5	0,8	4	1
Isòvol	3	1,5	0,8	4	1
Prats i Sansor	2	1,5	0,6	2	0
Urrús	2	1,5	0,8	2	0
Guils de Cerdanya	5	1,0	0,8	4	-1
Fontanals de Cerdanya	4	1,0	0,8	3	-1
Bolvir	4	1,0	0,4	2	-2
Bellver de Cerdanya	19	0,5	1,0	10	-9
Alp	16	0,5	0,6	5	-11
Llívia	14	0,5	0,0	0	-14
Puigcerdà	93	0,0	0,0	0	-93
Cerdanya	182			64	-118

#### 4.4.2. Who can access these licenses?

Once the Regional Council grants the permitted number of licenses to the municipalities, they will have the responsibility to manage the transfer to the interested parties. The transfer of these licenses will be granted through a public tender and all types of legal persons can be presented, from companies (if they are local or not), entities or groups, and even individuals.

To encourage small-scale economy, not all applicants may postulate for the same number of cabins. A number of licenses will be given in relation to a table of percentages according to the legal nature of each one. In this way, as can be seen in the following table “Illustration L”, the total number of licenses will be divided according to percentages. To finalize the grant, all licenses have to be given with a maximum of three rounds of designations.

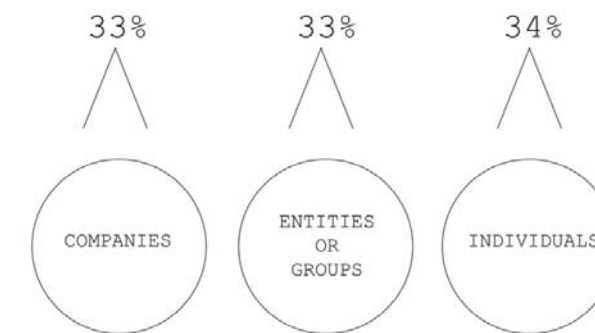


Illustration L, percentage of the first award round, own elaboration.

At the end of the first round and if there are any licenses left, the remaining ones will be distributed. This second time the groups of contestants will be modified “Illustration M”, but without changing the number of licenses remaining. Individuals will have the same opportunities as before but companies, entities and other groups will be arranged into a new group where they will be chosen for the places left on the previous round.

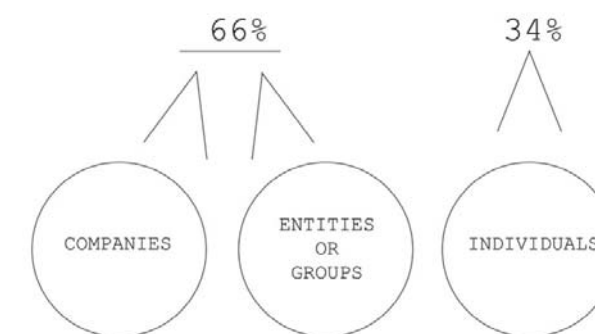


Illustration M, percentage of the second award round, own elaboration.

Finally, if the total permits have not yet been granted, a final round will be taken, where everyone can access the places that have not yet been awarded.

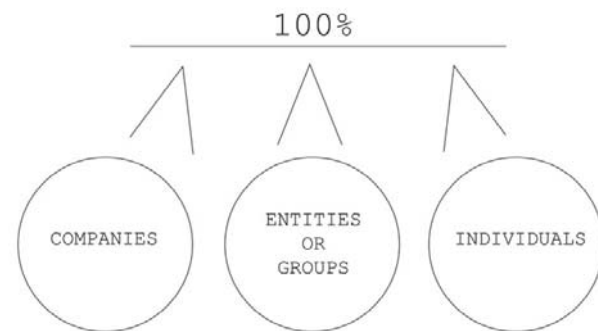


Illustration N, percentage of the third award round, own elaboration.

In the case that not all licenses have been awarded, they will be reserved. If the number of vacancies exceeds 33% of the total, in the next year the process will begin again with the same criteria explained before.

#### 4.4.3. What does an ecotourism cabin license entail?

The license of an ecotourism cabin allows the owner to build a cabin on non-buildable land, for the exclusive use of sporadic tourist housing. To access it, the applicant must demonstrate:

- An own economic viability.
- The presentation of the architectural project of an ecocabin, demonstrating its commitment to sustainability through some environmental I.S.O. and prove that the project does not harm or modify the environment.
- A project of the native flora, implementing the minimums. This value will vary depending on the surface of the project and the contributions it generates with a renewable energy system.
- To hold a certain number of licenses. This number will be specified according to the percentage calculation of the total licenses of the municipality.

Every applicant must know that the ownership of one of these licenses also entails legal compliance obligations. In the case of not obeying these responsibilities, the municipality will send a first fault. If it comes up to three faults, the license will be automatically withdrawn with a fine that will depend on the remaining years of assignment. Within a period of 6 months, from the moment the third fault is delivered the construction has to be removed and leave, as far as possible, the land in the same way it was given. To verify that the terms of the contract are respected, the corresponding technicians will carry out scheduled inspections throughout the concession.

Once the postulants have their license, they will have the following duties:

- Complete the architectural project presented.
- The maintenance and conservation of the assigned plot.
- Exercise fair competition with the other owners.

- Compliance with the assigned reforestation, within a period of 6 months.
- The maintenance of the plantations during the time of the license.
- The maintenance of all electrical energy produced by its sustainable mechanisms.

On the other hand, they also have rights and benefits:

- The transfer of a piece of an undeveloped land.
- The authorization to build an ecocabin project.
- A sporadic tourist exploitation license in the ecocabin itself.
- Free electrical consumption, which may vary according to the monthly production.

Before the licenses ends, a process will be opened to request renewal. Presenting again the updated documentation, as in the public contest. Also, it will be compulsory to reforest another area with the same vegetation proportion. In the case of a license renewal, technicians will have to submit a report on the compliment of the requirements established by contract.

If the owner rejects to make a renewal, the license will be withdrawn and a specific period of time will be given to break up the construction and return the land, as far as possible, to the same conditions. If these requirements are not accomplished, then there will be a fine and, in addition, the expropriation of the construction if is not disassembled.

In any case, if the owner does not act legitimately according to the contract or does not comply with the legal duties assigned, the technicians will have to fill out a form and the pertinent procedures or actions will be taken by the Regional Consell.

#### 4.5. Architectural mechanisms

This urbanization system is based on a building that allows inhabiting the no urbanizable land in a sustainable and respectful way. Proposing a cabin model that is self-sustainable and safe, where the only supply requirements must be having a safe access to the house and the connection to the general power grid (with an electric meter).

The mere fact of inserting a building on the mountain already alters the environment and leaves an artificial mark. From a sustainable point of view, a system with low occupational density of a territory can generate a better understanding of the place and a connection with nature. If the location data and what can be done in the place is well understood, it is possible to make an artificial work that will respect nature.

The survival and sanitary problems facing this sporadic housing model are the same as those in any building, but with the disadvantage that it is not connected to the general supply network. This can lead to a design by establishing a dialogue with the natural environment, being able to take advantage of the natural resources. This makes the design and the planning the most important steps for the viability of the project. In this way, it could be compared with mountain shelters, in which the words scrap or waste do not appear. Each decision has to solve multiple problems, giving maximum comfort with the minimum amount of energy and resources.

For the idea of an ecocabin and following the model of sustainable bioclimatic architecture, the design recommendations must be taken into account to meet the required architectural minimums. These characteristics, explained below, are a recommendation of possible solutions to the problems that each ecocabin will have to solve:

- The **location** is a vital decision for the operation of the cabin. Access to housing must be considered both in its daily use and in its construction. It has to be a land with the greatest possible solar contribution, looking for the facade to capture sun rays (passive and/or active gains), oriented to the South (+/- 15°). In this case, the municipality will make a preliminary study to delimit the actions within the undeveloped land, classified as a potential growing.
- The **foundation and the contact with the ground** is the most delicate part environmentally speaking. If in the future this construction disappears it will be the only footprint that will remain, therefore, a rigid foundation composed of stone gabions could be used, extracted in the nearby quarries. Moreover, if in the future it is decided to urbanize that area, these elements must be indicated and, as far as possible, easy to extract.
- The **structure** has to be made from a sustainable material. It is recommended being prefabricated, facilitating its disassembly and reducing the waste from the commissioning and its removal. It is proposed that the structure could absorb the slope of the land itself. Therefore, there will be a great variety of locations and the construction of ecocabins will not be limited by the slope, avoiding the alteration of the topography of the place.
- The **internal distribution** must be as optimal and compact as possible. Separating the kitchen area from the living room and from the sleeping area. The furniture must be versatile and functional, where the chimney (or biomass stove) could become the center of the program separating the environments. It is recommended that the project includes a terrace, which would improve the quality of the accommodation, as well as facilitate the maintenance of the capture elements.
- The **control of the loss of heat in the envelope of the building** is an important point for the design and a principle of passive houses. By reducing the loss of heat, the consumption of the building is also reduced. This is achieved with a good continuous thermal insulator, avoiding thermal bridges and with a strategic design of the openings, avoiding large windows (which lead to many energy losses). Like the structure, the envelope could be a prefabricated system to optimize resources and reduce waste. For this it could be a panel system. All walls have to be covered by rock wool for the insulation. The North-facing facade will be practically blind and can be used for storage or a reserved area for other facilities, since it is the coldest zone. While in the South is recommended that at least three elements appear: renewable energy production system (solar panels), passive energy collection system (*trombe* wall) and openings for direct solar gains (windows). The

East and West facades will be where the sleeping area and the kitchen area are. Depending on each project these needs will be adapted.

- The **generation of renewable energy** must be self-produced. Therefore, it will have an energy production system based on solar panels or a mini wind generator (with a design integrated in the cabin to reduce its landscape impact). Any of these systems will be connected to the general electricity network, which will serve as a battery. The ecocabin will produce energy that will hand over to the network and will be able to consume the energy at any time.
- The **active calorific gains** will be produced with a biomass stove system or a chimney. An optimization and the integration of the design will be taken into account. The compactness of the building has an important role in saving energy by reducing the volume to be heated.
- The **water consumption** will come mainly from the rainwater with some reservoirs located above the level of the cabin so that it can be moved by gravity. In the ecocabin, filters must be provided to be suitable for use.
- The **drainage** will have to be done through a black well system that is practicable. Specialist teams can discharge it and get rid of waste.
- The **final shape** will be a free decision in each project, the formal volume and materials, looking for an architecture that does not generate a great impact on the landscape.

## 5. CONCLUSIONS

The architectural requirements must move towards a sustainable model and respect for the environment. It is no longer useful a building that meets a need and is well designed. The awareness of caring for our planet is a reality and we have to respond to these concerns, not only measuring the CO<sub>2</sub> emissions it produces. There is the need to achieve an intelligent and responsible design that uses natural resources in an optimal way.

Self-sufficient buildings with a zero ecological footprint are almost a reality, however, more policies that promote these ideals and systems are needed. Work must be done so that this is the start for the future generations to continue.

This project is an opportunity to investigate and improve small-scale technologies, but also to propose changes in a system that has forgotten essential values and is in favor of the single-use capitalism.

This work seeks to unify a real demand, with values and a type of tourism that can have a positive feedback, with the aim of leaving to the future generations our territory and our culture better, or at least as the previous generation left it to us.

The placing in the undeveloped territory makes ecocabins an interesting and exciting architectural project, in which the environment has the maximum respect and where the use of sustainable tools is required. It seeks to cover a real need to accommodate sporadic tourists, causing a positive environmental impact, without giving up adequate comfort at any time.

This exercise has helped me to understand the peculiarities of the Cerdanya and that the economic model in which we live needs updating. The exploitation of the region has been taken to another level and it is time to change, without leaving aside the model, but modernizing the interests and benefits of those involved. We have to reach consensus to change of the short-term perspective to a vision of the medium or even long-term future.

The ecocabins suggested must be an example of self-sufficiency and sustainability in a complicated environment such as the Cerdanya. This system based on short-term licenses (5 years) is also designed to encourage technological innovation and experiment with new architectural systems. The system must also respond to specific problems, but with a greater benefit in the future. In the same way, the compensation through reforestation does not contribute to direct benefits in short term, but its results will be tangible in the medium/long term.

Once I have finished the work, I realized that the biggest obstacle that this proposal faces is the public administration. The greatest peculiarity of Cerdanya is its belonging to two provinces at the same time, which requires an understanding between two public bodies, which have different methodologies. For this reason, I have proposed that the Regional Council acted as a mediator between these entities, in addition to manage and follow the established rules.

To sum up, I think this is a possible line of work, but there are many more. In my opinion, the way to proceed is to create a network of small but effective actions, instead of greater measures that end with poor results. "If we do not change our direction, we will end up where we are heading now"<sup>5</sup>.

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