The Faces of Landscape.

Changes and permanencies.

A comparison between the cases of Montagut i Oix (Girona, Catalunya) and Heinävaara (Joensuu, Pohjois-Karjala).

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1. ABSTRACT

The municipality of Muntagut i Oix is the gateway of the Alta Garrotxa (Upper Garrotxa), a complex orography territory with Euro-Mediterranean vegetation, located at the "comarca" (shire) of La Garrotxa (Catalonia). Montagut i Oix is a good laboratory to analyze the main changes of the Landscape, both economical and cultural, occurred among the 1960s and 2000s. The technical advances -like the gas bottle- and the political and economical shift suffered in Spain in 1980s, specially the admission to the European Union (EU) in 1986, altered the traditional way of life of the populace, related by the change of the economical uses of the territory. A broad abandonment process (population, crops, economical forestry) build a new landscape, characterized by the growth of the spontaneous forests and the depopulation of the Alta Garrotxa. At the beginning of the 1990, the tourists started to visit the area, attracted by the particular environmental characteristics and the beauty of the landscape. At the same time, in 1995, Alta Garrotxa became a natural park (Catalan Government PEIN program) and the area entered completely in the tertiary economics era. The loss of the old landscapes suppose too a "reinvention" of the identity of the Alta Garrotxa, following similar trends which take place in other parts of Europe.

2. OBJECTIVES

The objective of the present article is try to understand and explain the main elements of those two different landscapes, Montagut i Oix and Heinävaara, explain its evolution during the last XX century, and, finally, find the similarities and the differences in aspects like geomorphology, physical and human geography, physical management and ecology. Also we will try to find and explain the causes of the identified changes and remainings.

3. METHODOLOGY

The methodology we have used has been based on a two weeks intensive workshop where we have visited both municipalities and analyzed land use cartography and the existing bibliography over our study case. Our working group was formed by two members of the University of Girona and three members of the University of Joensuu. Each subgroup has leaded the investigation in its country, and then we have putted in common our knowledge and experiences.

4. INTRODUCTION

First to begin the exposition of our study is necessary do a brief presentation of the geographic situation of both study cases.

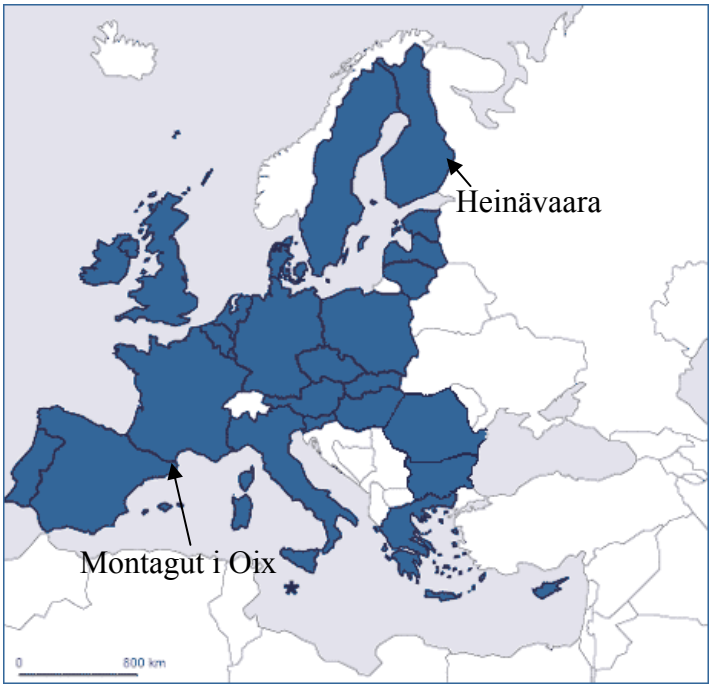
Montagut i Oix is a municipality of the county of La Garrotxa, in the province of Girona. Girona is the north-eastern province of Catalunya (Catalonia), at south of the Pyrenees and beside of the North-West corner of the Mediterranean Sea (maps 1 and 2). The geographic center of the municipality is approximately situated at 42º 16' N latitude and 2º 35' E longitude. Its altitudinal gradient goes from the 300 m. over the sea level of the Fluvià River to the 1.557 m. of Comanegra Mountain, in the south border of France. The Montagut i Oix surface is 93'8 km.2 and its population density is 9'6

inhab./km.2 (IDESCAT 2007). The morphology of the municipality is mainly mountainous and abrupt, with a small flat zone at South. There are two villages in the municipality, Montagut, the main, at South on the flat zone, and Oix at the North-West, on the mountainous zone (map 4).

Montagut i Oix is situated at the center of the protected area of Alta Garrotxa (Upper Garrotxa). This area is included in the Natura 2000 Net, with a low level of protection. Its protection level is similar than the IUCN Category V, Protected Landscape, as a protected area managed mainly for landscape conservation and recreation. The municipality is enoughtly representative of the Alta Garrotxa area and its dynamics and trends. By that reason we will use indistinctly data of the municipality and of the Alta Garrotxa area to explain the main dynamics.

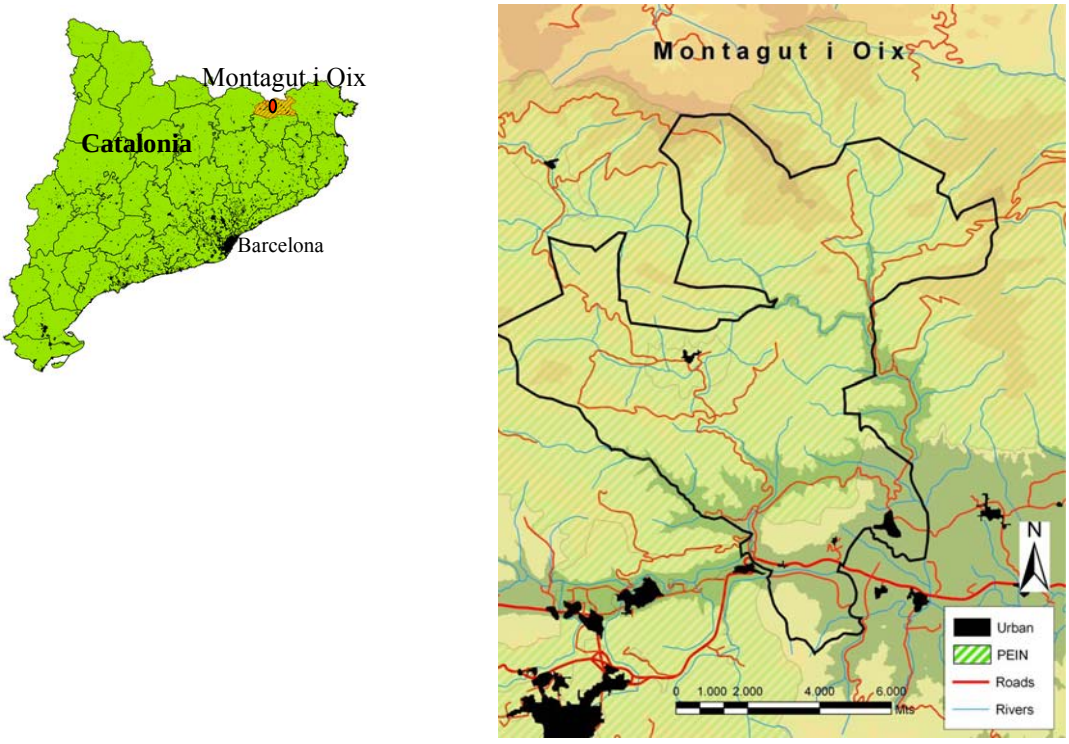
The Alta Garrotxa is a zone of Pyrenean calcareous relief with Mediterranean influences which constitutes a very characteristic natural area. The meaning of the word "Garrotxa" is that of a broken land, that is, rough and winding. It is also an area of enormous cultural and landscape interest, as it was strongly humanized by a rural culture which developed its traditional activities as well as others related to the presence of a border dividing administratively a unique Catalan identity between the Spanish and French states.

Heinävaara is a hill village in the municipality of Joenssuu, in the region of Pohjois-Karjala (North Karelia). Pohjois-Karjala is situated at North-East of the South third part of Suomi (Finland), beside the Russian border (map 1). Heinävaara is approximately situated at 62º 30' N latitude and 29º 50' E longitude. Its altitude is about 200 m. over the sea level, and it's situated at the top of a smooth and enlarged hill oriented from North-West to South-East, originated during the Precambrian and modelled by glacial processes. Hill villages were born when permanent cultivation started to become more common, and accompany for slash and burn practises. That fact was also the starting of the permanent settlements in Pohjois-Karjala. First mentions about permanent living in Heinävaara are circa from year 1600 AD. In cultural and historical sense Heinävaara is one of the most important hill villages in Pohjois-Karjala.



Map 1: Situation of the study areas.

5. MONTAGUT I OIX



Map 2: Situation of the municipality of Montagut i Oix referred to Catalonia (left), and its administrative border (right).

5.4 Physical Geography.

The municipality of Montagut i Oix is situated on the East Pre-Pyrenees, over Tertiary fissured calcareous bedrock. At South the soil was origined during the Quaternary by fluvial sediments

The natural elements have an absolute dominion over those of human origin. The flat land is limited and it is at the bottom of the Fluvià valley, at South crossing the municipality from West to East, with good alluvial soil for agricultural uses. The rest of the place is absolutely occupied by the mountain. More than long mountain ranges and peaks lining up, we often see blocks and mountains rising in an irregular and chaotic way. Many peaks have a strong personality, such as the Ferran Peak, 983 m. (picture 1). Despite its resistance to erosion, these rocks have been strongly excavated by rivers, giving as a result a quite complex orography, almost labyrinthic, with sudden high and low grounds between risen mountainous volumes and deep gorges.

The geological material in the area is basically sedimentary, especially calcareous, marl material, and oecenic clay. There are also siliceous outcrops which can sometimes be important. As a result of the complicated geologic history of the area, the materials have been strongly creased and suffered faults during the Alpine orogenic movements. In many places you can find calcareous stones sticking up forming a very vigorous and spectacular relief. The zones where marl material and clay, softer rocks more subjected to erosion, the landscapes we can found are much milder and placid, without the protagonisme of the cliffs, although it can be as beautiful as the one previously described.

The calcareous material of most rocks is suffering a karstic process by rain water. In this process many underground cavities (abysses and caves) and other superficial dissolution processes have resulted, producing rocky areas crossed by deep gorges (Pictures 3 and 4). A large amount of rain water flows underground. There is a stream to the south going further than the Fluvià River and feeding the Banyoles Lake and other ponds around. The main water courses of this area are, beside the Fluvià, the Llierca River (Picture 2), which has a complicated tributary net and crosses the area from North to South until the Fluvià River, and the Oix River flowing from West to East as a member of the tributary net of the Llierca River.

Just by the karstic processes, different sections of the rivers in this area, especially because of the underground leakages, are normally dry except for the rain seasons, spring and autumn. Historically there have been spectacular floods which have caused important damages, such as the breaking and pulling down of bridges (Orta 2002). Another effect of the karstic processes is the predominance of the Mediterranean evergreen forest, dryer, in a zone with important precipitations, from 800 to 1200 mm/year, and an average temperature about 13º.

Picture 1: The Ferran Peak (983 m.).

Picture 2: The Llierca River.

Picture 3: The calcareous cliffs of Gitarriu.

Picture 4: Abrupt and fractured relief.

Related with the climate we are in a transition zone between the Mediterranean area, at East, and a more Atlantic area, at west. The high mountains we found at West and North causes the elevation of the humid air which comes form the East, and causes that high rain level, manifestation of the Fohen effect.

Montagut i Oix is a good example of the Mediterranean medium mountain, which constitutes a geosystem situated between 600 and 1500 m. of altitude. The predominant relief forms have fluvial and periglacial origin, and usually, like is the case, are broken and with hard cliffs. The rain range is so important, 800 to 1200 mm. per year, which forms rivulets and torrents, characteristics of the Mediterranean regime, giving a high humidity to the ambient. The biotic elements are disposed depending of the altitudinal gradient and the aspect factor (de Bolós 1992) (picture 6). Is easy to distinguish the evergreen oak forest of *Quercus ilex* (*Quercetum illicis galloprovinciale*) (picture 8) until 800-900 m. on the South and East oriented zones, and the mountain evergreen forest (*Quercetum mediterraneo-montanum*) of *Quercus ilex* (picture 5) and some deciduous trees like *Quercus humilis* and *Acer campestre*, on the shadowed places. Over it we can find the dry oak forest of *Quercus humilis* (*Buxo-quercetum pubescentis*), arriving to the Comanegra Peak, around 1.500 m. In the North and West oriented faces the mountain evergreen forests ends its dominion at 350-400 m., where is substituted by the *Fagus sylvatica* forest (*Fagion*). The potential forests complete its presence with humid oak forest of *Quercus robur* (*Isopyro-Quercetum*). That exuberant vegetation is hardly altered by the anthropic action. By that reason is possible to find plantations of *Castanea sativa* over the silicic outcrops, and some introduced pines (*P. sylvestris, P. halepensis, P. nigra subs. Salzmaanni,* and *P. pinea*) (map 3). The forests are generally young, over 50-60 years, with high densities and a homogeneous structure. The landscape mosaic is completed with pastures, not many, and cultivated areas on the flats.

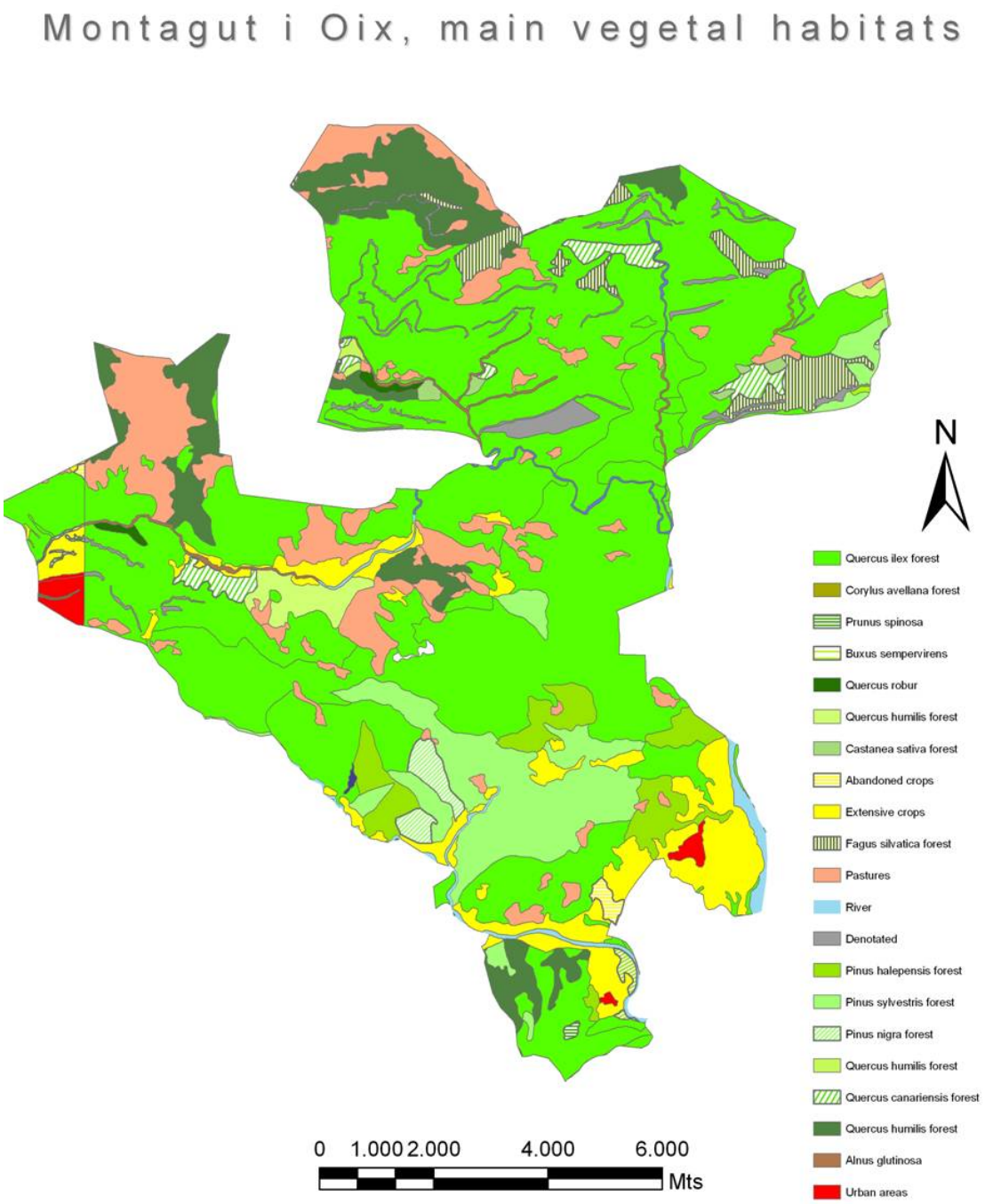
The forest soils are chemically rich with vegetation favourable structure and texture. The level differences and the high insulation gives to the landscape a high energetic level, what with the water richness gives to the vegetation a high recuperation level after perturbations (de Bolós 1992).

Having a general overlooking about the general physical characteristics of the municipality of Montagut i Oix, especially the climatic items and the potential forests, we thing we can define it as a "Euro-Mediterranean" landscape because it's high rain level, consequence of the Fohen effect, but modified by the karst of the main calcareous bedrock, giving to it main Mediterranean aspect. The fact we are in a climatic transition zone, between Mediterranean and Atlantic, fortifies our opinion.

Picture 5: Agro-forestry mosaic of mountain evergreen forest (*Quercetum mediterraneo-montanum*).

Picture 6: Vall de Riu. The effect of the aspect is visible in this picture. At left a north oriented side with deciduous forest, at right a south oriented side with evergreen oak forest. The pasture is consequence of the human action.

Picture 7: Vall de Riu. The farm house of Riu stills inhabited, against the general tendencies. At left end of the pastures, behind the house, it's possible to see the terraces, human modification of the ground to profit better the land and the humidity for cropping uses.



Map 3: Main vegetal habitats.

Picture 8: The evergreen Mediterranean oak forest of *Quercus ilex* (*Quercetum illicis galloprovinciale*), and the abandoned farm house of Maranyó.

5.4 Human Geography. Population Evolution.

Historically, the territory of Alta Garrotxa, also the Montagut i Oix's, has been hardly and extensively humanized. Always has been a population refuge, and is by that is not possible to find any place where there are no human prints. The human presence in Alta Garrotxa is very old. We have to look at last 60,000 years ago, to the Palaeolithic. The human settlements were mainly spread, with very small villages and farm houses extended by the entire surface. They organize its social structure around the Romanesque chapels we can found in nearly each valley and mountain. But at the mid XIX Century began a depopulation process which has arrived until the end of the XX Century. That process has had three main moments. The initial, when the Pyrenees population arrives at the level of overpopulation, the mid XX Century with the arriving of the bottled gas as a new energy source, and the end of the last century when begins a little and slow population recovery.

The excessive population of the Pyrenees in the XIX Century, in a territory with a low productivity, and an important lack of services, made really hard the quotidian live. The new industries appeared in the cities of the lower and better communicated zones, with better services, sure salaries and a higher live level were the cause of the first depopulation movement. The population reduction made the handwork price goes up and the works which need much handwork, nearly all in the agro-stockbreeding areas, were not rentable.

At the beginning of the XX Century, Montagut i Oix has 2246 inhabitants (table 1), also with the same spread structure. The main economic activities were agricultural, stockbreeding and, very important related with the abandonment process, forestry activities. Is necessary to remarks that the population was inside a slow reduction process but doesn't means a break point. The combination of those activities during the year, agricultural in spring, summer and autumn, forestry in winter and stockbreeding all the year made possible to maintain that level of population. The forestry productions were wood, firewood and charcoal. It's very important to understand the importance of the winter salaries to understand the second depopulation moment of mountain areas. The forestry products were the only cooking and warming energy source for nearly all the countryside society. In the year 1957 made its apparition a new energy source. The bottled gas. Cleaner and easier to use, was the cause of the starting of a generalized and fast energy source substitution process. For the mountain and forested areas inhabitants was the vanishing of the winter salaries (Castilló 2005). The migrate subsistence resources became insufficient to maintain the live forms. That moment was the real breaking point in the population evolution. Again, the cities and its better live conditions were the economic solution for most of the rural families. In 1960, the population was 1224 inhabitants. The lost of population was the 45'5% related 1900 (table 1).

The reduction of population stills until 1991, arriving to 774 inhabitants. Here starts the third main moment of the population evolution. Due to the arrival of new inhabitants in the earlier 80', coming from urban spaces from Catalonia, Germany and Netherlands, and an incipient touristy movement, which has been consolidated in the present, the population of Montagut i Oix is having a slow recovery process. In 2006 the municipality had 903 inhabitants.

In the period 1900-2006, the total loss of inhabitants was of 1343. (table 1)

Population	***1900***	***1960***	***1981***	***1991***	***2001***	***2006***
	2246	*1224*	*797*	*774*	*824*	*903*
Density (inhab/km2)	*23,9*	*13*	*8,5*	*8.25*	*8,8*	*9'8*
% of increase	***1900-1960***	***1960-1981***	***1981-1991***	***1991-2001***	***2001-2006***	***1900-2006***
	-45,5	*-34,9*	*-2,9*	*6,5*	*9,5*	*-59,8*

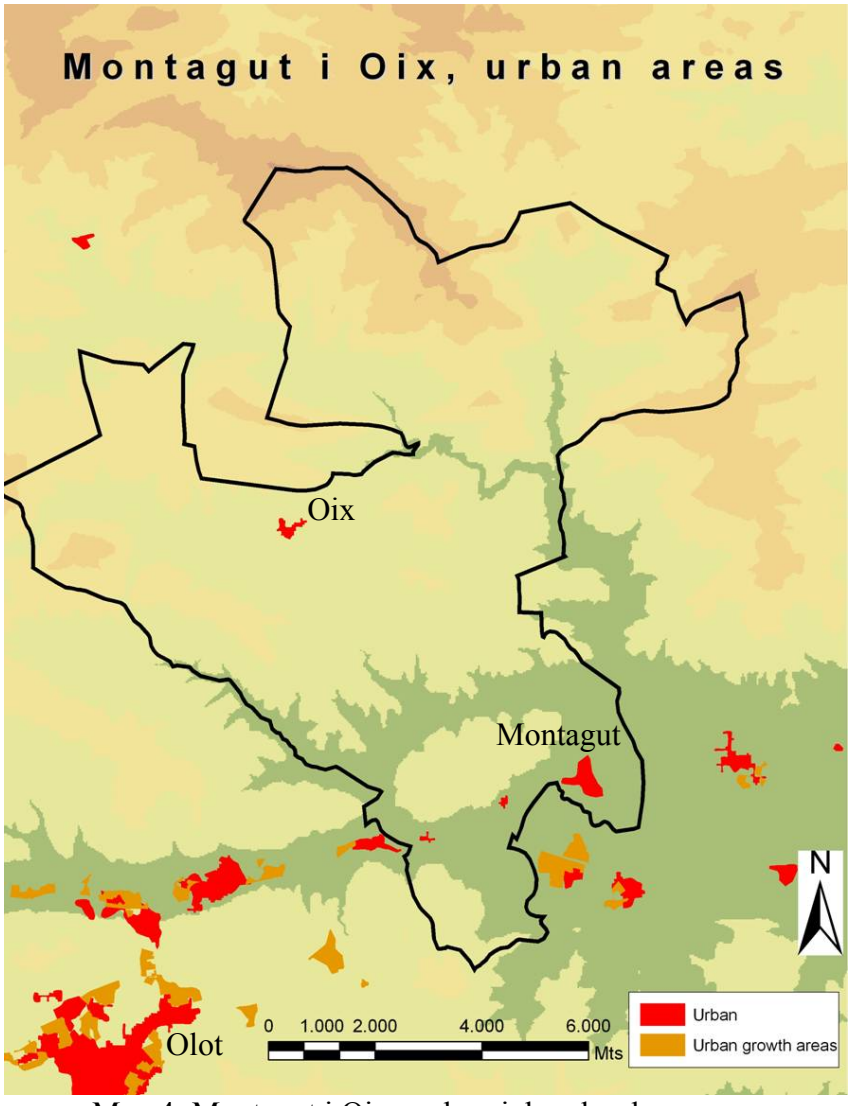
Table 1: Population evolution, density and % of increase. Period 1900-2006.
Source: Institut d'Estadística de Catalunya. www.idescat.net

5.4 Physical Management evolution.

Montagut i Oix is mainly managed by Village House ordinances. The special planning which affects the municipality comes from Special Rules for the Protected Area of Alta Garrotxa (NEAG), and the Territorial Planning of La Garrotxa (PTG).

The Territorial Planning of La Garrotxa is now having the approbation phase, so is not legally valid yet. But its provisions for this municipality are over don't growth of industrial soil, and the only new construction of houses must be to get a population reequilibrium related to the main area of Olot, capital city of the County. The objectives are to give to the young people of the municipality the capacity of emancipation inside the villages and obtain a balanced age pyramid.

The Special Rules for the Protected Area of Alta Garrotxa were implemented in December 1995. Its objective is to preserve the naturality of the space, improve the biodiversity and manage the human uses, including the touristic's. Related to the landscape problems of the area, the Rules don't permit the breaking up ground of wooden soils. That is important because one of the bigger ecologic and landscape problems of the area is the great loss of opened spaces (Vila *et al.* 2005). Now is in discussion to change that precept to may try to restore the opened spaces.

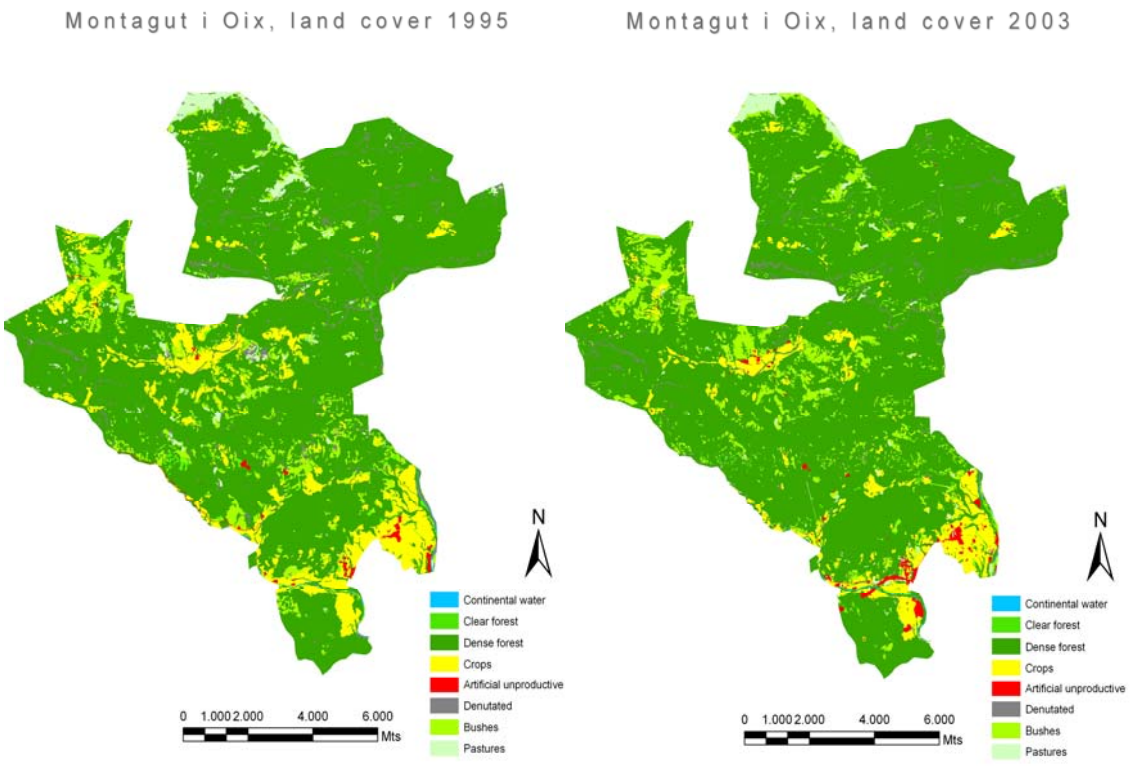


Map 4: Montagut i Oix, and peripheral, urban areas.

5.4 Landscape characterization: natural and cultural components. The consequences of the abandonment process.

Nowadays, the most important elements of the landscape of Montagut i Oix are the natural ones. They have an absolute dominion over the cultural ones. Morphologically, the first element we percept are the spectacular mountains rising one beside to the other, broken by calcareous cliffs and deep gorges. The forest, like a sheet, extends its presence trough the entire surface. Over the forest matrix we found pastures and cultivated land. Both cultural elements are a consequence of the human presence in the area. They are associated to the farmhouses and the economic activities: agricultural and extensive stockbreeding. Nowadays, the forest seems natural but not always was like now. Until the earlier 60' of last century, forests were the third base of the rural economy of the area. With the farm houses, the other essential cultural elements of the entire Alta Garrotxa are the Romanesque chapels. A full extended net of footways joins all the cultural and physical elements, acting as cultural and social connectors.

The evolution of crops, pastures and forests (map 5) is strongly related with the population evolution and the human activities over the territory. In this case, the abandonment process suffered during the last century has changed strongly the Montagut i Oix landscape. When the families began to abandon their houses, they also abandoned progressively the activities which had created the traditional agro-forestry mosaic. In master lines, the consequences have been the loss of the opened spaces and the progression of the forest.



Map 5: 1995 and 2003 land cover evolution.

The families who were living on the countryside had constructed a cultural and economic landscape based on the use of all the resources of the territory. The farmhouses are constructed with stone, the flats with wood and the roof is supported with wood structure and closed with clay tiles. Around the farm house, in the flatter zone, were the crops and the stockbreeding zone until the less sloped areas, usually arriving inside a cleared forest zone. When the slope was excessive for the herds, starts the forest zone. This area was strongly exploited to get constructive wood, firewood and the most important winter activity: the charcoaling. Over the cleared forest, in the strong sloped zone, was the closed forest. These activities had constructed a landscape which most important elements were the opened spaces and the cleared forests.

The landscape changes started with the abandonment of the charcoaling during the last 50' and earlier 60' of the past century, caused by the arrival of a new energy source: the bottled gas. The ending of the charcoaling represented the loss of the winter salaries and the breaking of the poor subsistence economy of the families. The young people went to the cities to get a substitutive salary, while the older tracts to maintain the agricultural and stockbreeding activities (Castilló 2005).

The next hit to the countryside economy came from the European Common Agricultural Policy (EU CAP), and from the changes of the world economic system, moving towards a reduction of the traditional agriculture during the 80'. The EU CAP, which looked for the growth of the productivity, made appears the intensive crops and stockbreeding on the flat zones, what Montagut i Oix have a very small piece (picture 9). The extensive agro-stockbreeding activities become not enough productive. The economic base of the countryside was definitively destructed. At the same time, the inhabitants of the countryside become too old to maintain any economic activity. The farmhouses were definitively abandoned, and with them, the agro-forestry mosaic arrives nearly to its end.

Picture 9: Over the lower and flat zones, with better soils, it has produced the intensification of the stockbreeding and agricultural activities. Beside the old farm house we can see the new buildings, with intensive stockbreeding purposes, and the crops produces forage for the animals.

On the abandoned zones, the vegetable succession had the conditions to act. Nearly anybody was there to stop it. The ancient opened spaces began to be substituted by the actual omnipresent forest.

	1957		1997		1957-1997	
	ha.	%	ha.	%	ha.	%
Closed forest (≥90 % recovery)	*12.808*	*39,4*	*24.258*	*74,7*	*11.450*	*89,4*
Dense forest (90-60 %)	*2.934*	*9*	*3.083*	*9,5*	*149*	*5,1*
Open forest (60-10 %)	*4.390*	*13,5*	*2.427*	*7,5*	*-1.953*	*-44,4*
Pasture (≤10 %)	*9.193*	*28,3*	*2.433*	*7,5*	*-6.757*	*-73,5*
Crops	*2.501*	*7,7*	*186*	*0,6*	*-2.313*	*-92,5*
Denuded space	*655*	*2*	*80*	*0,2*	*-575*	*-87,8*
Total	*32.482*	*100*	*32.473*	*100*		

Table 2: Land-use comparison between 1957-1997, in the entire area of Alta Garrotxa.
Source: Vila, J.; Varga, D.; Cortijo, S.; Macias, M. (2005)

The previous table 2 show us the dimension of the changes which affected the opened spaces and the forests in the whole protected area of Alta Garrotxa. We use that data because are really representative of the dynamics which have affected the municipality of Montagut i Oix. The trends and the processes dimension have been the same. The table describes the surface occupied changes in forests, pastures, crops and denuded spaces. The closed forest, without permanent human exploitation, nearly have doubled its surface during the second half of the past century, while the open forest, used as charcoaling and stockbreeding areas, has reduced its surface in more than 40%. The pastures have reduced its surface in more than 70% and crops in more than 90%. The consequence is a uniformation of the landscape and big forest continuity.

Picture 10 a, b and c: The vegetal succession process. At left, vegetation is coming over the pastures. In the middle and right, the spices sequence of the succession. First come in the *Juniperus comunis* and then the *Quercus ilex*.

The landscape has been empoored, has loosed the mosaic and, consequently, biodiversity has been reduced, specially the associated to the human presence. We have been passed from a mosaic landscape, with three main elements, to extended forest continuity with very small pieces of pastures and relictual crops. Pastures still existing near of the very few farmhouses which may resists the general trends, and in the higher parts of Comanegra Peak. Crops have been reduced to the flat lands near the villages of Montagut and Oix.

But the landscape changes haven't been only in the shape. This area contains also important changes of the cultural landscape, but the traditional way of life is changing very fast and it produces a high territorial and landscape impact (the abandonment process of the crops is an example). When walking on any of the paths in Montagut i Oix, we are constantly surprised by the historic heritage of the Middle Age, with enormous cultural interest which mold a landscape that has strongly been shaped by man. The Romanesque 12th century churches (picture 11), the main sign of identity of the zone, remains on the whole territory, nowadays converted to a tourist attraction. The old Montagut Bridge (picture 12) is considered the gate of the Alta Garrotxa, and perhaps is the most important symbolic element of the study area.

Picture 11: Riu chapel (XII Century).

Picture 12: The Sadernes bridge.

When we moves to the Fluvià River valley, the impact of the new highway, the main communication infrastructure between the cities of Olot and Girona, affects one of the most known traditional landmarks of the Girona county: the village of Castellfollit de la Roca, built on the top of a volcanic lava flow (pictures 14 and 15). The new landscape, without any type of own identity, destroys the old landscape, creating a postmodern mix. Using the words of the Belgian geographer Marc Antrop (2004), *"the current changes are characterized by the loss of diversity, coherence and identity of the existing landscapes. New elements and structures are introduced which look alike everywhere"*.

The changes also have affected the landscape perception. The resources territory we had in the past has become a turistic landscape, also biolgical. An attractive landscape which have been capable to get a protection level due to its spectacularity and its "natural" values. We want to remark that may be contradictory speak about natural forest in an area where the human presence have been very intensive and extensive, and where nevertheless its possible read the human prints everywhere.

Nowadays, the main use of the area is touristic. The most valued items are the beautifulness, quietness, naturality and the patrimonial related with the human print, Romanesque chapels, farmhouses, charcoaling places, ancient mining, Middle Age

bridges and the gastronomic. The closed forests are highly valued. Another attraction item is related with scientific activities, biological and archaeological mainly.

There are also some people, not many, who go to the area to restore and live in the abandoned houses. Some of them try to live from the land resources, mainly ecologic agriculture, but most of them have touristic enterprises, mainly restaurants, campings and little mountain hotels (Rural Tourism). There is another important group who may live "from the air", it means they can stay there because they proceed from accommodated families. That group is not stable and it's continuously changing.

That heterogeneous group is formed mainly by urban precedence people from Catalonia, Germany and Netherlands. Its perception of the landscape is based in aesthetic items and live quality level. The urban ecologist ideas are dominant, and usually they percept the forestry and management activities like an aggression to the nature. That group, with the touristic uses and the second residences, are responsible of the growth of the prices of the countryside properties. The ancient owners of the houses and the land, without any productive value for they, have seen that their properties are highly valued as residence by the urban precedence people. The last 30 years, the prices of the countryside houses have been coming up, in a rural version of the urban gentrification processes. The soil and houses prices are coming up, while the inhabitants have been substituted by an accommodated class.

Year	Hotels	Restaurants	Campings	Rural tourism
1975	*0*	*nd*	*0*	*0*
1995	*1*	*6*	*4*	*nd*
2000	*1*	*6*	*3*	*1*
2005	*2*	*nd*	*4*	*7*

Table 3: Table of touristic settlements.
nd: no data.
Source: Institut d'Estadística de Catalunya. www.idescat.net

5.5 The driving forces of changes and permanencies.

As we have seen until now, The Montagut i Oix landscape has suffered very important changes during the last century. The changes has occurred at physical, human, economic, ecological and perception levels.

At physical level the changes are visible in the growth of the forested surface and the reduction of crops and pastures. At human aspect, the most important and driving force of all the changes, with the economic world tendencies, is the continuous depopulation process until the end of the century. Also the recent very slow repopulation process means changes at the economic and perception levels.

Ecologically, the loss of the agro-forestry mosaic has derived in the loss of biodiversity. The reduction of the opened spaces and the transition ecotone zones represents a hard reduction of that areas associated spices. At the economic level, we have changed a territory, understood like an economic resources and living used land, to a landscape, understood like something to go to see and feel, a picture where is possible to be inside but isn't possible live of it.

There are, fortunately, remaining live forms of the past. The Riu Valley (picture 7), in the core of the Alta Garrotxa, stills being inhabitated by people originary of Montagut i Oix, and some other in few other places in the area, trying to resist the globalized economy and still constructing the traditional landscape of the area. They had to adapt their economy to the present moments with a little touristic activity, a small restaurant, to help their stockbreeding economy.

Picture 13: The permanence of the ruins remembers us how was the past, and the changes which has suffered the area. The abandonment is the main driving force of them.

The permanencies are, essentially, the human buildings and constructions, as farmhouses, Middle Age chapels, bridges or castles and the ruins of the older and more isolated houses, and paths. All that elements, and a not forgotten form of live, configures the strong garrotxic identity, founded in a large isolated history and in particular habits and traditions like the “Aplecs”. The “Aplecs” consists in annual meetings of the people of the villages in one of the mountain chapels. Actually, they have loss the ancient sense. Today, the people of the villages can interchange information, meet them and celebrate the live facts every day. But the traditional way of live made difficult those facts. The “Aplecs” were the unique opportunity in all the year to find all the people of the zone and celebrate the important events.

The driving force of permanencies, essentially, is the disposition to maintain a cultural heritage, as a base of identity, constructed while the traditional landscape was constructed, as long as of the human times.

The landscape is changing as a result of the social changes, but the memory of the past is the master line of a sustainable form of live in our times, times of climatic change, of uncertainty. May be, the interpretation of landscape can show us our next step, without forget we are in the XXI Century.

Picture 14: The landscape is changing as a result of the social changes. The new European economic structure needs new infraestructures. New bridge over Fluvià River.

Picture 15: The new bridge over the Fluvià River.

"The current times are characteritzed by the loss of diversity, coherence and identity of the existing landscapes. New elements and structures are introduced which look alike everywhere"

Marc Antrop, 2005

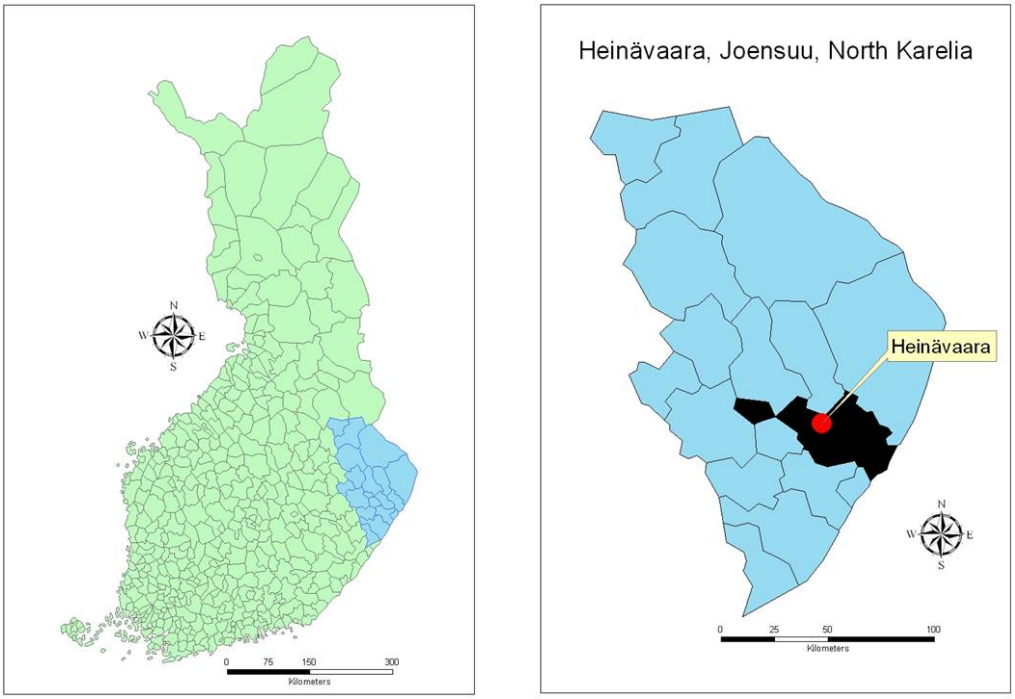
6. HEINÄVAARA HILL VILLAGE

6.1 Introduction

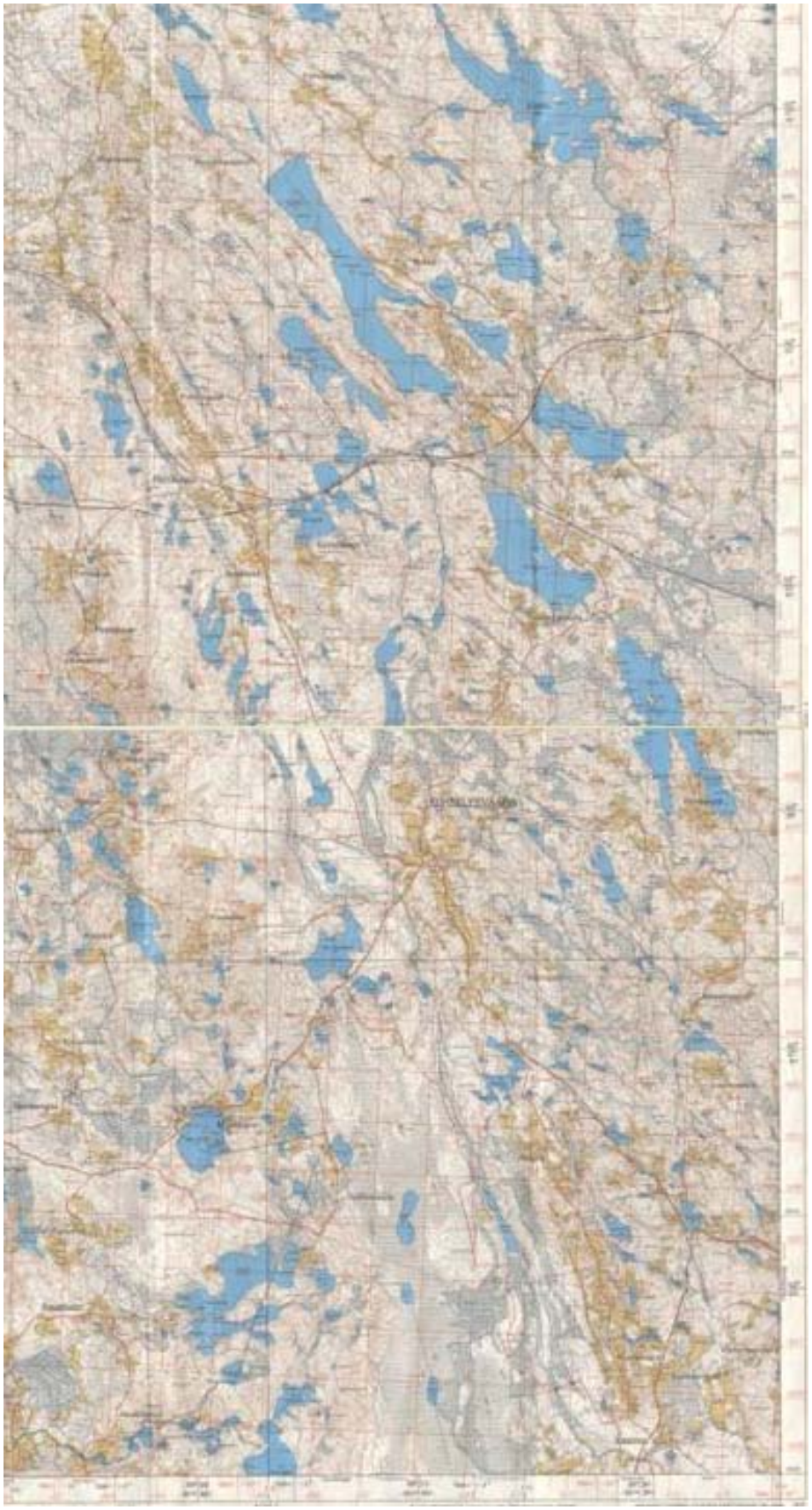
Changes in economic structure in Finland has affected also to agricultural practises. That has led to decrease of traditional agricultural structures, so traditional cultural landscapes and cultural environments are disappearing. Many animal and plant species which are depending of traditional agriculture had come rarer or are going to extinct. And nowadays it is very difficult to see blooming meadows and open wooden pastures almost anywhere. Traditional agricultural environments are kind of hotspots of Finnish biodiversity, just second important after forests. Also traditional landscapes include built environments like drying barns, granaries, cowsheds and closed farmyards. Those tell us about our cultural history and are also very important for that we can enjoy wide open agricultural landscapes. Heinävaara, lying east of City of Joensuu, is very important hill village including great amount of those things mentioned before. Hill villages are recognized nationally very important landscape areas, and in Finland they can be found only from Northern Karelia and Kainuu. East of Joensuu there is a chain of hill villages due to old Karelinian orogenic up lifting – those hills are the remnants of the Precambrian range of mountains which crossed our country from Southeast to Northwest. Hills has played very important role when permanent settlements and cultivation was established in Northern Karelia therefore the risk of frost is smaller at the upper lands. So from Heinävaara and other hill villages it can be found the longest continuous imprints of cultivation in North Karelia.

6.2 Geomorfology of Heinävaara

Heinävaara lies east of City of Joensuu. Nowadays it belongs to municipality of Joensuu but it is a part of old municipality of Kiihtelysvaara (picture 1). The eastern parts of Kiihtelysvaara are part of about 3 billion years old granit-gneiss zone of Eastern Finland and the western parts are part of younger proterozoic Karelidian micaschist zone. Between these two big major zones there are about 200 meter wide quartzite belt. That is the core of hill chain going the same way. That is a detritus of about 1.9 billion years old Karelidians, the ancient times mountains. Hill chain includes hills of Raatevaara, Hyypiä, Kiihtelysvaara, Heinävaara, Mustavaara, Selkie and Mönni (picture 2). This chain of hills is located in NW-SE direction. Quartzite is tough and that is why it has stuck there despite ice ages and work of water, wind and frost. Heinävaaras quartsit and micaschist core is covered with moraines and the top of the hill is supra-aquatic zone so after last ice age it hasn't been under water during Baltic Ice Lake and Yoldia Sea periods. Soil type is unleached moraine, in the surface there are fine moraines and beneath there are rougher moraines. The top of Heinävaara hill raises about 200 meters above the sea level. (Entiset mänimet 2002; Vesajoki 2007.) That is about 70 meters higher than surrounding glasifluvial gravel and sand heaths that have deposited to water level during melting period of last ice age.



Picture 1. Location of Heinävaara. (Maps: Eronen, S., Heinonen, M. & K. Metsola 2007)

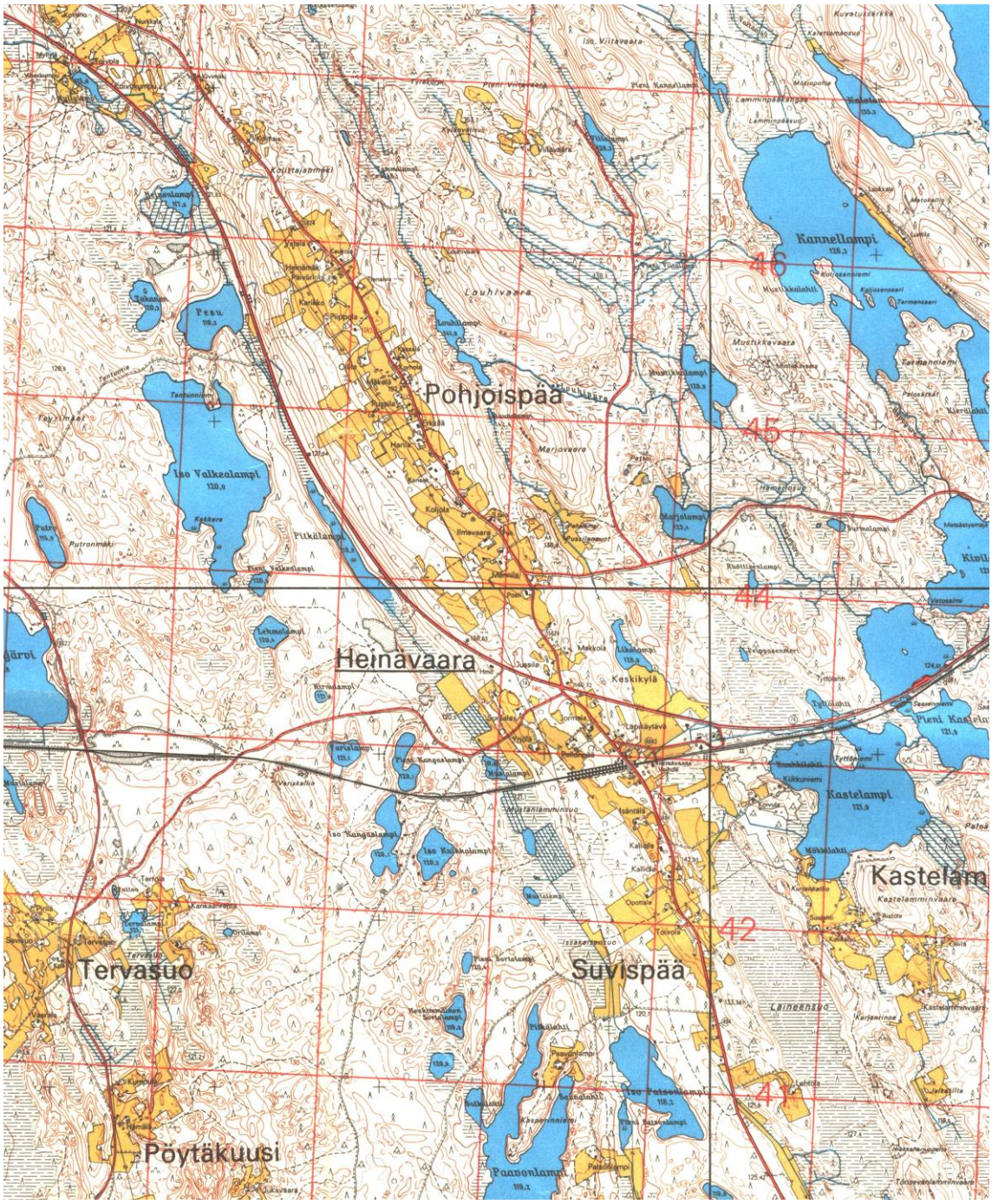


Picture 2. Chain of hills and hill villages. (Maanmittaushallitus, Peruskarttalehti 4241 03)

6.3 Living in the hill village

Hill settlement is traditional way of living in North Karelia. Hill villages were born when permanent cultivation started to become more common and accompany for slash and burn practises. That was also start for permanent settlements in North Karelia, which developed 16th and 17th century. The houses located near to fields. The location of hill living was depend on surface. The hills size solved the amount of houses with their fields and location of the houses was depended on hills form. The hills surface quality and thickness specified weather the living were in top of the hills or hillside. Slopes to the South and to the West were most desired farming lands, because of the sunshine. The main living form was single- or small group living due to small size of the hills. (Vesajoki 2007, 9.)

The soils type is fine sand in the hills and this fits for cultivation (Vesajoki 2007, 9). But the most important thing, which has due to hill village living is local climate. In the autumn nights, when cold air will settle down to the lowlands, the hills will stay much warmer. The average minimum temperature can be ten degree of Celsius higher in the top of the hills than down in the valleys (Ilmatieteen laitos 2007). That means cover for spring- and autumn frost. The land use was planned that demanding crops were located on hill fields and grass and other forage crops were situated at the bottom of the hill. In the 20th century agriculture living has spread also in the lowlands due to development of cultivation method, sustainable crop species and change over from grain growing to the pasture (Picture 3). (Vesajoki 2007, 10.)



Picture 3. Location of farms and fields in Heinävaara (Maanmittaushallitus, Peruskarttalehti 4241 03)

6.4 Settlement in Heinävaara

A permanent agriculture settlement arrived in the Heinävaara in 17th century. Before that there had been hunter-collector people, but this was only seasonal settlement (Entiset mänimet 2002, 24). The village Heinävaara mentioned a first time in 1618 in the Book of Lands, when there was two houses. In the 1630s the village has seven houses and the people were Russian-Karelian orthodoxies and their offspring. Because of hard taxation and pressure of Lutheran people, the Orthodox people had to escape to the east. The next inhabitants in the area were Lutheran people from Savo, which moved there from the inner Finland. (Vesajoki 2007, 11.)

Official general parcelling out of land started 1799 from a monarch command. Several scattered land pieces replaced coherent farm entirety (Entiset mänimet 2002, 52). Also the forests were shared and they were started forestry (Tiainen 2004, 26). The general parcelling out Law made ownership of the land more equal. The basics of share were new taxation, which due to a new tax figure, was general basic of share. The general parcelling out of land was finished in the Heinävaara area in 1875. In the 18th century settlement was grown very slowly. At First, there were several crop failures and secondly, there were some wars due to location in Russian-Sweden border region (Entiset mänimet 2002, 30). In the 19th century settlement started to grow. The village was surrounded by pasture, which borders located hills edge dells. The forage was gathered from the meadows which were lying at the bottom of the hill and mires. Meadow area was increased by drainage of the lake Jukajärvi. (Vesajoki 2007, 11.)

In the end of the 20th century settlement is focused to the Southeast head of hill Heinävaara after new highway and after the change of economic structure. The highway, which was built in the 1960s, directed next to hill village and this lead to decreasing of passage traffic. The agriculture sector has also decreased and service- and industrial sector has increased. Nowadays there are 650 inhabitants in Heinävaara. (Vesajoki 2007, 12.) Old traditions are still visible in Heinävaara hill: fields are cultivated on and on, and heritage of ancient people is tried to keep alive like there is one Orthodox tsasouna built up in Heinävaara (pictures 4, 5).

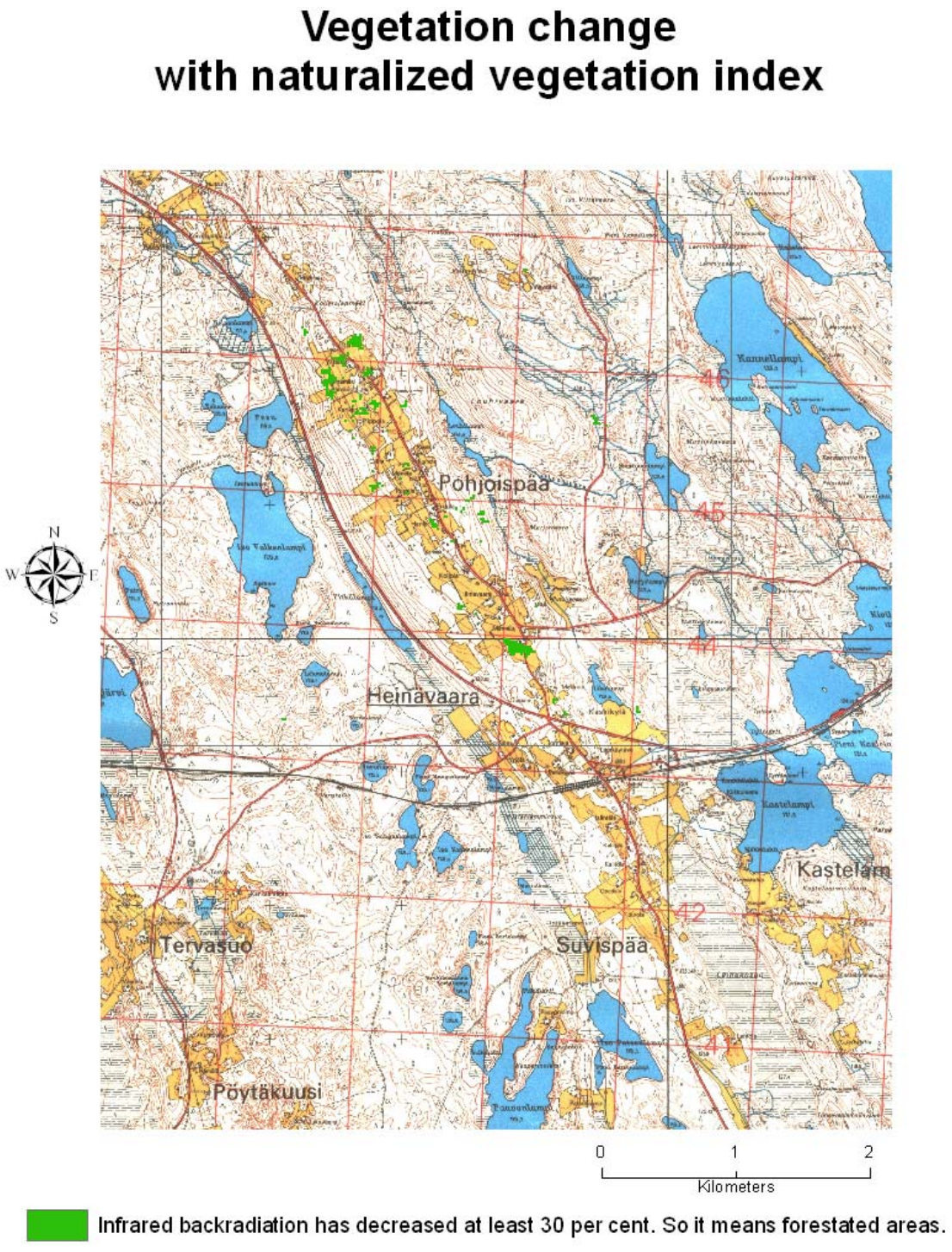
Picture 4: Tsasouna in Heinävaara.
(Picture: Eronen, S. 2007)

Picture 5: Pasture field.
(Picture: Metsola, M . 2005)

6.5 Concepts of a landscape

Landscapes can be divided to natural landscapes, those which are mostly formed by natural processes and cultural landscapes, those which are made together by natural processes and human impact. Traditional agricultural landscapes are formed due to traditional land using habits. Those landscapes include built and natural components that are embracing each others softly. Natural components are also called traditional biotopes which are for example meadows, clearings, leas, pasturages and wooden pastures. Traditional vegetation is nature vegetation but human activities have affected to species abundances very lot.

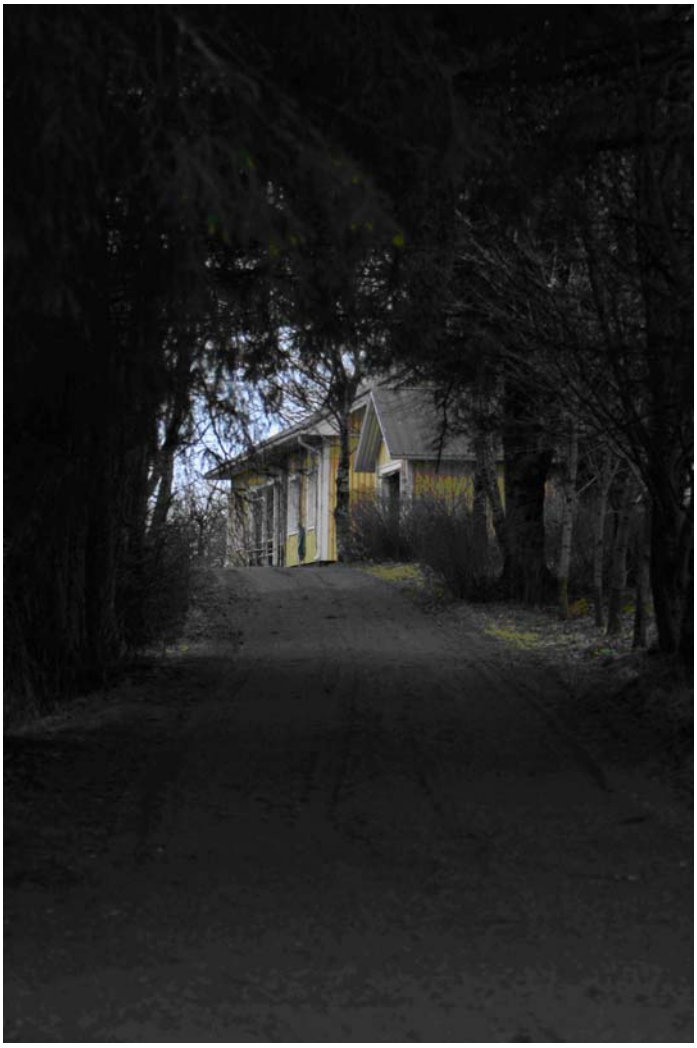
What kind of landscape is beautiful? It depends on appreciation, values and spirit of an era. Everyone sees landscape differently; some see an opportunity to exploit, to wander, to research, to enjoy or what ever. Many researches have proved that an open space with varying topography is the landscape that is most pleased for humans (Ahonen 2004, 11). Open landscapes are very important for quality of life. Nowadays those areas are disappearing in rural areas of Finland. Many of them are already forestated or are going to be forestated in future (picture 6). Earliest cultural historical marks on landscapes are monuments of antiquities that can be found from Heinävaara area. From the beginning of 17th century most important component has been agricultural component. Those were the days when permanent cultivation was started on the Heinävaara area. Slash and burn practices had played very important role in Eastern Finland and imprints are still found in landscape.



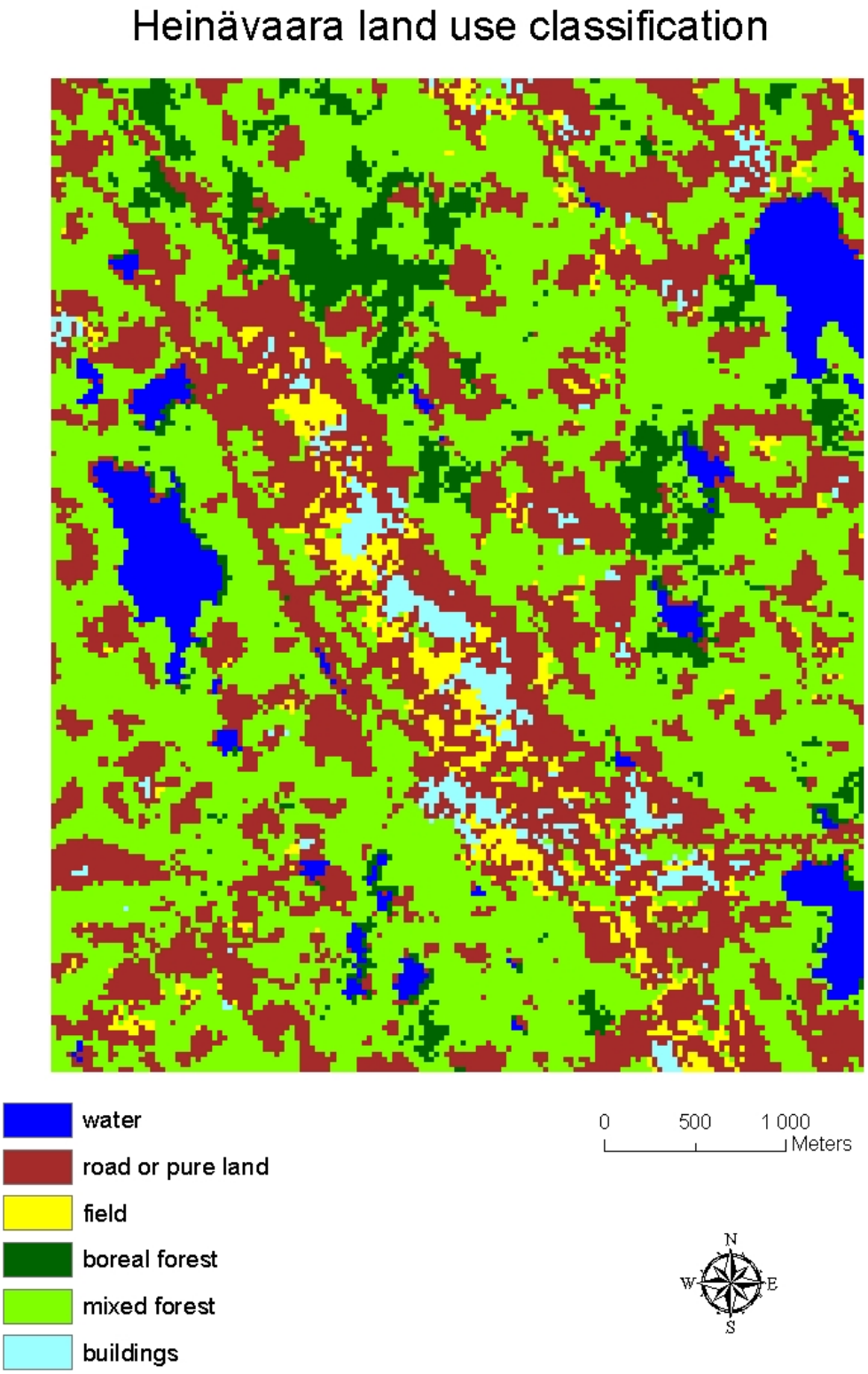
Picture 6: Vegetation change with naturalized vegetation index (NDVI) in Heinävaara area. (Picture: Eronen, S., Heinonen, M. & K. Metsola 2007; Maanmittaushallitus, Peruskarttalehti 4241 03)

6.6 Traditional agricultural landscapes

Agricultural landscapes are always made by human activities so it differs from natural environments (picture 7). When human culture and natural environment are put together sum is cultural environment where nature is not that totally enslaved under human power that is in the case of urban areas. Agricultural landscapes include farms and small villages, gardens, drying barns, granaries, cowsheds, meadows, tree avenues and spruce hedges, bush lined fields etc (picture 8). Traditional landscapes are formed by traditional ways of agricultural habits which contains both traditionally built constructions and traditional biotopes. Those traditional landscapes are made by pasturing or by mowing which has kept areas open. Different kinds of traditional biotopes are meadows, leas, wooden pasturelands, open fields made by slash and burn activities and slash and burn forests for example. Flora and fauna of those traditional biotopes are mostly endemic species migrating after the last ice age. Before human activities came dominion species were depended of natural disturbing factors like work of fire and wind. Humans don't have had very much to do about contents of species but has influenced mount of abundance.



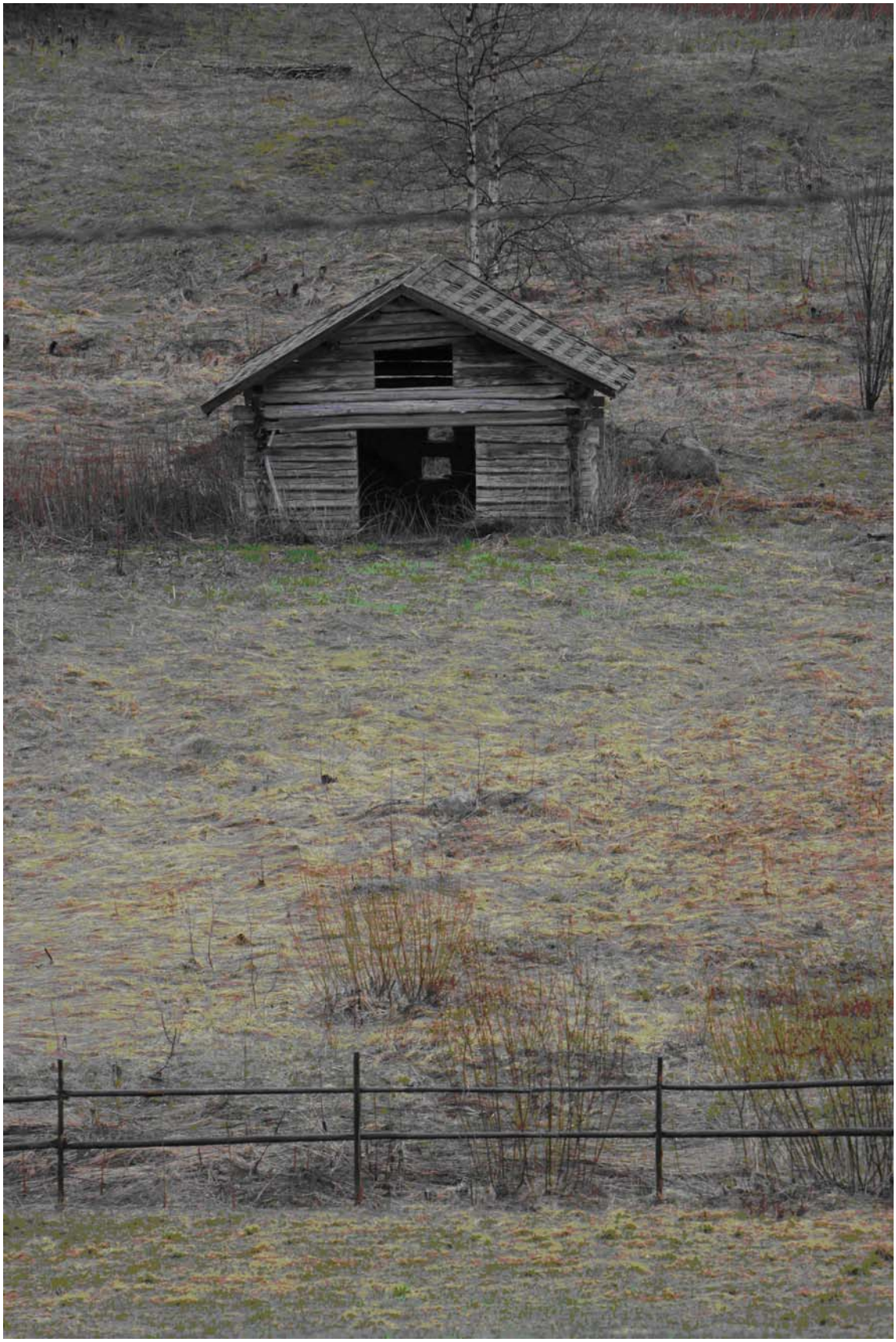
Picture 8: Old farm house with tree avenue.
(Picture: S. Eronen 2007)



Picture 7: Heinävaara land use classification. (M. Heinonen 2007)

In Finland agriculture was at first and for a long time mainly slash and burn practices, in particular eastern part of Finland. Slash and burn practices and tar burning have changed Finnish landscapes a lot, notably between 16th and 19th centuries (Tiainen 2004, 29). Tar burning was more common in Ostrobothnia than in Northern Karelia. After all those practices increased that much that government had to make a law which denied those practices (Lappalainen 1998, 72). Slash and burn practices are still seen in landscape as patches of deciduous forest with rich grass-herb vegetation, especially those areas are grown Betula pubescens and Betula pendula. Slash and burn practices were used in Heinävaara also, at first at top of the hill but when they need more pasturelands and slash and burn cycle came too intense, slash and burn activities were moved at bottoms of the hill. Anyway permanent settlements in North Karelian, hill villages at the head, were born when permanent cultivation started to become more common with accompany for slash and burn practises. (Entiset mänimet 2002, 24-29.)

After the World War II Finnish agriculture has gone trough great changes. Land use practices was intensified, agricultural chemistry developed, cultivation convention and improvement was advanced. Farms started to specialize but it did not mean monocultures like in United States for example. Those things has duplicate the agricultural productions. (Tiainen 2004, 33.) Spesialication has happened in farms but in regional scale too. For example, nowadays there is no more than every fourth farm which have cows, and 50 years ago 80 per cent of Finnish farms had cows. Traditional agricultural habits were common until the 1960s and that was also because of migration and settlement of Karelian people after the war (picture 9). After 1960s traditional agricultural biotopes has decreased dramatically which means drastic threat for biodiversity. Of course loss of traditional biotopes is not the only reason for decrease of agriculturally dependent species - subsurface drainage and decrease of ditches and bushes due to that, mechanization and so on has reason too – but it is the main reason. Traditional biotopes are second one when we are talking about the habitats of the Finnish endangered species, forests are the first one. Traditional biotopes are living habitat for approximately 28 per cent of our endangered species (421 of 1505 endangered species) (Pöyry, Heliölä, Ryttäri & Alanen 2004, 220; WWF 2007.) When Finland joined to European Union in 1995 agricultural practices has undergone new changes, which has decreased stock raising even more but it had have positive effects also like prevention of water pollution. But main threat for biodiversity is decrease of small farms which affects and leads reduce of traditional biotopes and landscapes. Keeping rural areas vital is fundamental for maintain traditional landscapes and biotopes and preserve hole gamut of species. The risk is noticed and is tried to prevent by making concessions to nature in farming habits, by paying agricultural environmental aids to farmers and also increase of ecological farming has been effective. To highlight the dramatic loss of the traditional biotopes there was more than two million hectares of those no more than one hundred years ago and now there is left only 1 per cent of that (19 000 ha) (Pöyry et al. 2004, 229-230; WWF 2007).



Picture 9: Traditional landscape: meadow and drying barn (Picture: Eronen, S. 2007)

6.7 Classification of the traditional biotopes

Traditional landscapes are formed by pasturing, grazing, mowing and pasturing in wooden lands. Those habits has kept environment open and sunny or at least well-lighted like are meadows and leas. In traditional agriculture cattle was grazing wooden pastures at spring and early summertime, and were allowed to go meadows not until the forage for winter had been gathered away (Ahonen 2004, 17). Until the end of 19th century in Finland there were more meadows than fields (Pöyry et al. 2004, 229). Traditional biotopes can be classified by vegetation or by land use method like are natural meadows, grass meadows, grazing meadows, wooden pastures and pasturages (Pykälä & Alanen 2004, 193-197; WWF 2007). Also there can be found traditionally built environments like historical buildings and monument of antiquities.

6.7.1 Open biotopes

Most of the traditional landscapes are different kind of open areas (Picture 10). That kind of meadows (if we here can call all of them as meadows) can be categorized by habitat, by vegetation, by humidity, by nutritiet contents and by limy of the surface (Pykälä & Alanen 2004, 192). Leas are meadows of dry sand or morainic or rocky habitats (WWF 2007). Old leas are usually distinguished by pillared Juniperus communizes, so they are called Juniperus leas. Leas are most common in Southern Finland (WWF 2007).

Fresh meadows are the most common traditional biotope and they were prevailing all over the country. Surface of the fresh meadows is more fertile and having better waters holding which guarantees fresher and more diverse vegetation. In traditional agriculture fresh meadows were very important grasslands. There are also waterside meadows riverside-, lakeside- and seaside meadows) which are naturally formed to lowland shores or to the shore sides that occasionally are left under floods. Mire meadows were quite important in Finland in past times to feed cattle. (Lappalainen 2002, 159; WWF 2007.) Clearings are open fields born after slash and burn cultivation. They are characterized by vegetation (for example Fragaria vesca and Bothrychium sp.) and by wooden fences and stone piles (Ahonen 2004, 15).

Picture 10: Meadow in Heinävaara (Picture: Metsola, M. 2005)

6.7.2 Wooden biotopes

Pasturages are enclosed wood-poor hey and grasslands (picture 11). Woods has been usually coppiced to improve grow of grasses and deciduous trees were promoted. Coverage of the trees is typically from 10 to 35 per cent of the area Pasturages sited normally near the farms and were meant to horses and heifers. (Ahonen 2004, 19; WWF 2007.) Pasturages are very important for Finnish landscapes rejuvenating wooden-intensive landscapes (Ahonen 2004, 20). Wooden pastures are basically unfenced wooden areas which are characterized by normal forest vegetation. Anyhow pasturing can be seen as increased grass production and little open areas turning to meadows. Wooden pastures are in contrast to forest management areas containing richer more diversiform species and varying aged woods. (Pykälä & Alanen 2004, 192-197; WWF 2007.) Coverage of trees is more than 35 per cent of the area (Ahonen 2004, 19). There has been only slight fellings in wooden pastures and they used to be good area to pick up fungi and because of quite amount of decomposing woods (Pykälä & Alanen 2004, 192-197). Slash and burn forest are born due to slash and burn practices which was established till 20th century. Those are nowadays deciduous forest (mainly Betula sp. and Alnus sp.) with rich grass-herb vegetation. Slash and burn forests are very important from preservation point of view. By pasturing slash and burn forests can be prevented not to become overgrown with Picea abies.

Picture 11. Pasturage, an example of traditional wooden biotope. (Picture: Metsola, M. 2005)

6.7.3 Built and other traditional landscapes

Traditional agricultural landscapes include also traditionally built buildings like houses, drying barns and granaries with the immediate surroundings (picture 12). Traditional landscape contains traditional farms and farmyards, small agricultural communities, gardens and tree avenues as well. Monuments of antiquity and old cemeteries, like old orthodoxian graveyard in Heinävaara are also traditional landscapes.

Picture 12: Built landscape from heinävaara (Picture: Eronen, S. 2007)

6.7.4 Endangered traditional biotopes and species

Traditional biotopes are most diversiform in flora of agricultural environment. From pastures and meadows there have been found about 30-40 plant species/m2. In regular field there are about 15 plant species/m2 and in organic fields there lives about 20 plant species/ m2. (WWF 2007.) In Finland there are valuable traditional environments only left about 19 000 hectares (Pykälä & Alanen 2004, 195). That is 1 per cent of the amount in the end of the 19th century. Meadows that have been mowed continuously are only left less than 10 hectares (WWF 2007). So situation is very alarming. That's why traditional landscape project was started. Project is trying to preserve this biotopes, species and landscapes that are telling a part of our national history and culture. To maintain traditional biotopes it is very important to take care of mowing, grazing and clearing. In Finland there are 1505 endangered species, 28 per cent of these are traditional biotopes species. Lepidoptera, Coleoptera, and Hymenoptera are most threatened groups (picture 13). In Finland we have lost 186 species, 51 of these species were traditional biotope species. (WWF 2007.) Overall it is very important to preserve these traditional biotopes to maintain biodiversity.

Picture 13. *Cupido minimus* (Family: Lycaenidae) is very rare (Picture: Metsola, M. 2005)

6.8 Conclusions

Pastures has came more rare because decrease of cattle and change in agricultural conventions. So that has led to loss of biodiversity because traditional biotopes are disappearing. Some species that have been quite common have became rarer because of the changes in habitats. For example Campanula sp., Fragaria vesca, Dianthus deltoides, Rubus arcticus, Gymnadenia conopsea and Potrychium sp. have been common plants before, but now those are getting much rarer (picture 14). (Metsola & Sieviläinen 2005). There are also some animal species that have gone down, for example these butterflies Coleophora lixella, Lycaena dispar and Melitea diamina. Nowadays some fields are forestated because declining of agriculture. Those forestated fields are ones with lots of stones and mostly they are located on the bottoms of the hill. Settlement used to be on the top of the hill, but now housing is concentrating in the SE part of the hill. Concentration of housing started to move there after 1960's when Joensuu-Ilomantsi highway was built and also economical structure started to change (picture 15). Slash and burn areas have changed to forest and clear cutting areas.

Pictures 14. Fragaria vesca, declined (left picture) and Bothrychium lunaria, very rare (right picture). (Pictures: Metsola, M. 2005)

The road, on the top of the hill, has been there for over 400 years. It has been very important during the days, but after Joensuu-Ilomantsi highway was built, it started to lose its meaning nationally but it is still very important for inhabitants of Heinävaara. Fields and overall view of the hill village have stayed mostly same. Also domestic animals have stayed same but the mount of cattle and horses for example has decreased a lot.

In a sense of cultural history, Heinävaara is one of the most valuable hill villages in the North-Karelia. The infrastructure of the general parcelling out of land time is still on the scenery. The borders of the estate across the hill, which has offered same condition to practise agriculture. The houses and their fields go like the strings both side on the way, which goes along the top of the hill. The road was the old horse way in the 17th century and changed to the highway in 1914. There are still old drying barns and granaries which are part of disappearing landscapes. On the side of the fields there used to be Alnus sp. and Betula sp. woods. Those and many old tree avenues and sprucehedges will bring alternation to the landscape and will work borders in the village structure. Heinävaara area is still characterized by great wide open sceneries. So in conclusion we can say that landscape hasn't changed that much but there have been great biological changes.

Picture 15. The old road over Heinävaara hill and old farm. (Picture: Eronen, S. 2007)

7. CONCLUSIONS. COMPARING MONTAGUT I OIX AND HEINAVÄARA TRENDS AND DINAMICS. SIMILARITIES AND DIFFERENCES

The first big differences between both studied areas we can see in evident form stays in the different geomorphologies and vegetation.

The materials of Montagut i Oix have been strongly creased and suffered faults during the Alpine orogenic movements, about 80-70 million years ago, after a large sedimentary period under the ancient Tetis Sea, where were formed the Alta Garrotxa calcareous rocks. The Alpine orogenic movements have origined high and acute mountains, as Pyrenees and the Alps, which haven't have time enough to be erosed. The present erosion processes in the zone are karstic, by rain water, configuring a quite complex orography, almost labyrinthic, with sudden high and low grounds between risen mountainous volumes and deep gorges.

The origin of the Fenoscandinavian relief is the Caledonian orogenic movements. Older than the Alpine orogeny, the erosion processes have configured a flat orography, where the prints of the glacial periods are everywhere. The area of Heinaväara belongs to old Karelian mountains which were formed 1.9 billions years ago and have been erosed down during long time. The materials are basically metamorphic. Heinävaara belongs to the arceic granit-gneiss and proterozoic micaschist area.

Continuing on the physical items, another big difference we can found is in the climatic items and in the associated vegetation. Both are strongly forested areas. If in Montagut i Oix we have a transition zone with Mediteranean and Central-European vegetation, Heinaväara has boreal vegetation. But, may be, the most important difference isn't only on the biological aspects, but also in the economic function of the forests, point we will explain later. Forests of both areas are strongly modified by human action, but in different senses.

The morphologic configuration, with the climatic differences, specially the Catalan micro climes, means to an aspect and altitudinal gradient conditioned vegetation in Catalunya, while the flat configuration of Suomi means to a uniform and extense unique kind of forests, except when there is a big hill. Then the spices are *Picea abies* in the North side and *Pinus sylvestris* in the other sides. The different bioregions have different spices, and by that the vegetal succession processes after pastoralism is finished are different. The succession in Catalunya starts with *Juniperus comunis* and *J. oxicedrus*, then the *Pinus sp*. and finally *Quercus ilex*. In Suomi starts with deciduous trees like *Salix sp.* and *Betula sp.* and later come the *Pinus sylvestris* and *Picea abies*.

Both kinds of forests have a common process of loss of biodiversity. The loss of opened spaces means the loss of associated spices.

As human geographic aspects we can put the accent in a common item: the depopulation processes occurred with different intensity in both areas. Montagut i Oix have suffered an intense depopulation process during the last century. The causes are the breaking of the economic base of the traditional live forms, the general decrease of the rents of the agro-forestry activities, the irruption of the intensive stockbreeding and agriculture and the attraction of the industrialized neighbour villages. The economic structures are having similar evolutions in Catalunya and Pohjois-Karjala, specially associated to the Common European Policies and the economic globalization. The human impact is decreasing in Montagut i Oix, while in Heinaväara and in all the zone is always visible. The changes here are not in the landscape, wich has not changed too much, but is in the great loss of biodiversity.

In the economic items is important to remark the historical different function of the forests, and its reflexion on its composition and evolution. The Alta Garrotxa forests, as a consequence of the abandonment process, are becoming natural and more

extense, but at the same time are becoming uniform in age, structure and composition, and continuous. They have loss its economic function. Related with the evolution of the abandoned rural areas, Suomi crops and pastures become often economic forests, highly productive. Actually, the forests in Suomi are the base of one of the most important industries.

At the same time, the rural tourism is increasing in both lands, which can help to keep peripheral areas occupied and so sustain a certain similarities with the traditional landscapes. The urbanization structure has important differences in the form of the villages and in the constructive materials. While villages in Alta Garrotxa are more compact and there are an important number of spreaded farm houses, villages in Pohjois-Karjala are more extended and broad. By the different natural resources, stone is the constructive material in Catalunya, and wood in Pohjois-Karjala. At the same time in Catalunya are much older because the constructive materials.

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